

# UK STEELMAKING

## The technical, economic and environmental options

*Alongside the UK Government's Steel Strategy, published on 19 March, the government released a new report, UK Primary Steelmaking Review 2025, commissioned from the Materials Processing Institute (MPI). The MPI is the UK's leading centre of expertise on steelmaking (formerly headed, incidentally, by Industry Minister Chris McDonald MP). The report is an excellent and thorough document that provides a definitive assessment of options for the future.*

*This note summarises the key evidence in the MPI report and assesses the implications for policymaking and investment.*

### **The need for 'primary iron'**

If the UK is to continue to produce a wide range of steel products it has an unavoidable demand for 'primary iron' – that is, virgin metal to feed into the steelmaking process alongside or instead of scrap metal.

Primary iron has traditionally been produced from iron ore by blast furnaces. The blast furnaces at Port Talbot in South Wales were closed in 2024, to be replaced by an electric arc furnace (EAF) now under construction that will produce steel from scrap. At Scunthorpe in Lincolnshire, the UK's two remaining blast furnaces are still in operation but the government's Steel Strategy expects that in due course they too will be replaced by electric arc furnaces.

The problem is that because of the contaminants in scrap steel, electric arc furnaces fed by scrap alone cannot produce all the grades of steel required. Most girders and reinforcing bars can be produced from scrap alone but for other products electric arc furnaces need to blend scrap with primary iron. The MPI report identifies the proportion of primary iron required to help make selected key items:

Car body panels	35-40%
Deep sea pipe	variable
Steel plate	20-25%
Beverage cans	35-40%
White goods	20-25%
Rails	25-50%
Engineering steels	variable

If UK producers are to continue to supply these markets, this translates into a demand for primary iron. The MPI report estimates this demand (in tonnes per year) in two scenarios:

	Scenario 1*	Scenario 2**
Plate	75,000	300,000
Construction long products	150,000	300,000
Forgings, aerospace	80,000	150,000
Pipe, construction	200,000	375,000
Hot rolled coil	500,000	600,000
Demanding coil, packaging	150,000	200,000
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UK demand for primary iron	1,155,000	1,925,000

\*Production builds from 2027 to 7mtpa and 100% electric arc by 2030

\*\*Domestic production supplies 80% of a 15mtpa UK long term market

Scenario 1 is essentially 'business as usual', with electric arc furnaces on stream at Port Talbot and Scunthorpe and UK producers supplying around 40% of the total domestic market – roughly the same share as just before the closure of the Port Talbot blast furnaces. Scenario 2 involves a larger share of a slightly larger UK market.

These scenarios require between 1 and 2 million tonnes a year of primary iron.

## Sources of supply

### *Scrap steel*

The UK presently recovers 10-11m tonnes of scrap steel a year, of which just over 2m tonnes a year is recycled in the UK and the remainder exported. In theory there should therefore be little difficulty, at least in the short-run, in supplying an increase in UK demand for scrap steel as new electric arc furnaces come on stream. This is the view of the MPI report and the British Metals Recycling Association.

On the other hand, an increase in demand for scrap steel in the UK and across the rest of Europe, as other countries move to electric arc production, is likely to raise prices. There may also be caps on availability. The MPI report suggests that if the maximum available scrap resource in the UK is 10m tonnes a year, in Scenario 2 there will be an additional UK demand for primary iron of 1m tonnes a year, bringing the total to 3m tonnes a year.

### *Primary iron*

If the remaining blast furnaces at Scunthorpe are replaced by electric arc furnaces (as anticipated in the Steel Strategy) and if there were to be no new primary iron capability in the UK, the whole of the UK's primary iron supply would need to be imported.

If this imported primary iron comes from blast furnaces, the effect would be to displace the carbon emissions from the UK to other countries, which partially undermines one of the key arguments for moving over to electric arc production.

Just at present the steel used in the rolling mills at Port Talbot is being imported, in effect transferring the primary iron production and the associated carbon emissions to elsewhere in the world.

### **Direct reduced iron**

The alternative to the production of primary iron in blast furnaces is a technology known as 'direct reduced iron' (DRI). This involves heating iron ore with natural gas, or hydrogen if it is available, to extract the metal which can then be fed into an electric arc furnace alongside scrap or on its own, depending on the technical requirements.

