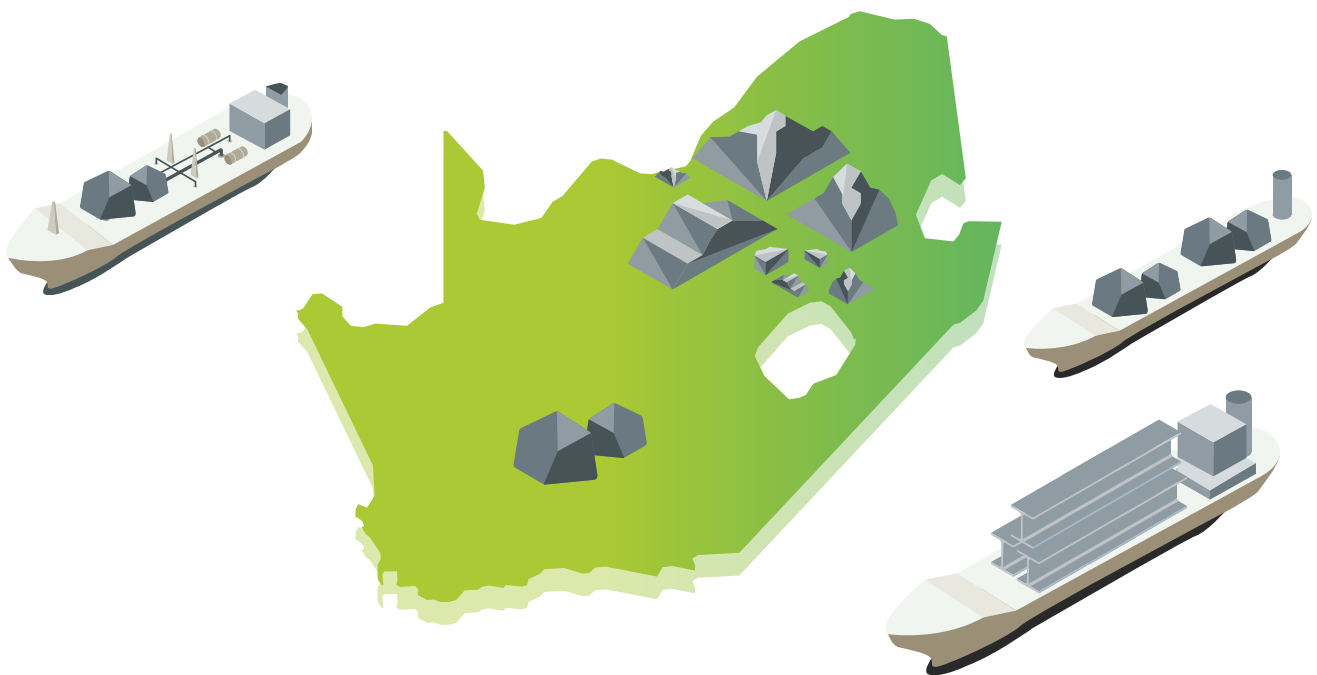


Implications of the Carbon Border Adjustment Mechanism (CBAM) for Hydrogen and Power-to-X Development in South Africa

Case Study #2: Iron and Steel



IMPRINT

As a federally owned enterprise, GIZ supports the German Government in achieving its objectives in the field of international cooperation for sustainable development.

Published by:

Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH

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Bonn and Eschborn, Germany

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Acknowledgement:

The International PtX Hub is implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH on behalf of the German Federal Ministry for the Environment, Climate Action, Nature Conservation and Nuclear Safety (BMUKN). Financed by the International Climate Initiative (Internationale Klimaschutzinitiative, IKI), the International PtX Hub is a contribution to the German National Hydrogen Strategy of 2020 and represents one of the four pillars of the BMUV's PtX action programme initiated in 2019. The opinions and recommendations expressed do not necessarily reflect the positions of the commissioning institutions or the implementing agency.

Pretoria, May 2026

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Abbreviations

BMUKN	German Federal Ministry for the Environment, Climate Action, Nature Conservation and Nuclear Safety
BMUV	Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection
CBAM	Carbon Border Adjustment Mechanism
CCS	Carbon Capture and Storage
CCUS	Carbon Capture, Utilisation and Storage
CID	Clean Industrial Deal
CN	Combined Nomenclature
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
DBT	Dibenzyltoluene
EEA	European Economic Area
EU	European Union
EU ETS	EU Emissions Trading System
FID	Final Investment Decision
GH ₂	Green Hydrogen
GHG	Greenhouse Gas
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GJ	Gigajoule
H ₂	Hydrogen
HS	Harmonised System (codes)
IEA	International Energy Agency
IKI	Internationale Klimaschutzinitiative (International Climate Initiative)
ITC	International Trade Centre

LNG	Liquefied Natural Gas
LOHC / LOHCs	Liquid Organic Hydrogen Carrier(s)
MCH	Methylcyclohexane
MRV	Monitoring, Reporting, and Verification
Mt	Million tonne
Mtoe	Million tonnes of oil equivalent
NH ₃	Ammonia
OECD	Organisation for Economic Co-operation and Development
PPAs	Power Purchase Agreements
PtX	Power-to-X
RE	Renewable Energy
RED	Renewable Energy Directive
RES	Renewable Energy Sources
RFNBO / RFNBOs	Renewable Fuels of Non-Biological Origin
RH ₂	Renewable Hydrogen
SAF	Sustainable Aviation Fuel

Executive Summary

Output from South Africa's iron and steel industry has been declining since 2006, largely because of electricity supply constraints, increased input and logistics costs, reduced local demand, and rising imports. The local market has shifted away from producing virgin steel using blast furnace (BF) and basic oxygen furnace (BOF) technologies, towards mini-mills using electric arc furnaces (EAFs), which now account for a significant share of local production. This structural change, combined with overcapacity and increased imports, has resulted in challenging trading conditions and significant uncertainty for local steel producers. These domestic trends are reflective of the global steel market, where continued overcapacity and a transition toward EAF-based steelmaking have caused significant upheaval. The latter is contributing to a global scrap metal shortage and is prompting export restrictions in various countries.

