



Centre for
Environmental Rights
Advancing Environmental Rights in South Africa



Tackling Climate Change

The Role of the Steel Industry
in South Africa



According to the IPCC Sixth Assessment Report of Working Group III: Mitigation of Climate Change, **limiting global warming to 1.5°C or 2°C would mean “rapid and deep” emissions reductions in “all sectors” of the global economy.** The IPCC report found that **industrial emissions accounted for 24% of greenhouse gas emissions in 2019, second only to the energy sector.**¹

The steel sector is a major industrial emitter and global efforts to tackle climate change must involve “rapid and deep” emissions reductions in the steel sector, especially given the role of steel in infrastructure development.



THE IRON AND STEEL SECTOR ACCOUNTS FOR
2.6 GIGATONNES OF CARBON DIOXIDE EMISSIONS ANNUALLY,
ACCOUNTING FOR **7 – 9% OF WORLDWIDE CARBON EMISSIONS.**



The steel sector is currently **the largest industrial consumer of coal**, which provides around **75% of its energy demand.** Coal is used to generate heat and to make coke, which is instrumental in the chemical reactions necessary to produce steel from iron ore.²



The iron and steel sector accounts for **more emissions than all road freight.**



To meet global energy and climate goals, **emissions from the steel industry must fall by at least 50% by 2050**, with continuing declines towards zero emissions being pursued thereafter. In this regard, the IPCC report found that there were several technological options for very low to zero emissions steel. These processes are explained briefly below.

¹ <https://www.carbonbrief.org/in-depth-qa-the-ipccs-sixth-assessment-on-how-to-tackle-climate-change>

² This is a simplification of the whole process. There are some other elements but these yield minor emissions and can also be decarbonised.



How is steel traditionally made?

In very simple terms making steel involves the conversion of coal into coking coal in a coke oven. The coking coal is then melted with iron ore in a blast furnace to make iron, which is converted to steel in a Basic Oxygen Furnace. Most GHG emissions from new iron and steel come from the blast furnace.

What is green steel?

A zero-carbon steel-making process involves the replacement of coking coal with green hydrogen. This process has been proven in pilot scale furnaces and is on the brink of commercialisation. It is called hydrogen direct reduced iron – we call that H-DRI in the diagram below. The iron is then converted to steel in an electric arc furnace powered by renewable energy. The whole process can be virtually GHG emissions free.³

