Steel Decarbonisation and Competitiveness: The Case for an Italian-German Dialogue

by **Alessio Sangiorgio** and **Pier Paolo Raimondi**

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Introduction

Over the past years, the European Union and its member states have been experiencing multiple crises that are shaking its core foundations. The sense of urgency was reiterated during the 2025 State of the Union by the European Commission President Ursula von der Leyen, who stated that "Europe is in a fight".[1] Besides freedom and democracy, the EU is in a fight for keeping alive its energy and climate trajectory. At the same time, policymakers and decisionmakers have been called to consider such trajectory in relation to productivity and economic gains. The European Commission and member states have increasingly called for plans aimed at ensuring competitiveness of European industries, which have been increasingly under stress due to trade tensions, China's rising exports, supply chains reconfiguration, high energy prices and decarbonisation imperatives. While some stakeholders, like incumbent industrial groups, demand slower and adjusted climate policies in the name of competitiveness, others highlight the potential benefit of a European clean energy transformation if social implications are properly addressed.

A relevant case study is the steel industry, which is of paramount importance for multiple reasons: economy at large, economic resilience, jobs, investments and emissions. Steel is a key basic metal used across multiple sectors, from construction and machinery to automotive and defence. The steel industry in Europe holds also a particular political symbolism as it has played a pivotal role in the European integration process, which started precisely with the European Coal and Steel Community in the aftermath of World War II. Draghi's Report on Competitiveness outlined the main reasons for the loss of competitiveness of

1 European Commission, *2025 State of the Union Address by President von der Leyen*, 10 September 2025, https://commission.europa.eu/node/42684_en.

the energy-intensive industries (EIIs), including the steel sector. The deteriorating international environment, due to the rise of tariffs and protectionist measures as well as the current and forecasted global overcapacity, exacerbates the fragilities of EU steel makers. The Commission is committed to revamping the industry, which led to the launch of the European Steel and Metals Action Plan in March 2025.[2] A strong and sustainable steel industry is vital also for Europe's energy and economic security as Europe has announced major expansion plans for its defence capabilities along with energy and digital ambitions. However, to achieve the goal, bold and serious policy measures are needed also in light of relevant trade-offs between protecting domestic production, downstream's access to cheap supply and managing outsourcing production.

The paper seeks to analyse Italian and German policy responses and measures to sustain decarbonisation efforts and regain competitiveness for their steel industry since they are the two largest European steel producers. Given the mounting challenges faced by European industries and countries, a coordinated response is very much needed. Therefore, the paper aims to find and present key areas of potential cooperation between the two countries at both bilateral and European levels.

1. The steel industry: The state of the art

The EU steel industry is widespread across 22 member states with more than 500 production sites, providing jobs to around 300 thousand people directly and 1.5 million indirectly.[3] The sector produced 129.6 million tons (Mt) of steel in 2024, corresponding to 7 per cent of global production.[4] However, the EU domestic production and its global relevance have declined over the past years. In 2017, the EU steel production was 160 Mt.[5] Although EU production is still able to cover most of consumption (90 per cent), the EU has moved from being a net exporter of finished steel products to being a net importer.

2 European Commission, *A European Steel and Metals Action Plan* (COM/2025/125), 19 March 2025, https://eur-lex.europa.eu/legal-content/en/TXT/?uri=celex:52025DC0125.
3 EUROFER website: Statistics, https://www.eurofer.eu/statistics.
4 EUROFER, *European Steel in Figures 2025*, June 2025, https://www.eurofer.eu/publications/brochures-booklets-and-factsheets/european-steel-in-figures-2025.
5 European Commission, *A European Steel and Metals Action Plan*, cit.

Since 2021, its steel trade deficit has widened significantly (10.7 Mt in 2024).[6] This is also due to a demand contraction in key sectors, such as construction, automotive and energy, following the 2008 crisis. Furthermore, the EU plays a significant role in the international trade in scrap, which is a critical input for secondary steelmaking. Over a decade, its scrap exports outside the EU increased by nearly 50 per cent: from 12 Mt in 2014 to 19 Mt in 2023. In 2024, scrap exports amounted to 16.2 Mt. As a consequence, the EU is the world's largest net exporter, accounting for 30 per cent of the world's scrap exported.[7]

Among member states, the two largest steel-producing countries are Germany and Italy, which account for 28.7 per cent and 15.4 per cent of EU steel production in 2024, respectively. Additionally, the two countries are also the largest consumers of steel in Europe (Table 1). In 2024, Germany produced 37.2 Mt of crude steel, while Italy produced 20 Mt. From a global perspective, Germany and Italy ranked as the world's seventh-largest and 12th-largest producers, respectively.

Table 1 | Key indicators of the steel industry in the EU, Germany and Italy in 2024

Key indicators	EU-27	Germany	Italy
Steel production (Mt)	129.6	37.2	20.0
Share of global output (%)	7	2	1
BF of total production (%)	55.4	70	16
EAF of total production (%)	44.6	30	84
Steel consumption (Mt)	127	27	15
Trade balance (Mt)	-15.0	+4.3	-3.5
Share of total emissions (%)	5	7	4.5
Emission intensity of steel production (tons of CO_2 per ton of steel)	1.8	1.2	0.7
GHG intensity of electricity generation (gCO_2e/kWh, in 2023)	207	320	250
Employment in 2024	298,012	78,000	30,822

Note: Trade balance represents net exports (+) net imports (-).
Source: Authors' elaboration on World Steel, EUROFER, WV Stahl, Federacciai, EEA and media reports.

6 In 2013, the trade balance of finished steel products amounted to +11 Mt.
7 Maury, Thibaut et al., "Analysis of the EU Steel Supply Chain: Current Trends and Circularity Opportunities", in *Raw Material Information System Briefs*, June 2025, https://publications.jrc.ec.europa.eu/repository/handle/JRC142660.

From an industrial perspective, the two vary in terms of production routes (see Box 1): Germany relies mainly on primary steelmaking blast furnaces-basic oxygen furnace (BF-BOF) (70 per cent of total steel production), while Italy focuses on secondary steelmaking based on scrap and electric-arc furnace (EAF) (84 per cent of total steel production) compared to the EU average (55.6 per cent BF-BOF and 44.4 per cent EAF). This difference is due to different resource endowment and industrial policy. For example, Italy has generally relied more on secondary steelmaking due to a lack of natural (coal) and financial resources. Therefore, the industrial landscape has been driven by private-led efforts, which also translated into a specific geography. Almost 90 per cent of Italian steel production is located in the northern regions, with only one BF-BOF plant in the south. By contrast, German steel production is well developed in the coal-rich Ruhr valley. In line with EU trends, both countries' steel production has experienced a reduction over the past years due to a challenging environment and general economic headwinds (see Figure 2). Indeed, the decline of steel demand has further weakened national steel production economics.

Box 1 | Overview of steel production routes

The BF-BOF method has historically been the main form of production globally. In this process, crude iron is smelted from iron ore in a blast furnace using coking coal as a reducing agent. The molten iron is then processed in a basic oxygen furnace to produce primary steel. It is the most carbon-intensive process – emitting (both directly and indirectly) on average 2.2 tons of CO2 per ton of crude steel, and it also emits significant amounts of particulate matter, such as sulphur dioxide (SO_2) and nitrogen oxides (NO_x), which contribute to air pollution and health problems.[8] BF-BOFs result in emissions at various steps, such as flue gas stacks at the hot blast stove and lime kiln, along with the combustion of gases in the coke oven, blast furnace and basic oxygen furnace. They are also highly energy-intensive, requiring around 22 gigajoule (GJ) per ton of crude steel.[9]

8 Institute for Energy Economics and Financial Analysis (IEEFA), *The Facts about Steelmaking Steelmakers Seeking Green Steel*, June 2022, https://ieefa.org/sites/default/files/2022-06/steel-fact-sheet.pdf; RINA Services, *Dichiarazione ambientale Centrale di Taranto 2024-2027*, 3 June 2025, https://acciaierieditalia.com/media/fm/source/Documenti/Dichiarazione%20Ambientale/Dichiarazione%20Ambientale%20Adl%20Energia%202024-2026_compressed.pdf.

9 IEEFA, *The Facts about Steelmaking Steelmakers Seeking Green Steel*, cit.

The EAF route produces steel by melting scrap. It is categorised as secondary steelmaking because of the recycled nature of these inputs, rather than the use of iron ores, although sometimes smaller shares of crude iron or direct reduced iron are mixed with the scrap. These materials are then melted using heat generated by an electric arc. As the process does not involve the reduction of iron ore, it requires substantially less energy than primary steelmaking, around 5.2 GJ per ton of crude steel.[10] Emissions associated with EAF production are therefore lower, although they vary significantly depending on the carbon intensity of the electricity used. EAFs do generate direct CO_2 emissions via their natural gas-fuelled burners and the oxidation of the graphite electrodes, although these levels are quite limited.[11] Secondary steel's physical properties are often not suited for applications that demand high purity, ductility and surface quality, such as automotive components and non-oriented electrical grades.

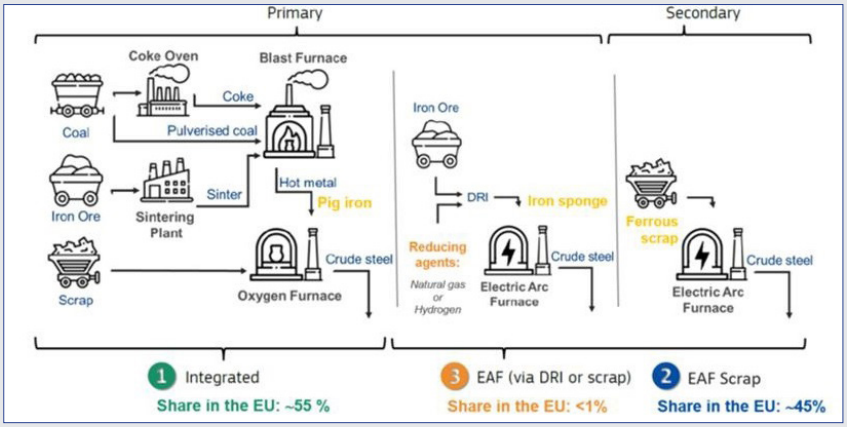
A third production route is direct reduction of iron (DRI). In this process, oxygen is removed from iron ore without melting it and without the use of coking coal, relying instead on natural gas as a reducing agent – although hydrogen may be a substitute. The resulting DRI is then processed in an EAF, resulting in primary steel. Although the DRI process is more energy-intensive than the BF-BOF route, it is considerably less carbon-intensive, as the use of natural gas instead of coke reduces CO_2 emissions by roughly 20 per cent. This reduction may be lowered even more by using hydrogen, depending, however, on the carbon footprint of the electrolysis process used to obtain it. Additionally, the DRI-EAF route requires iron ore pellets with low impurities, typically over 67 per cent iron (Fe) content, which are less available compared to the lower-quality ores used in BF-BOF or scrap used in EAF processes.[12]

10 Ibid.

11 Muslemani, Hasan, "Stainless Green: Considerations for Making Green Steel Using Carbon Capture and Storage (CCS) and Hydrogen (H2) Solutions", in *OIES Papers*, May 2023, https://www.oxfordenergy.org/?p=46152.