The EU CBAM targets emissions from the production of certain iron and steel products, with a focus on CO₂ direct emissions during the definitive period. The European Commission has proposed to expand CBAM's scope to include 180 steel- and aluminium-intensive products, like machinery and appliances, ensuring emissions are reduced rather than relocated. As part of further CBAM anti-circumvention measures, the European Commission has also proposed to incorporate pre-consumer aluminium and steel scrap in the CBAM scope. The European Commission proposal is now going through the corresponding legislative procedure and may be subject to changes.

Green hydrogen (GH₂) produced from renewable electricity can be used as an alternative reductant and energy carrier to natural gas and coal in Direct Reduced Iron (DRI) processes, allowing for a significant reduction in greenhouse gas emissions from iron and steel production. The adoption of PtX and GH₂ could in theory improve the sector's competitiveness and reduce exposure to CBAM and other carbon-related measures. However, although there is some existing DRI capacity in South Africa, which is the technology best suited to conversion to using GH₂ as a substitute for coal or natural gas, the existing scale is limited.

Given the high level of uncertainty in global steel markets due to global overcapacity, and the highly competitive nature of the European market, the preliminary research presented in this case study suggests that the CBAM would need to provide a very clear cost advantage to GH₂-based green steel to incentive investment by South African entities in green steel capacity. However, a more detailed analysis taking into account the latest CBAM developments should be carried out to better understand these dynamics.

In the GH₂-based DRI-EAF process, the production of iron and steel can be geographically separated from each other, offering one opportunity to produce the iron in South Africa using hydrogen, and then exporting it to Europe to be further processed into steel. Due to data limitations, it was not possible to evaluate this option as part of this case study. It is, however, an area to explore in future.

One of the main factors preventing green hydrogen and green steel investment in Africa (and elsewhere) is a lack of market premiums, which translates into an inability to sign offtake agreements while production costs are above that of fossil fuel-based alternatives. The impact of initiatives such as the lead markets in the EU or the external leg of the EU hydrogen bank, that could create such a premium, should therefore be closely monitored.

1 Introduction

The European Union's (EU's) Carbon Border Adjustment Mechanism (CBAM) is a key climate protection measure under the EU Green Deal and the Clean Industrial Deal. The CBAM seeks to create a more consistent application of carbon pricing across different jurisdictions by requiring carbon intensive imported goods into the EU that fall within CBAM scope to pay the same carbon cost as goods produced within the EU under the EU Emissions Trading System (ETS), thereby limiting carbon leakage (Ward, 2023). The CBAM regulation was adopted in May 2023, with a transitional phase that applied from October 2023 to December 2025, and a "definitive period" with financial implications which began in January 2026.

This case study considers issues that inform whether the CBAM may increase the attractiveness of green steel exports from South Africa to the EU. The scope of the case study was narrowed following the release of detailed regulation for the definitive period of the CBAM by the EU Commission in December 2025, after the case study had been finalised. The case study does not consider the impact that the CBAM or other trade measures may have on the local South African market for iron and steel.

The EU CBAM

- CBAM is a climate protection measure and an important element of the EU Green Deal to help EU member states meet their commitments under the Paris Agreement.
- CBAM aims to prevent the relocation of production facilities – and thus greenhouse gas (GHG) emissions – to jurisdictions with less stringent climate policies (carbon leakage).
- CBAM ensures producers inside and outside the EU are subject to similar carbon costs on products sold within the EU.
- CBAM is based on the „polluter pays principle“.
- CBAM is strongly anchored in carbon pricing fundamentals which internalise the external effects of greenhouse gas emissions.
- The Reporting Declarant (EU importer or Indirect Custom Representative should the importer be based outside the EU) is subject to reporting and financial obligations under the CBAM.
- As per recent legislative amendments (Omnibus package), CBAM costs for goods other than electricity as a CBAM good can be calculated using default embedded emissions values for products (published by the European Commission) or based on the actual amount of emissions embedded in products, calculated based on information provided by installations in third countries and verified by accredited verifiers.
- Default values for the definitive phase are based on country averages and feature mark-ups.

- CBAM is being introduced gradually.
- Carbon prices effectively paid in third countries can be deducted from CBAM costs payable.
- The distribution of CBAM costs among consumers, importers, exporters, and producers will depend on the dynamics within the markets for the individual products on which the CBAM costs are applied. Several studies point out that ultimately CBAM costs will be borne by the EU consumer.
- As part of the Omnibus package measures to reduce the CBAM's administrative burden without compromising its climate protection objectives were introduced.
- In December 2025 the European Commission adopted a series of implementing and delegated acts coupled with a legislative proposal intended to close loopholes to prevent circumvention and strengthen the efficacy of the EU's Carbon Border Adjustment Mechanism (CBAM). Together they complement the CBAM legislative and regulatory framework that will govern the definitive period.