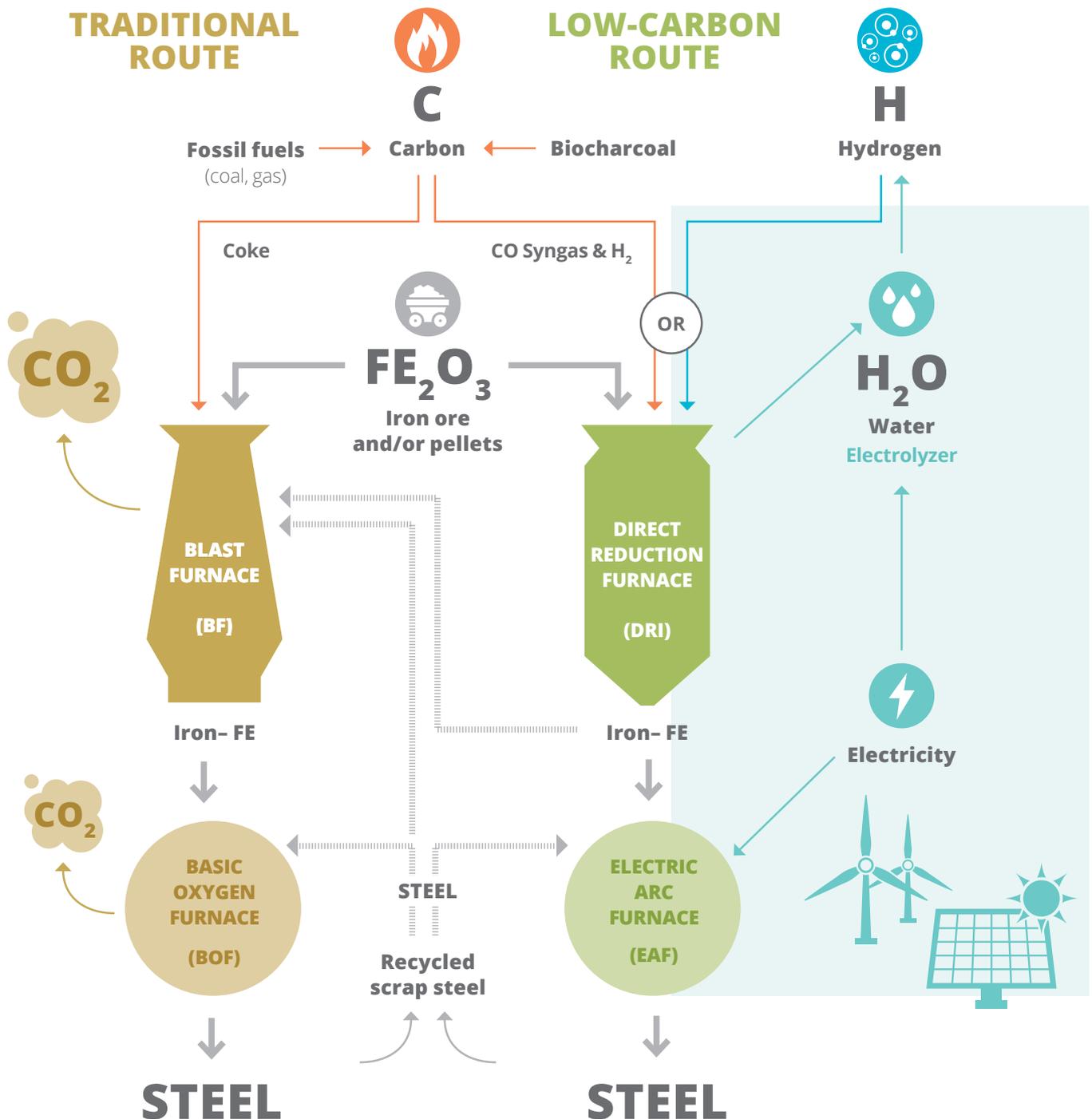


Figure 1: BF-BOF primary steelmaking compared to the hydrogen DRI-EAF process.⁴

³ This is a simplification of the whole process. There are some other elements but these yield minor emissions and can also be decarbonised.

⁴ <https://www.iddri.org/en/publications-and-events/scientific-publication/how-green-primary-iron-production-south-africa-could>



How Green Hydrogen can be used to decarbonise steel-making?

Until recently many thought it impossible to decarbonise steel making. But there is now growing acceptance that green hydrogen can play an important role in the decarbonisation of steel-making.