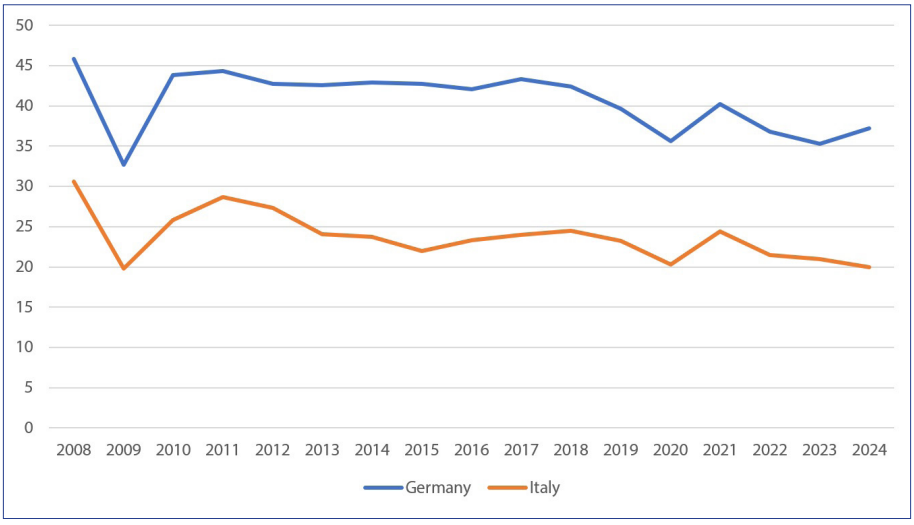
12 Witecka, Wido K. et al., *15 Insights on the Global Steel Transformation*, Berlin/Wuppertal, Agora Industry/Wuppertal Institute, June 2023, https://www.agora-industry.org/publications/15-insights-on-the-global-steel-transformation.

Figure 1 | EU steel value chain and crude steel production shares by process



Source: Maury, Thibaut et al., "Analysis of the EU Steel Supply Chain", cit.

Figure 2 | Steel production in Germany and Italy, 2008-2024, Mt



Source: Authors' elaboration on EUROFER, WV Stahl, Federacciai data.

Italy's steel sector has suffered three major weaknesses: the crisis of the integral cycle; the consequent reduction in production volumes of flat steels; and the

difficulties in finding raw materials and the energy costs (see next section).[13] The chronic challenges of primary steelmaking in Italy, with the illustrative case of Taranto, have resulted in a limited contribution of primary steelmaking (less than 15 per cent of national output) and consequently a reduction of flat products. Tightening output is also driven by a decrease of industrial production in key sectors, such as the automotive one. In terms of steel-consuming sectors, around 60 per cent of national steel demand is concentrated in construction, industrial machinery, automotive, energy and electronics.

Germany and steel have a long history. Germany was already a leading global producer in the 1960s. For Germany, steel holds a very strategic role not only because it is one of the largest producers, but also because the wellbeing and competitiveness of the domestic steel industry are critical for its export-led economic model. Indeed, steel is an essential element for many downstream sectors that have powered German economic growth and trade balance surplus. Two-thirds of German manufacturing is related to steel-intensive industries. For example, construction (33 per cent of steel demand), automotive (28 per cent) and machinery (13 per cent) are the largest steel consumers. Unsurprisingly, steel competitiveness and decarbonisation are a key priority for Berlin. This condition is further reinforced by the considerable socio-political weight of the industry. However, production has experienced a downward trend, recording a 20 per cent reduction in 2024 compared to the early 2000s. As a consequence, capacity utilisation rates dropped from over 90 per cent in the 2000-2009 period to 85 per cent in the 2010-2019 period and just 74 per cent in the current decade.[14] Such a worrying trend is also driven by a decline in national steel demand due to economic headwinds in recent years. Although in 2025 Germany announced a military and infrastructure expansion plan through public debt, it is likely that steel demand will remain low in other sectors such as the automotive industry and mechanical and plant engineering.[15] Italy, in addition to a slowdown in its own manufacturing and

13 Carriero, Alberto et al., "The Italian Steel Industry across National and European Challenges: What Prospects for Development?", in *CDP Briefs*, 2024, https://www.cdp.it/resources/cms/documents/CDP-Brief-Italian-Steel-Industry-ENG.pdf.

14 Kędzierski, Michał, "A Fragile Future: Decarbonisation of Germany's Steel Sector", in *OSW Commentaries*, No. 689 (17 September 2025), https://www.osw.waw.pl/en/node/33451.

15 Fritsch, Manuel et al., *Wertschöpfungskette Stahl: Nachhaltigkeit im internationalen Vergleich*, Köln, IW Consult, 12 August 2022, https://www.iwconsult.de/projekte/wertschoepfungskette-stahl-nachhaltigkeit-im-internationalen-vergleich; German Federal Ministry of Finance and Federal Ministry

its related decline in steel demand, is also affected by mutual interdependency with Germany.[16] Indeed, the drop in German domestic consumption of rolled steel has spilled over to Italy, which, on average, annually exports around 20 per cent of its steel products to Germany.[17]

Alongside competitiveness concerns, both countries need to push forward decarbonisation as they have committed to net-zero targets, also enshrined into EU law by the EU Climate Law. Furthermore, the steel sector is expected to be further pushed to decarbonise by the EU ETS, especially after 2030. Therefore, the steel sector is expected to play a critical role in reaching national and EU climate targets by addressing its environmental impact as it accounts for 7 per cent of German total emissions and 4.5 per cent of Italy's total emissions (5 per cent of total EU emissions). From an environmental perspective, Italy benefits of the lowest emission intensity rate among the world's top producers precisely because of its reliance on EAF. Steel transformation is related also to economic and industrial decisions as companies need to decide whether to reinvest in outdated, polluting technology (BF-BOF), invest in cleaner and low-carbon-emission alternatives (EAF and H_2-DRI) or move the production abroad. Decarbonising the steel industry requires a profound overhaul through multiple solutions (see Section 4). Companies can pursue energy efficiency and process optimisation, fuel switching and, ultimately, breakthrough technologies, such as hydrogen and carbon capture utilisation and storage Additionally, companies can pursue additional measures on the demand side, such as material efficiency and circular economy, to further mitigate emissions. The two countries have set climate targets in their national energy and climate plans. Renewable capacity, mainly solar, is expected to increase drastically in both countries: from almost 190 GW in 2024 to 360 GW by 2030 in Germany

for Economic Affairs and Energy, *German Medium-Term Fiscal-Structural Plan 2025-2029*, August 2025, https://www.bundesfinanzministerium.de/Content/EN/Standardartikel/Press_Room/Publications/Brochures/medium-term-fiscal-structural-plan.html; WV Stahl, *Weltweite Stahlnachfrage: Deutschland weiter Schlusslicht unter den Industrieländern*, 17 October 2025, https://www.wvstahl.de/?p=37529.

16 Alessandra Migliaccio, "Italy's Industry Production Slumps Most in 2025 as Economy Slows", in *Bloomberg*, 10 October 2025, https://www.bloomberg.com/news/articles/2025-10-10/italy-s-industry-production-slumps-most-in-2025-as-economy-slows; Confindustria, *Italy-Germany: Solid Ties but Recession and Inflation Put Trade Growth at Risk*, 11 September 2023, https://www.confindustria.it/en/?p=7400.

17 Istat, *Rapporto sulla competitività dei settori produttivi. Edizione 2025*, March 2025, https://www.istat.it/?p=89697; Carriero, Alberto et al., "The Italian Steel Industry across National and European Challenges", cit.

and 61 GW today to 131 GW in 2030 in the case of Italy. Given its significant reliance on BF-BOF Germany has taken the lead on hydrogen as it seems the technological option to decarbonise the primary steelmaking.

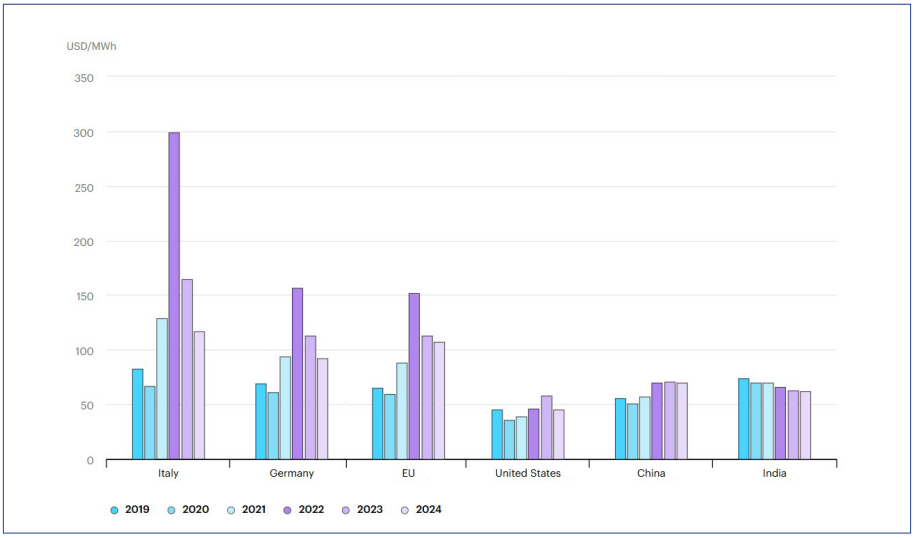
2. Short-term and long-term challenges

The two countries, and the EU as a whole, have experienced a decline relative to Asian countries. However, today the steel industry has been squeezed by multiple challenges that threaten its competitiveness and role both in the short and long term. These challenges regard mainly higher costs, global overcapacity and rising trade tensions.

2.1 High costs: Energy, CO_2 prices and green investments

Regarding high costs, the sector has been squeezed between high energy costs, carbon costs and large investment needs to decarbonise. From the energy cost perspective, the EU has been suffering a comparative disadvantage vis-à-vis other producing countries since the outbreak of the 2021/22 energy crisis. In 2022, industrial electricity prices jumped up to 300 dollar/MWh in Italy and around 160 dollar/MWh in Germany (see Figure 3). Since energy costs comprise a large share of production costs, such a price gap represents the main challenge at the global stage in the short term. Prior to the crisis, this share was 17 per cent of production costs for EU steel producers, while these figures skyrocketed up to 80 per cent during the 2021/22 energy crisis. Despite a reduction in 2024, EU energy prices remain well above vis-à-vis major competitors. For example, US and Chinese producers still benefit from prices that are two to three times lower. At the same time, energy price gaps are becoming relevant also among EU member states. Italy has traditionally suffered from higher energy prices compared to its European peers. This condition has been exacerbated during the energy crisis, when Italian electricity prices were almost double German rates. By 2024, average prices had fallen to about 120 dollar/MWh for Italy and 95 dollar/MWh for Germany.