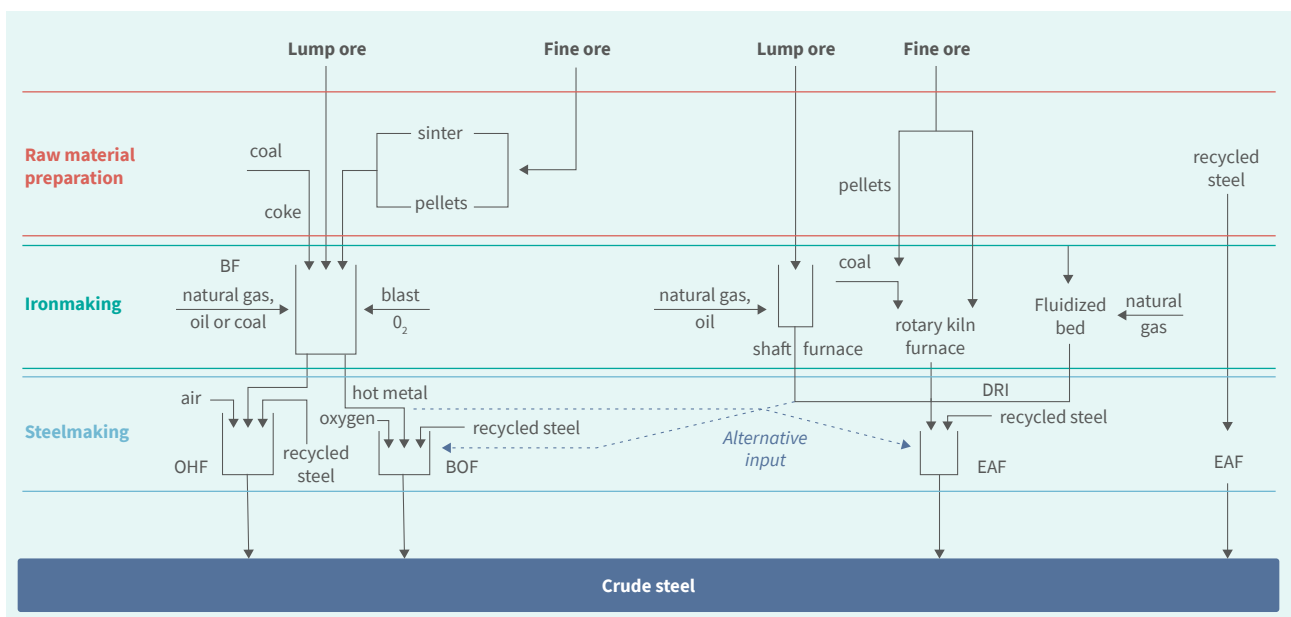
2 Iron and steel production processes

This section describes both the current processes for iron and steel production and the potential future application of green hydrogen (GH₂) in the decarbonisation of the sector.

2.1 Current production technology

The dominant process routes for iron and steel production globally are shown in Figure 1, and include (i) a blast furnace coupled with either a blast oxygen furnace (BF/BOF) or an open-hearth furnace (OHF); (ii) the combination of a direct reduced iron (DRI) process and an electric arc furnace (EAF); and (iii) an EAF using recycled steel. All three routes give rise to GHG emissions. These emissions arise from the use of gas and coal as both an energy carrier and a reductant, and from electricity use (unless electricity is sourced from renewables).

Figure 1: Steel production routes (World steel association, 2019)



The Blast Furnace (BF)/Basic Oxygen Furnace (BOF) route remains the most widely used steelmaking process globally. It also dominated South African steel production until a shift toward EAFs over the past two decades, as discussed later in the case study. In a blast furnace, iron ore is heated along with coke (which is in turn made from coal). CO₂ is released when the coke combusts with oxygen in the air. Limestone is also added to remove impurities, resulting in additional CO₂ emissions. In the subsequent steelmaking process, which typically takes place in a Basic Oxygen Furnace (BOF), the iron is refined into steel, producing CO₂ from the combustion of fossil fuels for heating and oxygen production. Scrap steel can also be added to BOF in limited quantities. In this process route, iron and steel production are often co-located, with molten metal produced in the blast furnace being used in its liquid phase as the feed for steelmaking in the BOF.

The second most widely used production route for primary steelmaking is the Direct Reduced Iron-Electric Arc Furnace (DRI-EAF) route. Here, the iron ore feed is reduced in a DRI furnace. The key reduction agents, hydrogen (H₂) and carbon monoxide (CO) are typically produced using natural gas, although coal can also be used. Natural gas-based production is generally more efficient than coal-based gasification (IEA 2020). The material remains solid, as opposed to reduction taking place in the liquid phase, as in a blast furnace. The reduced iron ore is then melted in the EAF, to which scrap can be added. Given that iron ore is reduced in the solid phase, it may be viable to have iron-making facilities located geographically separately from the EAFs used in steelmaking.

In the final production route shown in Figure 1, the EAF produces crude steel from scrap steel, without a requirement for iron ore. Greenhouse gas emissions from this process route are primarily those associated with the high electricity demand of the EAF. Historically, steel produced via the scrap-EAF route has been of lower quality than virgin steel produced via the BF-BOF or DRI-EAF routes; however, higher-quality steel is increasingly being produced via this route. It does, however, increase scrap management requirements (to ensure consistent high-quality scrap inputs) and higher capital expenditure. Currently, there are certain applications that require virgin steel from the BF-BOF or DRI-EAF route; however, this may not be the case in the future.