DRI can have the air of a fanciful idea, beloved by scientists. The MPI report comprehensively demolishes this notion. DRI is a mature technology that is now the focus of substantial investment across the globe. As the report puts it, "this emergence of EAF + scrap + DRI is in line with the majority of current US steelmaking capability and with all major steelmaking transformation investments currently announced across Europe during the early 2020s". The MPI report identifies nearly a dozen DRI investment projects underway across Europe:

	Capacity (mt p.a.)	Target date
Lulea, Sweden	1.35	2026
Boden, Sweden	2.1	2026
Hamburg, Germany	0.1	2026
Salzgitter, Germany	2.1	2026
Duisburg, Germany	2.5	2027
Dillingen, Germany	2.5	2028
Fos sur Mer, France	2.0	2029
Inkoo, Finland	2.0	2029
Gallivare, Sweden	1.35	2030
Ijmuiden, Netherlands	3.0	2030
Puertollano, Spain	1.0	2030

### **Carbon emissions**

The use of DRI to supply the UK's need for primary iron would further reduce the CO2 emissions resulting from UK steel production. The MPI report assesses the CO2 emissions associated with different technologies in the 'business as usual' scenario (Scenario 1 earlier) in which domestic steel supplies 40% of the UK market:

Pre-2027 production	9.8mt p.a.
EAF + scrap + blast furnace iron	3.0mt p.a.
EAF + scrap + natural gas DRI	2.1mt p.a.
EAF + scrap + hydrogen DRI	0.9mt p.a.

These CO2 emissions may or may not be offshored, depending on where blast furnace and/or DRI production takes place. Until late 2027, when the electric arc furnace at Port Talbot is due on stream, a substantial proportion of the CO2 is from blast furnaces outside the UK.

Carbon capture is technically possible, the MPI report says, but probably a non-starter. CO2 emissions occur at multiple points in the production process, retrofitting would be a massive challenge, the gas streams are 'dirty' with particulates and gases other than CO2, and the cost is likely to be prohibitive.

Replacing blast furnace iron with DRI reduces the CO2 emissions but does not eliminate them entirely, partly because of the role of fossil fuels in electricity supply but also because even a hydrogen DRI plant requires a modest addition of carbon to assist processing. The MPI report notes that in the UK a bulk supply of hydrogen at economic prices, produced using fully decarbonised electricity, is still some way off, so DRI plant using natural gas (which could eventually be converted to use hydrogen) is the likely way forward.

The report adds that UK steel consumers need to align their expectations about 'green steel' with this reality or there is a risk of loss of market share to overseas producers, especially in Scandinavia, with access to fully decarbonised electricity.

### **Sovereign capability**

The UK Government's starting point in its Steel Strategy is that "sustaining domestic steel production is necessary for our national security". Without investment in DRI, closure of the blast furnaces at Scunthorpe would leave the UK without the capability to produce primary iron – hardly a situation compatible with sovereign capability.

The MPI report notes that appropriate supplies of primary iron can for the moment be obtained from international markets. However, much of the new DRI capacity due on stream in other countries is intended to serve existing steel mills, so at least through to 2030 UK steel makers are likely to import iron from blast furnaces.

Taking the longer view, the MPI report says DRI capability should be considered "at least medium urgency for the UK under any scenario with production aiming above a restoration of business as usual". A feasibility study for a 2m tonnes a year hydrogen-ready DRI plant, to be on stream by 2028, is recommended.

The UK Government's line is that it is for the steel producers to come forward with potential investments that might be supported by its National Wealth Fund, which has monies earmarked for the steel industry. The problem here is that investment in DRI doesn't figure in the current thinking of UK steel producers and seems unlikely to do so given that the two

biggest producers are foreign-owned corporations with access to primary iron (and indeed semi-finished steel) from plants elsewhere in the world. In Tata's case, for example, its new DRI plant at Ijmuiden in the Netherlands might be expected to supply Port Talbot's needs. It's also hard to see how the single 2m tonnes a year DRI plant favoured by the MPI – which makes sense in terms of UK needs – would fit into a UK steel industry presently dominated by two big producers.

As things stand, it's therefore likely that aspirations for UK sovereign capability in steel production will reach an impasse: the producers won't bring forward plans for DRI, so the UK's requirement for primary iron will have to be met entirely by imports.

There is of course a different way in which the government could secure investment in DRI. This would be to decide that a DRI plant will be built and then to invite bids for funding from the National Wealth Fund. If the government is serious about delivering sovereign capability, this is perhaps the way forward.

### **Takeaway messages**

- **To continue to produce a wide range of steel products following a changeover to electric arc furnaces, the UK will have unavoidable demand for 'primary iron' of 1-3m tonnes a year.**
- **In the short-run primary iron could be imported, but a direct reduced iron (DRI) plant in the UK would involve lower CO2 emissions and ensure sovereign capability.**
- **A DRI plant doesn't figure in the current plans of UK steel producers, so the way to deliver this is to invite bids for funding from the National Wealth Fund.**



**Industrial Communities Alliance**

*The Industrial Communities Alliance is the all-party association of local authorities in the industrial areas of England, Scotland and Wales*

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