Figure 3 | Estimated final electricity price for large industrial customers in energy-intensive industries, 2019-2024



Source: IEA, *Estimated Final Electricity Price for Large Industrial Customers in Energy-Intensive Industries, 2019-2024*, last updated 12 February 2025, https://www.iea.org/data-and-statistics/charts/estimated-final-electricity-price-for-large-industrial-customers-in-energy-intensive-industries-2019-2024.

As energy systems – and steelmaking – are expected to rely increasingly on electricity, electricity prices (and regional variations) are expected to become a key ingredient for costs and competitiveness for the industry. This marks a drastic and fundamental shift from the current condition based on the global markets of coke and coal where competitiveness has mainly been based on operation efficiencies. Indeed, steel production costs were historically driven by iron ore and coking coal costs. Additionally, higher electricity taxes compared to gas taxes further discourage consumers from switching towards electrification.

Alongside energy prices, EU steel producers pay also higher carbon costs, which are carbon prices under the EU emission trading system (ETS). EU CO_2 prices have increased since 2019, overtaking the 100 euro/tonne threshold in 2023. Nonetheless, CO_2 costs represent a small share of total production

costs for EU steel producers (2 per cent in 2019).[18] Furthermore, EU industries have been benefiting from free allowances to avoid competitiveness loss. Particularly, EIIs have benefited from a more favourable treatment than the rest of manufacturing, with a higher share of free ETS allowance over total emissions (82 per cent) compared to the rest of manufacturing (21 per cent) during the period 2005-2020.[19] More specifically, EU steelmakers have received around 54.6 billion euros in free allowances since 2005, based on Steel News calculations.[20] While carbon pricing induces companies to invest in mitigation measures, such a signal is partially undermined by free allowances. However, this benefit is expected to gradually phase out towards 2035 as the EU Carbon Border Adjustment Mechanism (CBAM) kicks in. Once the EU CBAM fully starts, competitiveness will be based on the emission intensity of steel production.

In this scenario, companies need to step up in decarbonising their operations, which, however, requires large amounts of investments and entails higher operating costs. To transform the steel industry, investment needs are estimated at around 100 billion euros between 2031 and 2040 according the 2040 EU Climate Target Plan. The investment cost for an H_2-DRI-EAF facility is estimated at 574 euros per tonne of capacity, approximately 30 per cent higher than that of a new BF-BOF operation.[21] The capital-intensive effort to transform and decarbonise steel production (especially BF-BOF) clashes with the absence of enough low-carbon hydrogen supply as well as the definition of and demand for green steel. The decarbonisation effort and the required financial support might be challenging at a time of competing and "conflicting" expenditure needs (e.g., defence, artificial intelligence, space), fiscal discipline pressure and a complex, fragmented funding framework. Although there is no lack of available funds at the EU level (e.g., InvestEU, Innovation Fund, Horizon Fund, Modernisation Fund, Recovery and Resilience Facility) and the member state level, often these funds are not well integrated and are overly narrow.

18 Draghi, Mario, *The Future of European Competitiveness. Part B, In-depth Analysis and Recommendations*, September 2024, https://commission.europa.eu/node/32880_en.

19 Dechezleprêtre, Antoine et al., "A Comprehensive Overview of the Energy Intensive Industries Ecosystem", in OECD Science, Technology and Industry Working Papers, No. 2025/09 (June 2025), https://doi.org/10.1787/bbf7d4c2-en.

20 Gerber Group, "How Do EU Steel Makers Really Earn Their Money?", in *The Stainless Espresso*, 18 December 2024, https://steelnews.biz/?p=11786.

21 OECD, *OECD Steel Outlook 2025*, Paris, OECD Publishing, 2025, https://doi.org/10.1787/28b61a5e-en.

Additionally, the EU has traditionally funded mainly capital expenditure. By being largely CAPEX-focused, EU and national funds have limited space to support a business case for decarbonised efforts to scale up in a harsh environment.

2.2 Oversupply, trade fragmentation and global competition

The erosion of competitiveness due to higher energy prices has become an even more acute issue given the worsening of international trade. Trade tariffs and subsidies, and industrial policy measures in general, have overtaken free trade and tariff reduction within WTO countries over the past years. Furthermore, while EU steel production declines, global production has soared mainly underpinned by large producing countries like China and India. Global output has grown from 1,148 Mt in 2005 to 1,885 Mt in 2024. In 2023, oversupply was estimated at more than 611 Mt, which corresponds to a global capacity utilisation of 76 per cent. According to the OECD, this trend will only worsen as global capacity is expected to outpace global steel demand resulting in an increase of the capacity-demand gap to 721 Mt by 2027 (five times the EU's steel production).[22] Furthermore, the expected oversupply could put additional, enormous pressure on steelmakers as capacity utilisation could decline towards 70 per cent.[23] Rising import penetration contributes to depress utilisation rates, leading to high unit costs for production due to fixed costs of operating steel plants. Furthermore, this level of additional capacity comes also with environmental concerns as most of the 165 Mt of new capacity underway or planned (2025-2027 period) is mainly based on carbon-intensive BOF routes in Asia (67 Mt). This trend puts further pressure on the financial sustainability of green steel projects in Europe and abroad. Furthermore, new countries, such as in the Middle East and North Africa region, have increasingly invested in expanding steel production as well as green steel, positioning themselves as key steel players.[24]

22 Ibid.
23 Ibid.
24 E3G, *The State of the European Steel Transition*, March 2025, https://www.e3g.org/?p=31028.

Alongside global overcapacity and new players, the European companies have been struggling with rising trade and protectionist measures exacerbated by their historical ally and main export market, the United States. Donald Trump's second term has been characterised by the extensive use of tariffs. The US increasingly imposed tariffs of 25 per cent on steel (and aluminium) imports in March 2025, and a 50 per cent tariff in June. In August, the European Commission signed a heavily criticised deal with the US that set 50 per cent tariffs on EU steel.[25] Although the Commission defended the general outcome, the deal remains problematic for the EU steel industry, which is further affected by an additional 15 per cent tariff on most other products with a negative effect on many other steel-intensive exports, such as machinery and vehicles.[26] The US-EU joint statement allows for the possibility of cooperating on ring-fencing their respective domestic markets from global overcapacity, through tariff rate quota solutions. Given the economic burden for EU steel producers, the Commission is working with the US to remove tariffs on products made from steel.

The EU steel industry faces major challenges – especially in the short term – from the competitiveness standpoint. Higher costs compared to global competitors put European producers in a weaker position also in light of expected expansion of global overcapacity. Currently, the average utilisation rate is around 65 per cent, which is unsustainable in the long run. A further drop in European steel production could exacerbate negative socioeconomic consequences, such as job losses. Since 2008, the EU has seen a reduction of 90,000 jobs in the sector, with a further drop of 18,000 jobs announced in 2024 alone. Both the EU and national governments will need to reconsider their social and just transition plans to address additional job losses (or relocation) also by streamlining and adjusting EU and national funds.[27] As the EU regulations and targets give a clear signal for decarbonising the industry, stakeholders at large need to navigate and manage the transition. Powered by renewables and low-

25 USA and EU, *Joint Statement on a United States-European Union Framework on an Agreement on Reciprocal, Fair and Balanced Trade*, 21 August 2025, https://policy.trade.ec.europa.eu/node/1881_en.
26 EUROFER, *EU-U.S. Statement: Co-operation on Steel Is Intentionally Confirmed but Uncertainty Remains as 50% Tariff Continues*, 21 August 2025, https://www.eurofer.eu/press-releases/eu-u-s-statement-co-operation-on-steel-is-intentionally-confirmed-but-uncertainty-remains-as-50-tariff-continues.
27 Raimondi, Pier Paolo, *European and Italian Just Transition Policies amid Industrial Decarbonisation and External Policies*, Rome, IAI, April 2025, https://www.iai.it/en/node/19900.

carbon technologies, such as hydrogen, countries may see an alteration of the steel geography. Besides social concerns, this outcome is often opposed due to industrial, quality (e.g., for the automotive industry[28]) and resilience concerns.[29] For example, defence capability expansion plans will require steel volumes to be translated into concrete projects. Countries will need to balance between domestic and imported steel volumes to ensure economic security and steel quality. According to some estimates, 10,000 tanks amount to 0.5-0.6 Mt of steel (equal to only 0.6 per cent of EU primary steel production and 0.4 per cent of total steel production). To ensure economic resilience, the EU could rely on hot briquetted iron imports to preserve some domestic steel production aligned with climate targets.[30]

3. EU and national policy responses

Given the mounting challenges for EU industry, governments and stakeholders at large have started to explore measures to sustain EIIs especially. As mentioned, the European Commission has taken several measures to address multiple challenges faced by the steel sector. In February 2025, the Commission proposed the Clean Industrial Deal (CID), building on the Draghi Report. The CID goal is to create a business case for Europe's clean industrial transformation. To do so, the CID focuses on six drivers: affordable energy, lead markets, financing, circularity and access to materials, global markets and partnerships, and skills. The CID has been followed by the Action Plan for the Steel and Metals Industries[31] and the launch of a Strategic Dialogue on the Future of Steel in March 2025.[32] In line with the new, general policy framework, the Action Plan objectives are to ensure affordable and secure energy supply; prevent carbon leakage; promote and protect European industrial capacities;

28 SteelWatch, "Why the Auto Industry Doesn't Need Blast Furnace Steel", in *SteelWatch Explainers*, January 2025, https://steelwatch.org/?p=3775.

29 Johansson, Per-Olov and Bengt Kristrom, "'Green' Steel Investments in the EU: Pie in the Sky?", in *Resource and Energy Economics*, Vol. 82 (May 2025), Article 101494, https://doi.org/10.1016/j.reseneeco.2025.101494.

30 Johnson, Constantin et al., "Emerging Green Steel Markets Surrounding the EU Emissions Trading System and Carbon Border Adjustment Mechanism", in *Nature Communications*, Vol. 16 (2025), Article 9087, https://doi.org/10.1038/s41467-025-64440-9.

31 European Commission, *A European Steel and Metals Action Plan*, cit.

32 European Commission, *President von der Leyen Launches Strategic Dialogue on the Future of the Steel Sector*, 3 March 2025, https://ec.europa.eu/commission/presscorner/detail/en/ip_25_676.

encourage circularity; de-risk decarbonisation; and protect quality industrial jobs. Given this new politico-economic framework, the EU and member states need to design policy measures and regulatory frameworks that reconcile industrial competitiveness and decarbonisation.

National governments and EU institutions have been working on measures aimed at improving competitiveness and providing some relief for industries squeezed by high (energy) costs. Consequently, the first concern is obviously how to reduce energy prices for the European industries in the short and medium term. Along with the CID, the Commission presented an Action Plan for Affordable Energy, which envisages several measures to reduce energy prices, such as power purchase agreements (PPAs), reducing energy taxes and levies, accelerating permitting as well as more efficient network charges. However, governments need to carefully consider how to redesign energy prices, levies and taxes in favour of industries to avoid negative consequences for other consumers, such as households and small and medium enterprises.