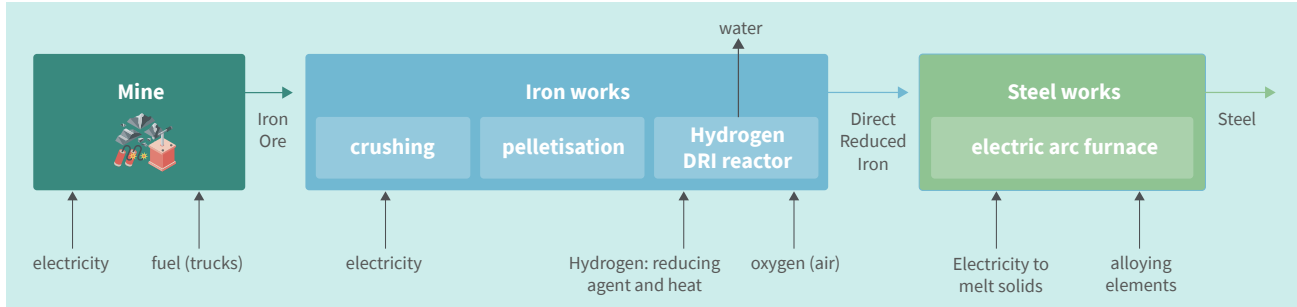
2.2 Alternative production via Power-to-X

Recognising that the more widely used routes for producing iron and steel are greenhouse gas emissions-intensive, globally, the sector has been seeking alternative production routes with lower emissions. Power-to-X (PtX) refers to a group of technologies that use renewable electricity to produce green hydrogen (GH₂) through a process known as electrolysis. The GH₂ thus produced can be used directly as an energy carrier, or converted into other energy carriers such as synthetic fuels, methanol, and ammonia. Methanol and ammonia derived from hydrogen can also serve as chemical intermediates and final products in a wide range of applications.

Hydrogen is also used as a feedstock and energy carrier in a wide range of industrial processes, including the production of iron and steel. In green iron and steel production (Figure 2), GH₂ can act as both a reductant and an energy carrier for the reduction of the iron ore in a DRI, producing water as the only reaction by-product. This differs from the natural gas (NG)-DRI route, where a combination of CO and H₂ is used in the reduction reaction, producing carbon dioxide and water as by-products. Many current DRI facilities (which make up around 30% of global primary production and a small percentage of South Africa's production) could theoretically be modified to operate with GH₂ as a replacement for a mixture of CO and H₂.

The main challenge in using GH₂ for steelmaking is related to high production costs rather than technical issues. As these costs decrease, this method is likely to become the only feasible way to produce virgin steel with low GHG emissions, unless the cost of carbon capture and storage drops significantly. This is unlikely in South Africa for several reasons, chiefly the lack of suitable geological storage sites or disused oil wells that would allow storage at an affordable cost.

Figure 2: Iron and steel production using hydrogen



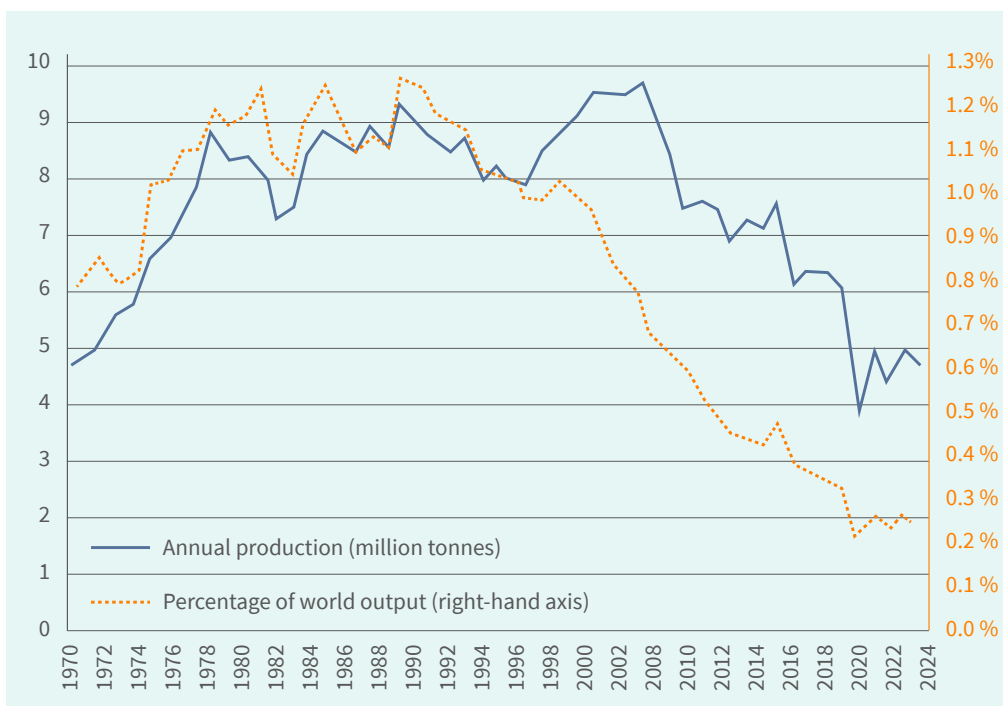
Source: CSIRO 2026 South Africa’s iron and steel sector

South Africa has produced steel via all three production routes in the past and has the potential to produce GH₂-based green steel. These issues are discussed in more detail below.