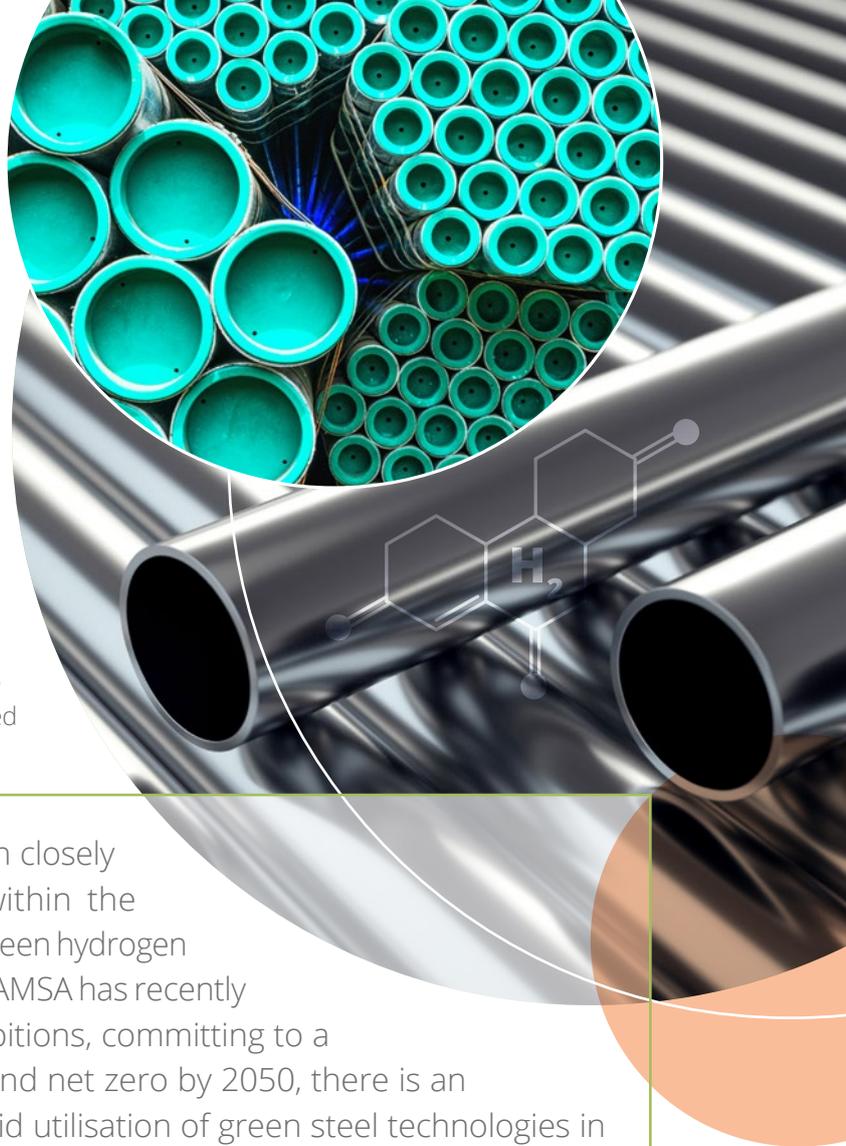
For example: ArcelorMittal announced plans for a steel plant in Sestao, Spain which will become the world's first full scale zero-carbon emissions steel plant, and will produce zero-carbon steel across scope 1 and 2 emissions as early as 2025, with an expected annual output of 1.6 million tonnes of steel.⁵

ArcelorMittal South Africa (AMSA) can closely follow the rapid developments within the ArcelorMittal Group and ensure that green hydrogen is at the centre of its transition. While AMSA has recently released its climate targets and ambitions, committing to a 25% emissions reduction by 2030 and net zero by 2050, there is an opportunity for AMSA to ensure rapid utilisation of green steel technologies in advancing its climate commitments.

It is now no longer a question of whether the technology is available but whether AMSA is taking the steps to ensure that it has the necessary financial, technical and other support needed to support an urgent decarbonisation transition in its iron and steelmaking processes. This will be incredibly important for local steel-maker ArcelorMittal South Africa (AMSA) which is the third highest GHG emitter in South Africa, with a long history of environmental non-compliance and pollution.⁶ Although AMSA is majority owned by the ArcelorMittal Group, it is failing to transition as quickly as other subsidiaries in the ArcelorMittal Group, particularly those in Europe.

With local iron ore reserves, existing infrastructure, and among the lowest cost⁵ abundant renewable energy in the world, AMSA has every commercial reason to be a leader in the green steel industry and worldwide steel value chains. Net zero policies in key markets and the steel industry create immense opportunities for AMSA to decarbonise. This is outside of any pressure being placed on them by government by taxes or civil society due to climate concerns. There is huge commercial opportunity in transforming operations.

South Africa could also use access to EU markets both to earn substantial export revenues and to kick-start the local and regional green steel industries. With steel being an integral component of Africa's development, the ability of steel-makers like AMSA to ensure "rapid and deep" emissions reductions is immensely important for tackling climate change - ensuring sustainability of people and the planet, not to mention its own economic sustainability.



⁵ ArcelorMittal, Climate Action Report 2 (July 2021) at page 10. See https://corporate-media.arcelormittal.com/media/ob3lpdom/car_2.pdf

⁶ <https://cer.org.za/wp-content/uploads/2019/05/AMSA-Full-Disclosure-5-web-1.pdf>