The Commission and many member states have taken steps to review public aid through the EU ETS compensation mechanism. For example, the Commission approved the removal of the maximum aid intensity factor of 75 per cent within the ETS compensation mechanism for Germany in July 2024.[33] As result, German companies are expected to receive 100 per cent of compensation for indirect emission costs incurred between 2023 and 2030. This measure corresponds to an additional subsidy of 10-15 euros/MWh. By contrast, Italy budgeted an initial mechanism at 140 million euros per year, which corresponded to a compensation of 25 per cent of the maximum aid in 2024. However, this is expected to increase above 50 per cent in 2025.[34]

Moreover, the European Commission and governments have also increasingly relied on the use of state aid[35] to ensure some economic relief to the industrial

33 European Commission, "Commission Approves Amendments to German State Aid Scheme to Compensate Energy-Intensive Companies for Indirect Emission Costs", in *Daily News*, 2 July 2024, https://ec.europa.eu/commission/presscorner/detail/en/mex_24_3603.

34 International Energy Agency (IEA), *Electricity 2025*, 14 February 2025, https://www.iea.org/reports/electricity-2025.

35 The State Aid Regulatory Framework: Guidelines on State Aid for Climate, Environmental Protection and Energy (CEEAG) replaced previous guidelines for environmental protection and energy (EEAG) which expired on 31 December 2021. For a legal overview, see: EUI Florence School of Regulation (FRS),

sector. Particularly in the aftermath of Russia's invasion of Ukraine, the Commission adopted a Temporary Crisis Framework (TCF), which allowed aid to compensate for high energy prices (section 2.4). The TCF became the Temporary Crisis and Transition Framework (TCTF). The goal was to accelerate the installation of renewables and facilitate decarbonisation of industrial processes. Under the new framework, the Commission approved Germany's aid to ThyssenKrupp for its tkH_2Steel project. The TCTF has been replaced by the Clean Industrial Deal State-Aid Framework (CISAF), adopted by the Commission in July 2025. The CISAF aims to enable governments to support industrial decarbonisation and will be in place until the end of 2030.[36] Despite such objective, the CISAF does not adequately address the structural challenges and fundamental political-economic questions, along with the potential risk of market fragmentation caused by an excessive use of state aid, given different fiscal spaces at the national level.[37] Furthermore, the Commission set out seven specific actions to be implemented in cooperation with member states to bring energy prices down.[38]

The new general policy framework seeks to combine industrial competitiveness with decarbonisation as outlined by the CID. Indeed, despite challenges and concerns, decarbonisation remains an industrial opportunity and commitment not only for European producers. More than 90 per cent of global steelmaking capacity is located in countries that have announced net-zero targets. To further decarbonise steel production, it is of paramount importance to accelerate the decarbonisation of the power sector by installing renewables and low-carbon capacity as well as investing in the grid infrastructure. Again, the use of PPAs and CCfD (carbon contracts for difference) mechanisms is being considered and pursued by national governments. Germany has inaugurated the use of a CCfD mechanism, which aims at covering both capital and operating expenses over

State Aid and Industrial Decarbonisation, 28 July 2025, https://fsr.eui.eu/?p=45593.

36 European Commission, *New State Aid Framework Enables Support for Clean Industry*, 25 June 2025, https://ec.europa.eu/commission/presscorner/detail/en/ip_25_1598.

37 Centro Studi Confindustria, "Rates, PNRR, Superbonus, Energy: What Will Happen to Italian Growth? - Spring 2024", in *CSC Forecast Reports*, 17 April 2024, https://www.confindustria.it/en/publications/pnrr-superbonus-energy-rates-what-will-happen-to-italian-growth-spring-2024.

38 European Commission DG for Energy, *Commission Steps Up Efforts to Lower Energy Prices with a Set of Actions to Bring Relief to Industries and Consumers*, 21 October 2025, https://energy.ec.europa.eu/node/6858_en.

15 years.[39] Furthermore, the German government has launched a 6-billion-euro funding initiative aimed at industrial decarbonisation for EIIs, including carbon capture and storage (CCS).[40] Through 15-year contracts, the government will subsidise costs for decarbonisation, while shielding from volatile energy and carbon prices. Italy has adopted and amended its Energy Release mechanism, approved by the Commission. Through the mechanism, EIIs can benefit from power supply at a fixed price (65 euros/MWh rather than 113 euros/MWh) for a period of 36 months in exchange for the commitment to build clean energy generation[41] within 40 months to reinject in the system over the 20-year period.[42] The new decree envisages a clause that avoids any over-remuneration of the investment at the end of the 20 years.[43] However, the adoption of PPAs for EIIs has been slowed by multiple factors, including high prices, expensive counter-party risk and competition with less energy-intensive firms. Therefore, many steel producers have struggled to sign PPAs also because of strong market volatility that affects their ability to ensure long-term viability of their products.[44] To partially address this issue, the Commission has launched in collaboration with the European Investment Bank (EIB) a 500-million-euro pilot programme to support the take-up of more corporate PPAs.

To encourage investment in green steel production, the EU and member states would need to stimulate domestic demand by creating lead markets and requirements. The Action Plan envisages the creation of lead markets to foster green steel, although with a high level of abstraction.[45] A major barrier is the lack of shared definition of what "low-carbon emissions steel" is. This weakens the creation of a clear price signal for "green premium" products and undermines

39 Parodi, Julian and Parul Kumar, "Ironing out the Transformation of EU Steelmaking: Actionable Pathways for Climate Neutrality", in *EPICO Policy Reports*, December 2024, p. 14, https://epico.org/en/publications/ironing-out-the-transformation-of-eu-steelmaking-actionable-pathways-for-climate-neutrality.

40 "Germany Launches 6 billion Euro Industrial Decarbonisation Program, Includes CCS Technology", in *Reuters*, 6 October 2025, https://www.reuters.com/sustainability/climate-energy/germany-launches-6-bln-eur-industrial-decarbonisation-program-includes-ccs-2025-10-06.

41 At least 200 kW of new solar PV, wind or hydropower capacity.

42 Gestore dei servizi energetici (GSE) website: *Energy Release 2.0* (in Italian), https://www.gse.it/servizi-per-te/energy-release/energy-release-2-0.

43 Enerdata, *Italy Amends Its Energy Release 2.0 Mechanism for Energy-Intensive Companies*, 31 July 2025, https://www.enerdata.net/publications/daily-energy-news/italy-amends-its-energy-release-20-mechanism-energy-intensive-companies.html.

44 Parodi, Julian and Parul Kumar, "Ironing out the Transformation of EU Steelmaking", cit., p. 16.

45 WV Stahl, *Statement on the European Steel and Metals Action Plan*, 20 March 2025, https://www.wvstahl.de/?p=36575.

companies' green steel investments, such as in the case of ArcelorMittal and Thyssenkrupp. Among countries, a variety of definitions have emerged.[46] For example, German WV Stahl has developed the Low Emission Steel Standard (LESS) based on the principles outlined by the IEA report requested by the German G7 Presidency in 2022.[47] The LESS methodology, however, covers also downstream processes. It adopts a cradle-to-gate approach, excluding downstream emission. By contrast, Federacciai proposed a dual-system approach, combining a carbon footprint index and a decarbonisation effort index as a conceptual exercise. The former is intended for green procurement purposes, while the latter should be used to get incentives and access to sustainable funds.[48]

Once definitions have been addressed, a further tool for the creation and development of the green steel market is the strategic use of public procurement. Since it accounts for 10 per cent of the EU's total carbon footprint and corresponds to 15 per cent of the EU's GDP, public procurement can be a powerful tool of industrial and climate policy. This could be applied especially in some key sectors that are expected to see an increase of demand, such as defence.[49]

By the fourth quarter of 2025, the Commission was expected to present the Industrial Decarbonisation Accelerator Act (IDAA), whose goal is to accelerate the industrial decarbonisation – especially of the EIIs – while preserving competitiveness. The IDAA is expected to introduce resilience and sustainability criteria to promote European clean EII production, along with other measures to facilitate EII decarbonisation like faster permitting. In her 2025 State of the Union speech, President von der Leyen referred to the initiative as the Industrial Accelerator Act (IAA), raising questions about a potential delay in adoption. Moreover, the IDAA is expected to introduce a voluntary label on the carbon intensity of steel, which should help companies achieve a green premium for their products. Italy and Germany (together with France) expressed their

46 Blanco Perez, Sara et al., "Defining Low-Carbon Emissions Steel: A Comparative Analysis of International Initiatives and Standards", in *JRC Reports*, April 2025, https://doi.org/10.2760/4271464.
47 IEA, *Achieving Net Zero Heavy Industry Sectors in G7 Members*, Paris, IEA, May 2022, https://www.iea.org/reports/achieving-net-zero-heavy-industry-sectors-in-g7-members.
48 Blanco Perez, Sara et al., "Defining Low-Carbon Emissions Steel", cit.
49 Crawford, Anna, "Green Steel for European Defence: An Enabler for Decarbonisation, Competitiveness, and Security?", in *EPC Commentaries*, 3 July 2025, https://www.epc.eu/publication/green-steel-for-european-defence-an-enabler-for-decarbonisation-competitiveness-and-security.

shared priorities related to the IDAA, affirming that the Act should support EIIs in fostering investments, accelerating decarbonisation and circularity, while enhancing competitiveness.[50]

4. Enabling technological transformation pathways

To decarbonise the steel sector, countries and companies can explore different technological solutions and production routes given their peculiarities. The main ones are the conventional BF-BOF route, the secondary route based on EAFs and DRI. These routes vary in both their carbon intensity and in the steps at which emissions are released. They also present different degrees of energy intensity, require different energy vectors, stand at different technological readiness levels and entail different geopolitical and geoeconomics consequences (see Box 1).

For Italy, as steel production is already largely EAF-based, the main decarbonisation pathway is linked to the gradual substitution of fossil fuel electricity – especially natural gas – with low-carbon electricity. Renewable development in the country is showing some positive signs, with additional capacity in 2024 increasing by around 7.4 GW, exceeding the 2023 figure by 1.6 GW.[51] However, the goal of reaching 70 GW of new renewable capacity installed by 2030 could be hindered by a lack of enabling policies and slow permitting, as well as lower political commitment.[52] Steelmakers may directly support the push for clean sources in the national power mix through long-term PPAs, which may also help companies to stabilise volatility. A good example is the ten-year agreement between Acciaierie Venete and Iberdrola for 12 MW of solar capacity.[53] In addition to decarbonising electricity, the technological pathway

50 Germany et al., *Statement by Governments of France, Germany and Italy on the Planned EU Industrial Decarbonization Accelerator Act (IDAA)*, 29 September 2025, https://data.consilium.europa.eu/doc/document/ST-13273-2025-INIT/en/pdf.

51 Terna, *Electricity Consumption Increases by 2.2% in 2024*, 16 January 2025, https://www.terna.it/en/media/press-releases/detail/electricity-consumption-2024.