2.3 Historical South African production trends

South Africa was the 7th largest producer of iron ore in 2023, contributing 2.5% of global iron ore output (USGS, 2025). South Africa produced 63.2 million tonnes (Mt) of iron ore, and around 95% of this production was the high-quality hematite ore prized for steelmaking (Minerals Council, 2023). High-quality iron ore enabled South Africa to build a globally significant iron and steel industry. Total production peaked in 2006 at 9.7 Mt, while South African output as a percentage of global output peaked in the early 1990s at 1.27%. Since 2006, however, local steel output has declined substantially, driven by disruptions to electricity supply (due to a national electricity crisis and exacerbated by poor maintenance of municipal distribution networks), a reduction in local demand (linked to slow economic growth and a lack of large-scale infrastructure projects), increased logistics and input costs (linked to deteriorating South African rail network and port performance), and an increase in imports (connected to an oversupply of steel internationally) (The dtic, 2021; Chibanguza, 2024; Mark & Rose, 2025).

Figure 3: South African steel output (1970-2024)



Sources: (Our World in Data, Undated; Worldsteel, 2025)

Historically, ArcelorMittal South Africa (AMSA) dominated steel production in South Africa. It evolved out of the state-owned Iscor¹, which received significant public support and protection to become a national champion (AMSA, Undated b; The dtic, 2023). The traditional technology used to produce iron and steel (BF-BOF route) generated significant economies of scale, resulting in a highly concentrated iron and steel market in South Africa (Maimela, 2025). In 2008, the total installed steel production capacity in South Africa (excluding stainless steel) was approximately 10.3 million tonnes per annum (Mtpa) (Kuma Iron Ore, 2011). Only two companies in South Africa could produce virgin steel: AMSA (6.1 Mtpa) and Evraz Highveld Steel and Vanadium (1 Mtpa). Additional Electric Arc Furnace (EAF) steelmaking capacity was contributed by AMSA (1.7 Mtpa), Scaw Metals (0.6 Mtpa), Cape Town Iron and Steel (CISCO) (0.3 Mtpa) and DAV Steel (0.6 Mtpa). In addition to accounting for around three-quarters of production capacity, AMSA also supplied the bulk of local steel demand in South Africa (including imports) during the 2000s. AMSA supply peaked at 86% of the local market in 2003 (Makgetla, 2024).

An important recent feature of the South African iron and steel market is an increase in the number of independent mini-mills using EAF to produce steel from scrap metal from 3 in 2008 to 11 in 2025 (see Table 1). Mini-mills can produce most types of steel, but due to lower investment costs and less onerous scrap metal requirements, they have largely focused on lower value long steel products in South Africa. That said, more than a quarter of mini-mill output is exported. Since the mid-2010s, the South African government has been supporting the development of mini-mills as a way to support more inclusive ownership in the sector and to reduce the market power of AMSA (Makgetla, 2024; Creamer, 2022; Landman, 2025; The dtic, 2025). The main forms of support were concessional funding from the Industrial Development Corporation of South Africa (IDC), periodic export restrictions on scrap metal, preferential pricing regulations that force local scrap merchants to offer scrap metal at a 30% discount on an international benchmark price to mini-mills (scrap merchants also have to pay transport costs) before it can be exported, and an export tax on scrap exports.

Global excess capacity in iron and steel production, resulting from a more than doubling of steel production capacity since 2000, combined with increased tariffs in developed countries, led to an increase in steel imports into South Africa.² While South Africa was historically a net exporter of crude steel, it became a net importer in 2020 and imports now account for roughly a third of local steel demand (SAISI, 2022; Makgetla, 2024; The dtic, 2025).

The combination of increased mini-mill output and imports had a significant impact on the structure of the South African iron and steel market. By 2023, AMSA's share of local steel sales (including imports) fell to 39%, and in 2024 mini-mills were responsible for 45% of the crude steel produced in South Africa (Makgetla, 2024; Ngwadla, 2025).

1 ISCOR's operations were unbundled into mining (Kumba Resources) and steel (Iscor) operations in 1999. In 2003, LNM Holdings, which later became part of the Luxembourg-based multinational ArcelorMittal, acquired Iscor (AMSA, Undated b). The local entity started trading as ArcelorMittal South Africa in 2006.

2 Increased tariffs in developed countries led to iron and steel imports being diverted to markets with lower tariff barriers, like South Africa.