52 "Rinnovabili in Italia, mercato in calo del 29% nel secondo trimestre 2025", in *Materia Rinnovabile*, 17 August 2025, https://www.renewablematter.eu/rinnovabili-italia-mercato-in-calo-secondo-trimestre-2025.

53 Iberdrola, *Iberdrola and Acciaierie Venete Spa Sign an Off-Site PPA Agreement for the Supply of*

pursued in Italy is linked with the circularity of secondary steelmaking. Italy is well above the European average on raw material recycling, including ferrous scrap.[54] The common practice to recycle steel contaminated with other alloys involves diluting it with primary steel; however, due to the limited primary steel production in Italy, a better alternative would be to improve initial product design to facilitate the separation of copper from steel, particularly in sectors like automotive manufacturing.[55] Specifically, technical alternatives based on better end-of-life material management are available, which have the potential to build "closed loops" where steel is recovered from sectors that discard higher-quality scrap and reintroduce it into similar applications, to better ensure that the recycled steel meets the specific physical requirements of that sector.

Concerning decarbonisation pathways for Italy's primary steel production, the main uncertainty is related to the future of Taranto's output and profitability, which needs two key ingredients: clear ownership and a solid industrial policy in the long term. The facility has been at the heart of many political and business discussions, which have attempted to link plans for the facility with decarbonisation technological solutions and energy efficiency improvement. However, a lack of long-term planning has prevented the full exploitation of financial opportunities. Italy's National Recovery and Resilience Plan designated 1 billion euros to the company DRI d'Italia to promote a transformation pathway based on DRI, but while the plan initially foresaw the realisation of a DRI facility powered by green hydrogen by 2026, the investment was later divided into multiple payments, rather than a single one, to be made yearly up to 2029, delaying its realisation.[56] Nonetheless, in August 2025, the Ministry for Enterprises and Made in Italy managed to find an agreement with local stakeholders on a plan to build a DRI-EAF system powered by natural gas, which would supply reduced iron to EAF facilities in Taranto's former facilities.[57]

Renewable Energy, 11 July 2024, https://www.iberdrola.com/press-room/news/detail/iberdrola-acciaierie-venete-spa-sign-off-site-ppa-agreement-supply-renewable-energy.

54 Carapella, Piergiorgio, "Sustainability and Circularity of Italian Companies", in *Notes from the CSC*, No. 3/25 (10 March 2025), https://www.confindustria.it/en/publications/sustainability-and-circularity-of-italian-companies.

55 European Commission, *Just Transition Platform Working Groups. Action 15: Strategies for Increasing Material Efficiency and the Use of Secondary Steel*, December 2023, https://eeb.org/?p=114116.

56 Italy, Law decree No. 19 of 2 March 2024: *Ulteriori disposizioni urgenti per l'attuazione del Piano nazionale di ripresa e resilienza (PNRR)*, https://www.normattiva.it/uri-res/N2Ls?urn:nir:stato:decreto.legge:2024-03-02;19.

57 Italian Ministry of Enterprises and Made in Italy, *Ex Ilva: svolta al Mimit. Firmata l'intesa tra le*

Despite the positive development, actual realisation remains dependent on technical feasibility studies and business decisions by the new owner.[58] At the same time, ownership offers will need to meet a series of decarbonisation conditionalities set by the government.[59] Given costs and political acceptance, natural-gas-based DRI is likely to be favoured in comparison to hydrogen-based especially in the short and medium term. Nonetheless, some Italian steel companies are testing small-scale hydrogen-related production with a focus on steel processing stages rather than manufacturing, as in the case of Tenaris' Bergamo plant.[60]

Traditionally, Germany has looked at hydrogen as a technological solution to transform its BF-BOF facilities into DRI-EAF ones.[61] Although EAF is also promoted and under consideration, its development is met by concerns regarding steel and scrap quality in line with the requirements of Germany's key manufacturing sectors, such as the automotive one, that can be met by secondary production only if scraps used are of high quality and not mixed with lower grades with greater impurities. Therefore, the goal is to prevent an excessive reduction of primary production.[62] This approach has been pursued in coordination between public authorities and major steel producers since 2020 with Chancellor Merkel's Steel Action Concept[63] and later reinforced under

amministrazioni nazionali e locali sulla piena decarbonizzazione impianti, 12 August 2025, https://www.mimit.gov.it/it/notizie-stampa/ex-ilva-svolta-al-mimit-firmata-lintesa-tra-le-amministrazioni-nazionali-e-locali-sulla-piena-decarbonizzazione-impianti.

58 Italian Ministry of Enterprises and Made in Italy, *Ex Ilva: riunito al Mimit il Comitato tecnico su gas e DRI*, 21 July 2025, https://www.mimit.gov.it/it/notizie-stampa/ex-ilva-riunito-al-mimit-il-comitato-tecnico-su-gas-e-dri.

59 Palmiotti, Domenico, "Ex Ilva, piano da 8 milioni di tonnellate e nuova gara", in *Il Sole 24 Ore*, 14 July 2025, https://www.ilsole24ore.com/art/ex-ilva-piano-8-milioni-tonnellate-e-nuova-gara-AH8aOmiB; Leonardi, Matteo and Giulia Novati, "Taranto, Primary Steel Production in the Decarbonization Challenge", in *ECCO Policy Papers*, November 2021, https://eccoclimate.org/?p=1276; "Mimit, Updated Ex-Ilva Tender: Decarbonisation Requirement Arrives", in *Il Sole 24 Ore*, 7 August 2025, https://en.ilsole24ore.com/art/mimit-updated-ex-ilva-tender-decarbonisation-obligation-arrives-AHiN6i5B.

60 Snam, *Hydrogen to Decarbonise Steel: First Trial Launched in Italy*, 3 July 2024, https://www.snam.it/en/media/news-and-press-releases/comunicati-stampa/2024/snam-hydrogen-decarbonise-steel-first-trial-italy.html; "Snam, Tenaris e Tenova sperimentano a Dalmine l'utilizzo di idrogeno green nel ciclo di lavorazione dell'acciaio", in *Hydronews*, 3 July 2024, https://hydronews.it/?p=13621.

61 German Federal Ministry for Economic Affairs and Energy, *For a Strong Steel Industry in Germany and the EU. The Steel Action Concept*, July 2020, https://www.bundeswirtschaftsministerium.de/Redaktion/EN/Publikationen/Wirtschaft/the-steel-action-concept.html.

62 Lopez, Gabriel et al., "Towards Defossilised Steel: Supply Chain Options for a Green European Steel Industry", in *Energy*, Vol. 273 (15 June 2023), Article 127236, https://doi.org/10.1016/j.energy.2023.127236; Kędzierski, Michał, "A Fragile Future", cit.

63 German Federal Ministry for Economic Affairs and Energy, "For a Strong Steel Industry in Germany

Chancellor Scholz's industrial policy framework. To foster decarbonisation, the German government has provided substantial state aid (a total public co-finance of 6.9 billion euros out of a total 12.5 billion euros estimated cost) to steelmakers ThyssenKrupp Steel, Salzgitter, Stahl-Holding-Saar and ArcelorMittal to build DRI plants and result in new capacity of 11.5 Mt of green steel annually.[64]

However, DRI production remains low (at around 0.2 Mt in 2023)[65] and several companies are reassessing their commitments due to higher-than-expected hydrogen costs. For example, ArcelorMittal has withdrawn from its planned DRI projects in Bremen and Eisenhüttenstadt despite state financing.[66] ThyssenKrupp was unable to guarantee the profitability of its proposed 3 billion euro green steel plant in Duisburg, with investment decisions further slowed by the potential sale of its entire steel division, driven also by declining returns of its BF-BOF plants.[67] Salzgitter has delayed by up to three years the expansion of its SALCOS project in Wilhelmshaven, originally expected to produce 2 Mt of DRI by 2030.[68] These constraints are also affected by a lack of physical interconnections that enable the transport of hydrogen across the country and abroad. The two countries are eager to enhance their cooperation given their respective geographical positions in the emerging European hydrogen network.[69] The main joint hydrogen interconnection involving Germany and Italy is the SouthH_2 Corridor, which will run for 3,300 km and will transport up to 4 Mt of green hydrogen annually from North Africa to Germany via Italy and Austria.[70] Given constraints to domestic hydrogen production, the project

and the EU", cit.

64 Kędzierski, Michał, "A Fragile Future", cit.

65 World Steel Association, *World Steel in Figures 2024*, June 2024, https://worldsteel.org/?p=56174.

66 EUROMETAL, *ArcelorMittal Cancels DRI-EAF Decarbonisation Investment in Germany*, 23 June 2025, https://eurometal.net/?p=34311; ArcelorMittal, *ArcelorMittal Europe Urges Faster Implementation of Steel and Metals Action Plan*, 19 June 2025, https://corporate.arcelormittal.com/media/news-articles/arcelormittal-europe-urges-faster-implementation-of-steel-and-metals-action-plan.

67 EUROMETAL, *Kretinsky to Sell Thyssenkrupp Steel Europe Stake, Opening Path for Jindal Deal*, 4 October 2025, https://eurometal.net/?p=35758.

68 EUROMETAL, *Salzgitter, Uniper Sign Green Hydrogen Supply Pre-Contract for German Steel Plant*, 24 April 2024, https://eurometal.net/?p=28596; EUROMETAL, *Salzgitter Delays Salcos Hydrogen Steel Project by Three Years*, 23 September 2025, https://eurometal.net/?p=35601.

69 Raimondi, Pier Paolo and Max Munchmeyer, "From Interconnection to Integration: German-Italian Energy Relations and the SoutH2 Corridor", in *IAI Commentaries*, No. 24|03 (January 2024), https://www.iai.it/en/node/17992.

70 See the official website, https://www.south2corridor.net.

would be instrumental to connect German steelmaking clusters – especially those in Southern Germany – to the North African region, characterised by higher renewable generation potential. The strategic relevance of the project has been recognised by both the 2023 Italian-German Action Plan and the EU, which included it in the Project of Common Interest list. Nonetheless, the EU and the two countries need to overcome multiple challenges to create an effective hydrogen network. Limited (and unclear) hydrogen demand in Italy may undermine economic feasibility of hydrogen pipelines despite existing international gas pipelines – alongside political and economic priorities and challenges faced by potential exporting countries in the Mediterranean.[71] For example, the Southern Mediterranean countries face substantial challenges, namely slow renewables uptake coupled with skyrocketing local power demand.[72] Due to higher-than-expected costs of construction, many hydrogen pipeline projects between Germany and other neighbouring countries, especially in Scandinavia, have experienced significant setbacks.[73] For example, energy companies Equinor and RWE cancelled their plans for a hydrogen pipeline between Norway and Germany citing high costs and lack of demand.[74] Similarly, Energinet postponed the commissioning of the Denmark-Germany interconnection from 2028 to the end of 2031 citing both technical challenges and additional time required due to changes in the capacity bidding process.[75]

At the same time, CCS is increasingly considered by both companies and policymakers, as they are committed to reach climate targets without harming competitiveness and social stability. In Germany, Chancellor Merz has strengthened political backing for CCS by introducing draft legislation to facilitate the large-scale deployment of carbon storage and transport infrastructure, streamlining the associated planning and permitting processes.