Table 1: Plants producing iron and steel in South Africa

Province	Plant	Iron process	Steel process	Products produced	Operating
Gauteng	AMSA – Vanderbijlpark	BF & DRI	BOF	Flat steel: PL HRC CRC C GCC	Yes
	AMSA – Vanderbijlpark		EAF	As above	Closed
	AMSA – Vereeniging	Scrap	EAF	Long steel: SS B&R RB SP	Closed
	Cape Gate – Davsteel	Scrap	EAF	Long steel: SS B&R RB	Yes
	Scaw Metals	Scrap & DRI	EAF	Long steel: SS RB Flat steel: HRC	Yes
	SA steel Mills (Pro-roof Grp)	Scrap	EAF	Long steel: SS RB	Yes
	Force Steels (Fortune Steels)	Scrap	IF	Long steel: SS RB	Yes
	Veer Steel (India Steel)	Scrap	IF	Long steel: SS RB	Yes
	Chung Fung Metals	Scrap	EAF	Long steel: RB	Yes
	North West	Unica Iron and Steel	Scrap	IF	Long steel: B&R SS
Western Cape	Kamal Cape Town Iron and Steel (CISCO)	Scrap	EAF	Long steel: B&R	Yes
	SA Steelworks	Scrap	IF	Long steel: B&R, RB	Yes
	AMSA – Saldanha	Corex/Midrex (DRI)	Conarc (EAF/BOF hybrid)	Flat steel: HRC	Care and maintenance
	Duferco Steel Processing	N/A	Re-rolling	Flat steel: CRC GCC	Yes
Eastern Cape	Coega Steels (Agni Steels SA)	Scrap	IF	Long steel: B&R RB	Yes
KZN	SAFAL	N/A	Re-rolling	Flat steel: C GCC	Yes
	AMSA - Newcastle	BF	BOF	Long steel: B&R SS RB	Yes (but unclear future)
	United Heavy Industries	Scrap	EAF	Long steel: B&R	Yes

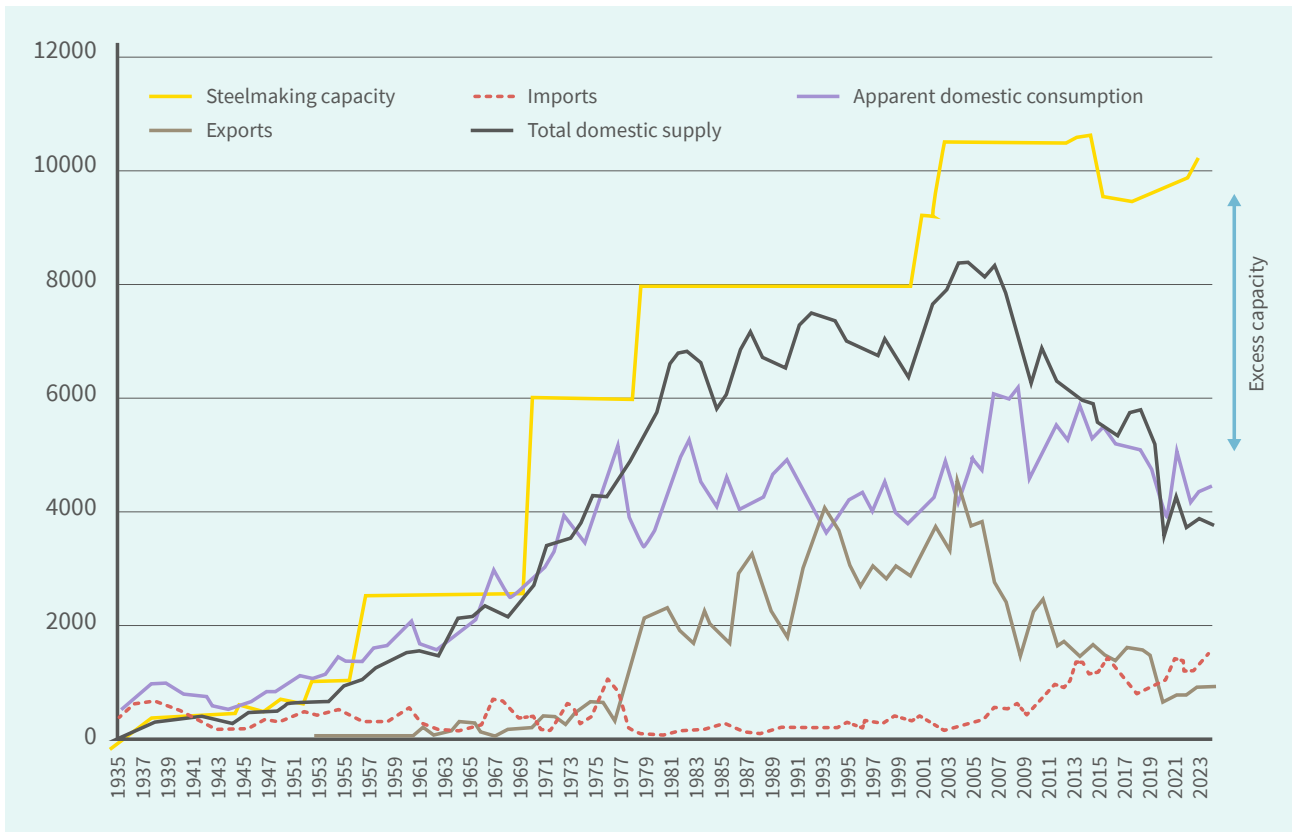
Mpumalanga	AMSA - Highveld Steel – structural mill		Re-rolling	Long steel: SS	Yes
	Highveld Robusteel	BF	BOF	Long steel: SS	Care and maintenance
	Columbus Stainless	Scrap	EAF	Flat steel: PL HRC	Yes

Sources: (The dtic, 2021; The dtic, 2025; Maimele, 2025; United Heavy Industries, Undated; SAISI, 2022; AMSA, Undated; Makgetla, 2024; Scaw, Undated; Coega Steels, Undated; SA Metal Group, Undated) (ArcelorMittal, 2025; Creamer, 2024; Columbus Stainless, Undated; Creamer, 2018)

Key | Processes: Blast Furnace (BF), Basic Oxygen Furnace (BOF), Direct Reduced Iron (DRI). Electric Arc Furnace (EAF), Induction Furnace (IF) Cold rolling and coil coating (Re-rolling). Long steel: Structural Sections (SS), Bar & Rod (B&R), Rebar (RB), Seamless Pipe (SP) Flat steel: Plate (PL), Hot Rolled Coil (HRC), Cold Rolled Coil (CRC), Galvanised Coated Coil (GCC), Organic Colour Coated Coil (C).