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71 Italian Government, *Strategia nazionale idrogeno*, November 2024, https://www.mase.gov.it/portale/documents/d/guest/strategia-nazionale-idrogeno-pdf.

72 IEA, *The Future of Electricity in the Middle East and North Africa*, September 2025, https://www.iea.org/reports/the-future-of-electricity-in-the-middle-east-and-north-africa.

73 "Green Hydrogen Will Be Far Costlier than Estimated, Harvard Scientists Find", in *Bloomberg*, 8 October 2024, https://www.bloomberg.com/news/articles/2024-10-08/harvard-study-green-hydrogen-will-be-far-costlier-than-estimated.

74 "Norway's Equinor Scraps Plans to Export Blue Hydrogen to Germany", in *Reuters*, 21 September 2024, https://www.reuters.com/business/energy/norways-equinor-scraps-plans-export-blue-hydrogen-germany-2024-09-20.

75 Wettengel, Julian, "Danish-German Hydrogen Pipeline Delayed by Three Years", in *Clean Energy Wire*, 9 October 2024, https://www.cleanenergywire.org/node/14068.

Moreover, the Federal Ministry for Economic Affairs and Energy has announced a financing programme for industrial decarbonisation of 6 billion euros, including projects incorporating CCS technologies.[76] CCS could ideally be deployed in various emission-intensive steelmaking stages. An option would be to couple CCS with the blast furnace, which accounts for around 60 per cent of total process emissions.[77] However, due to high costs, current deployment remains limited to pilot projects, such as ArcelorMittal's facility in Ghent, Belgium.[78] To scale up CCS projects, higher carbon prices and a stable regulatory framework are of paramount importance. Geographical constraints are also likely to limit CCS expansion in both Germany and Italy. Storage sites must be located close to suitable storage basins or connected to CO_2 transport infrastructure to the emissions sites. Steel plants in Southern Germany lie too far from the North Sea storage sites, while in Italy, the main production centres in the north are distant from the only operational CO_2 storage facility near Ravenna and other potential sites in the Adriatic Sea.[79] The only proposal in Italy to integrate CCS technologies into steel production is Marcegaglia AdriatCO_2, located in the company's Ravenna plant.[80] The plan foresees the connection of the already existing natural gas and biomethane co-generator unit with a DRI production unit and a CCS mechanism, with the resulting carbon products being stored in the Ravenna storage site.[81] The absence of CO_2 transport infrastructure, alongside the current limited technological maturity of CCS applications to the manufacturing stages of BF-BOF steelmaking – as well as a lack of pilot projects in Italy and Germany – makes it difficult to reconcile this transformation pathway with the 2030 reduction targets.

76 "Germany Launches 6 billion Euro Industrial Decarbonisation Program, Includes CCS Technology", in *Reuters*, 6 October 2025, https://www.reuters.com/sustainability/climate-energy/germany-launches-6-bln-eur-industrial-decarbonisation-program-includes-ccs-2025-10-06.

77 Muslemani, Hasan, "Stainless Green", cit.

78 ArcelorMittal, *ArcelorMittal Inaugurates Flagship Carbon Capture and Utilisation Project at Its Steel Plant in Ghent, Belgium*, 8 December 2022, https://corporate.arcelormittal.com/media/press-releases/arcelormittal-inaugurates-flagship-carbon-capture-and-utilisation-project-at-its-steel-plant-in-ghent-belgium.

79 Eni, *Eni and Snam Launch Ravenna CCS, Italy's First Carbon Capture and Storage Project*, 3 September 2024, https://www.eni.com/en-IT/media/press-release/2024/09/eni-snam-launch-ravenna-css-italy-s-first-carbon-capture-storage-project.html.

80 Marcegaglia Steel website: *AdriatiCO_2 Project*, https://www.marcegaglia.com/officialwebsite/en/?p=18012.

81 Ibid.

In light of the new political framework, policymakers and stakeholders at large could be tempted to pursue natural-gas-based DRI production coupled with CCS. Such an option could gain ground – especially vis-à-vis H_2-DRI – in case of lower gas prices due to the expected LNG glut in the upcoming years.[82] Additional political considerations may further influence policymakers' preferences, such as the US-EU trade deal. Despite potential economic relief, policymakers will need to consider environmental implications, such as methane emissions resulting from an increase in LNG shipments.[83]

5. Responding to geopolitical and geoeconomic pressures

The German and Italian transformation pathways are also subject to geopolitical and geoeconomic pressures, most notably global overcapacity and rising protectionism in the steel sector. Additionally, some production may move out of European countries to countries with more favourable energy prices due to resource availability (renewable pull effect).

As already mentioned, the broader global overcapacity, largely driven by Asian steelmakers and particularly by China, represents a major geoeconomic challenge for European steel producers. In 2024, Chinese production outpaced any other producer, reaching 55 per cent of global output, at around 1,005 Mt, dwarfing the 37.2 Mt in Germany and 20 Mt in Italy.[84] Additionally, the slowdown of Chinese domestic demand, due to economic challenges and lower residential construction, will likely enhance overcapacity, resulting in more steel volumes for international markets, hence further lowering steel prices.[85] This trend was already visible in 2024, when production levels were the lowest in five years, but exports reached the highest level since 2015 (118

82 Fulwood, Mike et al., "The Global Outlook for Gas in a $6 World", in *OIES Papers*, No. NG202 (October 2025), https://www.oxfordenergy.org/?p=48857.

83 IEA, *Assessing Emissions from LNG Supply and Abatement Options*, June 2025, https://www.iea.org/reports/assessing-emissions-from-lng-supply-and-abatement-options.

84 World Steel Association, *World Steel in Figures 2025*, June 2025, https://worldsteel.org/?p=63833.

85 Wood Mackenzie, *Steel Demand from China to Decline Annually by an Average of 5-7 Mt over Next Decade*, 3 September 2025, https://www.woodmac.com/press-releases/steel-demand-growth-decline-in-china.

Mt). The Chinese overcapacity has sparked an anti-dumping investigation by the European Commission.[86] Besides lower energy and labour costs as well as limited environmental restrictions, China's steel producers' comparative advantage is further reinforced by a high degree of subsidies. It has been estimated that Chinese steel production benefits from a subsidisation rate five times higher than that of OECD countries.[87] Chinese domination of the market is also worrying from an emissions standpoint, as it is still largely based on the BF-BOF route (89.9 per cent of steel production) and it is estimated that the carbon intensity of its steel industry amounts to 2.33 ton CO_2/ton.[88] Although EAF is gaining ground (10.2 per cent of domestic production), it still relies on coal-fired power generation (61 per cent of China's power generation).[89] Even higher emission levels come from the second-largest steel producer, India. The country's steel production (149.4 Mt in 2024) is the most carbon-intensive in the world, emitting about 20-25 per cent more CO_2 per tonne than China.[90]

Steel overcapacity is also unlikely to decrease in the short term. Despite modest global demand growth, an additional 165 Mt of new production capacity is planned to be operational before 2027.[91] India alone aims to reach 300 Mt per year by 2030.[92] This additional flux of cheap steel may also capture the share of the European market previously occupied by Russia and Ukraine. The Russian

86 Lv, Amy and Lewis Jackson, "China's 2024 Crude Steel Output Slips to Five-Year Low on Feeble Property Demand", in *Reuters*, 17 January 2025, https://www.reuters.com/markets/commodities/chinas-2024-crude-steel-output-five-year-low-weak-demand-2025-01-17; "EU Launches Trade Investigation into Chinese Tinplate Steel", in *Reuters*, 16 May 2025, https://www.reuters.com/markets/commodities/eu-launches-trade-investigation-into-chinese-tinplate-steel-2024-05-16; World Steel Association, *World Steel in Figures 2025*, cit.

87 OECD, *Steel Outlook 2025*, Paris, OECD Publishing, May 2025, https://doi.org/10.1787/28b61a5e-en.

88 Song, Xiaocong et al., "Carbon Emissions in China's Steel Industry from a Life Cycle Perspective: Carbon Footprint Insights", in *Journal of Environmental Sciences*, Vol. 148 (February 2025), p. 650-664, https://doi.org/10.1016/j.jes.2023.04.027; Koolen, Derck and Danko Vidovic, "Greenhouse Gas Intensities of the EU Steel Industry and Its Trading Partners", in *JRC Technical Reports*, 2022, https://dx.doi.org/10.2760/170198.

89 Global Energy Monitor, *Pedal to the Metal 2025*, May 2025, https://globalenergymonitor.org/?p=16363; Qi Qin, and Lauri Myllyvirta, "Guest Post: Why China Is Still Building New Coal – and When It Might Stop", in *Carbon Brief*, 12 August 2025, https://www.carbonbrief.org/guest-post-why-china-is-still-building-new-coal-and-when-it-might-stop; IEA website: *China*, https://www.iea.org/countries/china.

90 Global Energy Monitor, *Pedal to the Metal 2025*, cit.

91 IEA, *Global Critical Minerals Outlook 2025*, May 2025, https://www.iea.org/reports/global-critical-minerals-outlook-2025; Runde, Daniel F. and Austin Hardman, "Elevating the Role of Critical Minerals for Development and Security", in *CSIS Reports*, September 2023, https://www.csis.org/node/107042; OECD, *OECD Steel Outlook 2025*, cit.

92 Global Energy Monitor, *Pedal to the Metal 2025*, cit.

steel sector is being progressively excluded from the EU market as the bans of the 12th sanctions package become operational, with crude iron imports to end by 2026 and all semi-finished products by 2028 (following a postponement from the original October 2024 deadline).[93] Meanwhile, Ukraine's steel production capacity has fallen to roughly two-thirds of pre-war levels due to the ongoing conflict, leading to a drop in its exports to Europe, despite the Commission's attempts to facilitate imports by lifting import safeguard measures for non-EU members.[94]

Unsurprisingly, a rise in steel-related protectionist measures can be observed globally – in line with the broader fragmentation of the international trade regime. Most notably, Germany and Italy are vulnerable to the consequences of rising US trade barriers. Indeed, the America First Trade Policy, and the broader US-China rivalry, not only limits European exports to the American market but also indirectly leads to more Asian supply shifting away from the US and toward the more open European market, exacerbating overcapacity. While American protectionism has been primarily attributed to the Trump presidency, trade barriers have been implemented in various forms under the last US administrations. In 2021, the 25 per cent tariffs on all foreign purchases of steel and aluminium – established in 2018 – were temporarily suspended and replaced with a barely less penalising import quota system, fixed at 3.3 Mt for the EU.[95] Parallel to the quota system, a local content requirement was also introduced with the 2021 "Build America, Buy America" Act, which mandated that all steel used in federal infrastructure projects be melted and poured in the US.[96] In 2025, the second Trump administration reintroduced new tariffs on steel (among other goods), set at 50 per cent for the EU.[97] Steel protectionism

93 Grigorenko, Yuriy, "European Steel Producers Oppose Imports of Russian Slabs", In *GMK Center posts*, 18 September 2025, https://gmk.center/?p=113479.