Continued investment in mini-mills during a period of declining local demand and increased imports have led to significant overcapacity in the South African iron and steel industry (see Figure 4). This has led to several entities entering business rescue, and the future of AMSA’s Newcastle plant becoming uncertain (The dtic, 2025; The dtic, 2024). While three plants have stopped operating, only one (AMSA Vereeniging) appears to have been permanently decommissioned, with the other two being placed on care and maintenance. The EAF capacity at AMSA’s Vanderbijlpark ceased operation in the early 2010s (see Table 1). There are still opportunities for investment in specific niche markets however, as shown by Scaw Metals recent R5 billion upgrade of its plant to enable it to also produce flat metal products (Creamer, 2024).

Figure 4: Evolution of the South African steel market, 2035-2023 (mtpa)



Source: (The dtic, 2025)

While South Africa does have installed DRI capacity, which will be necessary to produce virgin green steel (see section 2), it is unclear how many of these facilities are currently operational. Only approximately 7% of the 2.9 million tonnes of iron produced in South Africa in 2024 was produced using DRI (0.2 million tonnes) (Worldsteel, 2025). All the DRI iron produced in South Africa is used in integrated steelmaking processes, and South Africa currently lacks a merchant DRI plant to supply third-party steel producers like mini mills (Ngwadla, 2025).

Developments in the South African steel market broadly mirror those in the global market.

There is significant overcapacity in international steel markets, with capacity utilisation remaining between approximately 60-80% since the start of the millennium. The amount of overcapacity is expected to increase up to 2026, as new capacity additions will exceed retirements (OECD, 2024). Overcapacity in international steel markets is also expected to worsen as steel tariffs implemented in the US (and retaliatory tariffs elsewhere) are expected to exacerbate this situation as trade is diverted to lower-tariff jurisdictions (Bounds, 2025).

Internationally, there has also been a move towards producing steel via the EAF route. The percentage of total steelmaking capacity globally contributed by EAFs increased from 30% in 2020 to 32% in 2025, and is expected to grow to 36% by 2030 based on project announcements (Grigsby-Schulte, et al., 2025). The shift towards EAF steelmaking is likely to lead to a shortage of scrap metal globally, and several countries have imposed or are considering export restrictions on scrap metal exports (including the EU) to divert supply to local EAF facilities (Kumar, 2024; Yermolenko, 2024; Landman, 2025; European Commission, 2025; Worldsteel, 2021). DRI ironmaking has not kept up with the growth in EAF capacity, and this is one of the factors leading to increased demand for scrap metal inputs in EAF steelmaking (Grigsby-Schulte, et al., 2025).

2.4 Green iron and steel production potential in South Africa

South Africa is well positioned to be a producer of both green iron for direct export and green steel products to meet local and global demand, given its substantial iron ore reserves, long experience in the sector, and high potential for renewable electricity generation to produce GH_2 at scale and at low cost.

ArcelorMittal South Africa (AMSA), the country's largest producer, has considered the production of green steel using GH_2 . In its 2023 decarbonisation roadmap, ArcelorMittal outlines an ambition to reduce its overall carbon intensity from a 2018 baseline of 2.90 tonnes of carbon dioxide (tCO_2e) per tonne of crude steel to 2.16 $\text{tCO}_2\text{e}/\text{t}$ crude steel (a 25% reduction) by 2030, and to 0.40 $\text{tCO}_2\text{e}/\text{t}$ crude steel (equivalent to an 86% reduction) by 2050. GH_2 is noted in their plans to play a role in meeting the 2050 target (ArcelorMittal, 2023) (IPCC, 2006). The roadmap highlights the currently mothballed Saldanha Steel site as the primary candidate for initially adopting green hydrogen production. At this site, the current production line includes two licensed technologies, known as the Corex and Midrex processes. Corex is a two-unit process that represents an environmentally preferred alternative to the blast furnace. Midrex is a DRI process. Midrex is ordinarily configured to use natural gas to produce hydrogen and carbon monoxide, although at Saldanha the Midrex operated uses off-gases from the Corex process.

In its exploration of opportunities for green steel production, AMSA identified the Midrex unit as suited to production of green steel using GH_2 . While converting the plant to produce green DRI would be significantly cheaper than investing in a new DRI plant, some investment would still be required to modify it to operate on hydrogen. Being a DRI process, Midrex reduces iron in the solid state. Although the facility has the necessary infrastructure to convert the iron to steel on site, the iron could also be transported elsewhere for further processing. The Saldanha Midrex plant has a capacity of 0.8 Mt of DRI per annum³, with the overall plant capacity being in the order of 1.35 Mt of liquid steel per annum.

The company was pursuing a partnership with Sasol to explore the production of green hydrogen and derivatives. However, at the start of 2025, AMSA and Sasol announced the shelving of their GH_2 production plans, which was attributed to high costs and shifting company priorities.