94 EUROMETAL, *How Ukraine's War-Torn Steel Industry Has Transformed Since Russia's Invasion, with Closer Ties to EU*, 24 February 2024, https://eurometal.net/?p=27790; EUROMETAL, *EU Approves Ukraine's Steel Safeguard Measures Exemption for 3 Years*, 9 June 2025, https://eurometal.net/?p=34077.

95 "Biden Extends EU Steel Aluminium Tariff Exemption for 2 Years", in *Reuters*, 28 December 2023, https://www.reuters.com/world/us/biden-extends-eu-steel-aluminum-tariff-exemption-2-years-2023-12-28.

96 Painter, Dustin J., "Build America Buy America: Strong Domestic Procurement Provisions in Infrastructure Bill Signal Increased Commitment to U.S. Manufactured Goods", in *Kelley Drye Viewpoints*, 15 November 2021, https://www.kelleydrye.com/viewpoints/blogs/trade-and-manufacturing-monitor/build-american-buy-america-strong-domestic-procurement-provisions-in-infrastructure-bill-signal-increased-commitment-to-u-s-manufactured-goods.

97 Clarke, Jennifer, "What Tariffs Has Trump Announced, and Why?", in *BBC News*, 5 November 2025,

is not a uniquely US trend and is increasingly pointed toward the substantial Chinese production: 81 anti-dumping investigations have been launched to probe the Chinese steel sector and 62 countries have introduced restrictions against steel imports from China.[98] India is considering a three-year import tariff of 11–12 per cent on steel products to curb shipments from China.[99] At the same time, Canada, Brazil, Mexico and Turkey have raised steel tariffs on all suppliers to address import surges.[100] After initial uncertainty, the EU followed this trend. In October 2025, the Commission set steel tariffs at 50 per cent, cut tariff-free quotas by 47 per cent (to a volume of around 18.3 Mt) and introduced a melt and poured requirement to prevent their circumvention.[101]

Due to their weight in the European steel sector, Italy and Germany remain positioned at the centre of the current trade steel tension. These safeguards have been considered generally favourable by Federacciai, which has called it an "overall positive measure", but it has also called into question the EU's plan to involve all trade partners for negotiations, fearing that negotiations with China – on measures intended to diminish its influence over the steel market – would be counterproductive. It has instead called for an increase of supplementary measures, specifically a "Buy European strategy", increasing the quota of European steel in public procurements and a review of the CBAM's phase out of free allowances.[102] Similarly, WV Stahl noted that the measure balances the European market, as half of the import volumes remain duty-free, and that the European approach also creates the conditions to invest in decarbonisation of the sector.[103] Historically, due to its export-led economy, Germany has opposed trade barriers in sectors where it was traditionally strong, even when external

https://www.bbc.com/news/articles/cn93e12rypgo.

98 Glushchenko, Andrii, "62 Countries Implemented 207 Restrictions against Steel Products from China", in *GMK Center posts*, 13 October 2025, https://gmk.center/?p=114298.

99 "India Recommends Import Tariffs for Three Years on Some Steel Products", in *Reuters*, 18 August 2025, https://www.reuters.com/world/india/india-recommends-import-tariffs-three-years-some-steel-products-2025-08-18.

100 OECD, *OECD Steel Outlook 2025*, cit.

101 European Commission, *Proposal for a Regulation Addressing the Negative Trade-Related Effects of Global Overcapacity on the Union Steel Market* (COM/2025/726), 7 October 2025, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52025PC0726.

102 SteelOrbis, *Federacciai: EU's Permanent Safeguard Regime Is an 'Overall Positive Measure',* 8 October 2025, https://www.steelorbis.com/steel-news/latest-news/federacciai-eus-permanent-safeguard-regime-is-an-overall-positive-measure-1413506.htm.

103 WV Stahl, *Neues Handelsschutzinstrument: Wirtschaftsvereinigung Stahl begrüßt ausgewogene Vorschläge der EU-Kommission*, 7 October 2025, https://www.wvstahl.de/?p=37495.

competition was mounting.[104] A recent example is the country's opposition in 2024 to raising duties on Chinese electric vehicles.[105] However, in the steel sector, the gap in production levels and the difference in production costs have reached such a level that German public and private actors are now backing the European plan for a tariff-quota system that limits excessive imports.[106] These solutions were also promoted in November 2025 as the German government held a steel summit gathering national steelmakers, Lander and trade unions' representatives. During the summit necessity of a more decisive "Buy European" approach was requested from European trade policies. By contrast, Italy has been more tepid on raising other trade barriers, especially toward the US, fearing retaliation on other commodities exported to the American market, and instead pushing to build a transatlantic EU-US system for joint protection against overcapacity.[107]

Alongside these measures, the full implementation of the CBAM will also affect steel trade patterns. The mechanism – which includes many iron and steel products imported into the European market – will become financially operational from 2026. The imposition of a carbon price on carbon-intensive steel imports should theoretically bridge the cost paid by external producers to that faced by domestic ones under the EU ETS. However, the production cost gap with external producers is likely to remain, as CBAM operationalisation will be coupled with the gradual phase-out of free ETS allowances until 2034, forcing European steelmakers to buy more carbon allowances.[108] The 2025 November German steel summit also showed how many stakeholders have

104 Grahn, Michal et al., "A Game of Tariffs: Is There Demand for Tariffs in Europe?", in *Journal of European Public Policy*, 11 October 2025, https://doi.org/10.1080/13501763.2025.2571062.

105 Rinke, Andreas, "Germany to Vote Against EU Tariffs on Chinese Electric Vehicles, Sources Say", in *Reuters*, 3 October 2024, https://www.reuters.com/business/autos-transportation/germany-vote-against-eu-tariffs-chinese-electric-vehicles-sources-say-2024-10-03; Coi, Giovanna et al., "Mission Impossible: Germany's Bid to Kill EU Duties on Chinese EVs", in *Politico EU*, 24 September 2024, https://www.politico.eu/?p=5403501.

106 Rinke, Andreas, "German Coalition Partner Seeks Protections, European Steel Document Shows", in *Reuters*, 4 October 2024, https://www.reuters.com/world/china/german-coalition-partner-seeks-protections-european-steel-document-shows-2025-10-04.

107 Cinelli, Antonella and Angelo Amante, "Italy's Government, Businesses Warn of Heavy Impact of U.S. Tariffs", in *Reuters*, 2 April 2025, https://www.reuters.com/world/italys-meloni-says-us-tariffs-would-hit-italian-producers-hard-2025-04-02; Angela Giuffrida, "'A Fatal Blow': Italian Producers Fear Effects of Trump's 'War against Pasta'", in *The Guardian*, 9 October 2025, https://www.theguardian.com/p/x3cpft; Italian Government, *President Meloni's Message to the Federacciai General Assembly*, 10 November 2025, https://www.governo.it/en/node/30297.

108 At time of writing the CBAM directive is facing a revision.

called for increases in flexibility regarding the phase-out of free allowances of the ETS system. Additionally, many loopholes that could be exploited by external producers remain, and anti-circumvention measures are still lacking. First, as currently only raw materials are covered, competition from non-EU manufacturers not facing green production costs may just spill from steel to finished products with steel components. Second, steel scrap is not included in CBAM, regardless of its embedded or indirect emissions. In July 2025, the Commission started monitoring imports and exports of metal scrap and hinted in the Steel and Metal Action Plan about an expansion of CBAM coverage to them as well – for instance, citing the need to address commodities that have a misleading scrap content.[109]

This measure was however considered not enough by WV Stahl, which described European measures as still lacking in concrete monitoring measures for steel scrap, while Federacciai and the Italian government have long pushed for a ban on export of ferrous materials from Europe.[110] Scrap metal trade is another geopolitical pressure, potentially destined to increase. At the European level scrap exports from Europe to non-EU countries went from 11.7 Mt in 2016 to almost 19 Mt in 2024, with around 56 per cent of them directed toward Turkey.[111] While currently Germany is a net exporter of scrap (around 7 per cent of global scrap export), Italy remains a net importer (around 6 per cent of global scrap imports) with a third of domestic needs met by imports, 15 per cent of which comes from outside the EU.[112] This may appear as a potential complementarity, but the trend is unlikely to remain stable. First, the expansion of EAFs will drastically increase the demand for scrap as raw material. This could potentially lead to shortages, especially regarding high-quality steel scrap.[113]

109 European Commission DG for Taxation and Customs Union, *Commission Introduces Surveillance of Imports and Exports of Metal Scrap*, 23 July 2025, https://taxation-customs.ec.europa.eu/node/2072_en; European Commission, *A European Steel and Metals Action Plan*, cit.

110 WV Stahl, *Statement on the European Steel and Metals Action Plan*, cit.; SteelOrbis, *Federacciai Addresses Key Challenges for Future of Steel: Energy, Scrap, and EU Policies*, 27 September 2024, https://www.steelorbis.com/steel-news/latest-news/federacciai-addresses-key-challenges-for-future-of-steel-energy-scrap-and-eu-policies-1359378.htm.

111 Yermolenko, Halina, "Scrap Shortage Situation in Europe Will Get Worse: Federacciai", in *GMK Center posts*, 30 September 2024, https://gmk.center/?p=100817.

112 Carriero, Alberto et al., "The Italian Steel Industry across National and European Challenges", cit.; GMK Center, *Global Scrap Exports Restrictions 2025*, April 2025, https://gmk.center/wp-content/uploads/2025/04/Scrap-Restrict-2025_eng-2.pdf.

113 Yermolenko, Halina, "Scrap Shortage Situation in Europe Will Get Worse: Federacciai", cit.

Second, German scrap exports are already declining, reaching in 2024 the lowest figure in almost two decades and still largely destined toward India and Turkey.[114] These factors have prompted many to ask for restricting this surplus towards non-EU producers, as a way to maintain enough inputs for European EAFs.[115] However export bans pose the risk of causing retaliatory measures and may lead to market distortions and difficulties in preventing circumvention.[116] Furthermore, excessive scrap export bans may severely hinder global objectives and may cause diplomatic backslash with trade partners, especially the emerging economies.

As decarbonisation costs seem increasingly difficult to stack on top of the already difficult European industrial challenges, many producers are faced with the alternative of outsourcing steel production towards other regions. This may be inevitable if countries do not find valuable and fast solutions for their challenges. On one hand production outsourcing will result in lowering energy demand, and consequently energy prices for the rest of consumers. However, this solution entails high political and social costs that are difficult to accept. Competitiveness is not the only factor that will alter production locations and trade balance. Adjusting steel production routes from coal-based steel to renewable electricity is expected to entail also major transformations in the global steelmaking geography as result of changing comparative advantages among countries. Countries that are endowed by or have access to large renewable potential (or hydrogen) could gain significant comparative advantage in developing and increasing production of green iron and steel – through the so-called renewable pull effect.[117] This dynamic will also generate different trade dependencies with countries that have lower hydrogen and electricity prices seeing more competitive low-emission imports than BF-BOF and H_2-DRI-EAF. This will likely lead to quotas of hydrogen to be imported to Germany and Italy, as already foreseen respectively by both countries'

114 Kolisnichenko, Vadim, "Germany Reduced Scrap Exports to a Record Low in 2024", in *GMK Center posts*, 14 March 2025, https://gmk.center/?p=106367.