3 https://www.midrex.com/wp-content/uploads/MidrexSTATSBook2024.Final_.pdf

3

Potential impact of the CBAM on iron and steel imports from South Africa into the EU

A myriad of factors determine the competitiveness of steel exports. Most of these factors will not be influenced by the CBAM. ⁴ Producing green steel using GH_2 results in negligible direct CO_2 emissions, assuming non-fossil fuel process inputs are used. ⁵ The price of green steel imported into the EU is therefore not impacted by the CBAM mechanism. CBAM can, however, make green steel imports to the EU more attractive by increasing the cost of imported iron and steel produced using fossil fuel-heavy production. The cost of producing zero-carbon green steel is currently higher than that of producing iron and steel via fossil fuel-heavy routes. The cost differential stems from higher upfront capital and energy costs ⁶(specifically the cost of GH_2 used in the process). Thus, for CBAM to make green steel imports into the EU more attractive than carbon-intensive steel, the additional CBAM costs on carbon-intensive imports need to exceed the green steel production cost premium.

4 These include, for example, iron ore prices, scrap metal prices, labour costs, etc.

5 The inclusion of indirect emissions from iron and steel production into the CBAM scope is currently uncertain, so that it is excluded from the analysis.

6 The cost of other inputs will be broadly similar between the two processes.

4 CBAM as a driver for industrial decarbonisation

South Africa is theoretically well-positioned to produce green iron and steel, given its potential to produce low-cost GH_2 and the availability of high-quality iron ore reserves. ArcelorMittal's mothballed Saldanha Works utilises technology that can be converted to produce green iron and steel from GH_2 at a lower cost than a new plant. ArcelorMittal entered several partnerships to explore this opportunity, and in its 2023 South Africa Decarbonisation Roadmap, expressed the hope that this could enable ArcelorMittal to become "the first African producer of low-carbon intensity steel" (ArcelorMittal, 2023).

In January 2025, however, as ArcelorMittal struggled with challenging trading conditions in the South African market (see section 0), it announced that it was halting development of green iron and steel at its Saldanha Works (Van Diemen, 2025). ArcelorMittal's global strategy has also moved away from focusing on GH_2 -derived green steel towards greater utilisation of EAFs, despite having received billions of Euros of grant funding from governments in the EU and Canada (Martin, 2025; SteelWatch, 2025). In its 2024 sustainability report released in April 2025, ArcelorMittal's CEO mentions that it is "becoming increasingly clear that transformational ironmaking... [like] moving to green hydrogen DRI-EAF, is only likely to be economical post 2030" (ArcelorMittal, 2025). Furthermore, the report highlights that this will only happen if policies are implemented to address high capital and operational costs. The report concludes that the current level of uncertainty in the global steel market linked to overcapacity and a lack of willingness from consumers to pay a premium for low-carbon steel, mean that long-term decarbonisation planning is currently not attractive (ArcelorMittal, 2025; ArcelorMittal, 2024b). Other large steel producers, like Thyssenkrupp, have also significantly scaled back their green steel plans in recent months (Martin, 2025b).

The OECD (2025) emphasises that while GH_2 -based steel currently faces significant cost and competitiveness challenges, these are likely to become less as technologies improve. Arguably a bigger barrier to the deployment of green steel, however, is "overcapacity, the massive presence of market distortion and... resulting trade frictions" in the steel market (OECD, 2025). This negatively impacts the health of steel companies and reduces incentives to invest in new green iron and steel capacity.

The current overcapacity in global steel markets also creates incentives for firms to dump steel at below production costs in the EU and other markets (South Africa, for example, currently has anti-dumping measures in place on steel from several countries) to increase low plant utilisation rates. This weakens the impact of price-based mechanisms, such as the CBAM, since firms are not making decisions solely based on market prices.

Because of these factors, it is believed that supply-side measures (e.g. state aid, innovation support and the CBAM) alone will not incentivise increased production of low-carbon steel, and additional demand-side measures like labelling requirements and public procurement rules to increase the green premium for low-carbon steel would be necessary. This sentiment is shared by Hydrogen Europe, the Hydrogen Council, the Renewable Hydrogen Coalition and the International Partnership for Hydrogen and Fuel Cells in the Economy (IPHE) (Collins, 2025). The proposed use of public procurement to create lead markets for low carbon goods in conjunction with other demand side measures like low carbon product labelling (which will be based on the CBAM methodology) as part of the Clean Industrial Deal, are indicative of the type of measures called for by European industry (European Commission, 2025d).

Given the high level of uncertainty in global steel markets and the highly competitive nature of the European market, the CBAM would need to provide an obvious cost advantage to GH_2 -based green steel to incentivise investment by South African entities in green steel capacity.

5

Policy implications and future research

Although the EU CBAM may represent an opportunity for export-oriented installations in South Africa, it is assumed that the EU CBAM, on its own, is unlikely to increase the competitiveness of green steel exports from South Africa to the EU in the short and medium term. Further research could be carried out on what aspects of CBAM design and also what complementary measures (e.g., lead markets, demand side incentives, hydrogen bank international leg) could be proposed to increase the competitiveness of green steel exports from South Africa to the EU in the foreseeable future.

In the GH_2 -based DRI-EAF process, the production of iron and steel can be geographically separated, offering an opportunity to produce iron in South Africa using hydrogen and then export it to Europe for further processing into steel. Further research could be carried out on the influence of CBAM on the competitiveness of DRI imports from South Africa into the EU.

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