115 WV Stahl, *Statement on the European Steel and Metals Action Plan*, cit.; SteelOrbis, *Federacciai Addresses Key Challenges for Future of Steel*, cit.

116 Pothen, Frank, "Are Export Barriers on Recycled Steel Economically and Ecologically Justified?", in *SSRN*, 29 August 2025, https://ssrn.com/abstract=5416634.

117 Samadi, Sascha eta al., "The Renewables Pull Effect: How Regional Differences in Renewable Energy Costs Could Influence Where Industrial Production Is Located in the Future", in *Energy Research and Social Science*, Vol. 104 (October 2023), Article 103257, https://doi.org/10.1016/j.erss.2023.103257.

National Hydrogen Strategies.[118] The Mediterranean area could become an ideal hub for both production and trade given the high renewable capacity of the region. Partnerships in this direction have already been explored, as shown by the declaration signed by Italy, Germany, Austria, Algeria and Tunisia to strengthen the hydrogen supply chains – not only as the physical SouthH_2 corridor, but to sustain the broader offtake of production across the area and ensure stability of supply.[119] The Trans-Mediterranean Energy and Clean Tech Cooperation Initiative – to be presented in 2026 as a supplement to the Pact for the Mediterranean presented in October 2025 – is expected to complement this vision.[120] However, the initiative would need to be broadened beyond just hydrogen imports. Specifically, it should consider industrial co-development instead of just south-to-north trade of raw materials or energy vectors. Indeed, as the EU will probably have limited amounts of competitive H_2-DRI-EAF steel available to replace its BF-BOF, it would need to import more steel to satisfy its domestic demand. At the same time, third renewable-rich countries could attract the energy-intensive step of ironmaking, while European countries could retain some competitive aspect of steel quality and value added of downstream processing along with the most labour-intensive production.[121] In this new scenario, cooperation is required with new players with high potential for renewable and abundant iron ore reserves (also beyond the Mediterranean) as they could become strategic partners for decarbonised steel to Europe.[122] Clean Trade and Investment Partnerships (CTIPs) could be valuable initiatives to foster local manufacturing, even in EIIs such as green steel, and international climate cooperation.

118 German Federal Government website: *The National Hydrogen Strategy*, https://www.bundeswirtschaftsministerium.de/Redaktion/EN/Hydrogen/Dossiers/national-hydrogen-strategy.html; Italian Government, *Strategia nazionale idrogeno*, cit.

119 Italian Ministry of Foreign Affairs and International Cooperation, *Hydrogen: Five States Signed a Declaration to Continue the Southern Corridor Works*, 21 January 2025, https://www.esteri.it/en/?p=129955; European Commission DG for International Partnerships website: *Southern Hydrogen Corridor Connecting North Africa, Italy, Austria and Germany*, https://international-partnerships.ec.europa.eu/node/3692_en.

120 European Commission, *Pact for the Mediterranean. One Sea, One Pact, One Future* (JOIN/2025/26), 16 October 2025, https://eur-lex.europa.eu/legal-content/en/TXT/?uri=celex:52025JC0026.

121 Johnson, Constantin et al., "Emerging Green Steel Markets Surrounding the EU Emissions Trading System and Carbon Border Adjustment Mechanism", cit.

122 Janke, Leandro et al., *The Role of Green Iron Trade in Accelerating Competitive Steel Transformation*, Berlin, Agora Industry, September 2025, https://www.agora-industry.org/publications/the-role-of-green-iron-trade-in-accelerating-steel-transformation.

6. Policy recommendations for steel transformation pathways

Strategies to enable transformation pathways in the steel sector in Germany and Italy should balance climate ambition with industrial competitiveness, while accounting for the policy, technological and geopolitical dimensions. At the European level, the priority is to develop, operationalise and better synchronise the EU's climate and industrial policy frameworks and develop a trade policy to respond to both protectionist pressures and steel overcapacity. At the bilateral level, Germany and Italy should deepen their cooperation related to both supply and demand measures as well as funding mechanisms.

A first crucial step is to design a clear, sustainable political and industrial strategy both at the national and European levels. Currently, countries have a window of opportunity in a critical position as many BF-BOF facilities are expected to reach the end of their operational lifespan before 2035. It is the case for seven (out of fifteen) German blast furnaces. It is also true for Italy as reinvestment decisions for its primary production have been brought up prematurely due to the Taranto facility crisis. Although a wide range of technologies is needed, it is also crucial for policymakers to assess precisely the real contribution of specific technologies given time and financial constraints.

To design effective national timelines, more clarity is needed regarding several ongoing European policy debates, which is essential to sustain companies' investment decisions and public support. A lack of regulatory uncertainty complicates such decisions among both public and private actors. Illustrative cases are, for example, the postponement of the full operation of the ETS2 from 2027 to 2028 and a relaxation of CBAM reporting obligations. Although these measures may provide temporary relief, they also risk disrupting and deterring investment to decarbonisation projects.

Consequently, countries need to commit and allocate adequate financial resources for industrial decarbonisation and competitiveness as well as productivity growth. The two countries should build on the expansion of EIB capacity to provide counter-guarantees and other de-risking support in

order to take full use of this new coverage.[123] Additionally, countries should work to create also funding support for not only capital expenditures, but also operational ones to support companies. They should also streamline existing EU funds, such as the Industrial Decarbonisation Bank and the Hydrogen Bank programmes, in order to facilitate access for steelmakers in case of synergies, such as H_2-DRI projects with projects for green hydrogen production destined to those facilities.

On the supply side, the two countries should work together to define a broader "hydrogen import strategy" to connect Europe and the Mediterranean. As explored, the Northern African region's potential to become a hub for renewable energy and green hydrogen exports is still hindered by several challenges. Italy and Germany could cooperate with Mediterranean countries by ensuring demand and joint investment initiatives on hydrogen production projects, also ensuring environmental standards. A first area of cooperation should be developed within larger European frameworks, such as the upcoming Trans-Mediterranean Energy and Clean Tech Cooperation Initiative. Besides hydrogen imports, Italy and Germany should consider industrial co-development through models that are not just based on the South-to-North trade of raw materials or energy vectors. The two countries should leverage their respective diplomatic weights in formalising recently announced EU CTIPs aimed at fostering investments and local manufacturing in the steel sector abroad.

Concerning the structural energy price disadvantage faced by European steelmakers, the increased use of PPA and CCfD mechanisms is of paramount importance for addressing price volatility and ensuring clean energy supplies. Despite the positive steps represented by CISAF, the countries should carefully assess market integrity and social fairness in providing financial support to EIIs. Moreover, the two countries should consider broader reform of the electricity market, specifically working on the fiscal dimension and marginal pricing, to avoid a scenario where high electricity costs prevent the shift from BF-BOF to electric steelmaking.

123 European Commission, *A Clean Industrial Deal for Competitiveness and Decarbonisation in the EU*, 26 February 2025, https://ec.europa.eu/commission/presscorner/detail/en/ip_25_550.

Alongside supply-side measures, governments need to work on demand for low-carbon steel. Public procurement reform is a key step to create clear sustainable standards. Moreover, the two countries should work to leverage their mutual dependence and shared interests in several key sectors, such as automotive, defence and machinery. The two countries should work to collaborate in defining resilience and sustainable criteria that create a clear signal for steelmakers by acknowledging decarbonisation efforts for different routes. Additionally, they should work to integrate such topics into EU and national trade policy. A first step would be to operationalise the "Climate Club" and promote concrete steps for the steel sector decarbonisation, such as standardisation of green steel definitions and coordination mechanisms to address overcapacity.

With demand for ferrous scrap expected to grow in the foreseeable future, it is crucial to address its strategic relevance as material for both circularity and competitiveness reasons. Ensuring access to high-grade scrap is critical. In this sense, the two countries should work at setting targeted policy instruments, such as recycled content requirements, and data sharing to have an effective and granular monitoring system. At the same time, export bans should be carefully assessed in light of trade and diplomatic relations as well as global climate ambition. Given the absence of forecasted scrap shortage, excessive restrictions on scrap exports should be avoided, as they may lead to destabilisation of the recycling sector, price increases as well decarbonisation and trade setbacks.[124]

Building on the general Action Plan signed in November 2023, Germany and Italy should work on a joint roadmap focused on the clean steel sector, which makes full use of the tools deployed by the several EU initiatives. A continuous coordination effort should be developed at the political and ministerial levels, as well as that of private companies. Such coordination cannot overlook collaborative international partnerships with key partners for the (green) steel trade.

124 Toto, Deanne, "Euric Warns against Restricting Scrap Exports", in *Recycling Today*, 15 January 2025, https://www.recyclingtoday.com/news/euric-warns-agains-restricting-scrap-exports.

List of acronyms

BF	Blast furnace
BOF	Basic oxygen furnace
CBAM	Carbon Border Adjustment Mechanism
CCfD	Carbon contracts for difference
CCS	Carbon capture and storage
CID	Clean Industrial Deal
CISAF	Clean Industrial Deal State-Aid Framework
CO_2	Carbon dioxide
CTIP	Clean Trade and Investment Partnership
DRI	Direct reduction of iron
EAF	Electric-arc furnace
EIB	European Investment Bank
EII	Energy-intensive industry
ETS	Emissions Trading System
EU	European Union
GASSA	Global Arrangement on Sustainable Steel and Aluminum
gCO_2e/kWh	Grams of carbon dioxide equivalent per kilowatt-hour
GDP	Gross domestic product
GHG	Greenhouse gas emissions
GJ	Gigajoule
GW	Gigawatt
H_2	Hydrogen
H_2-DRI	Hydrogen as a reductant to produce DRI
IDAA	Industrial Decarbonisation Accelerator Act
kWh	Kilowatt-hour
LESS	Low Emission Steel Standard
LNG	Liquefied natural gas
Mt	Million tons
MWh	Megawatt-hours
NO_x	Nitrogen oxides
OECD	Organisation for Economic Co-operation and Development
PPA	Power purchase agreement

SO_2	Sulphur dioxide
TCF	Temporary Crisis Framework
TCTF	Temporary Crisis and Transition Framework
US	United States
WTO	World Trade Organization

Steel Decarbonisation and Competitiveness: The Case for an Italian-German Dialogue

The steel sector plays a crucial role in the European Union's economy, yet it faces significant challenges, including global overcapacity, rising protectionism and the high costs of decarbonisation. Italy and Germany are major players in this industry, but both require stronger and more coordinated action to balance competitiveness with climate objectives while facing challenges of the political, geopolitical and technological dimensions. This study assesses the state of the steel sector in both countries, highlighting both their shared and national challenges. It highlights pathways for strengthening cooperation between Italy and Germany – both bilaterally and within the broader European system – to generate mutual benefits for their industries and better support the sectors' transformation.

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