May 2022

Friends of the Earth

Briefing

Green steel and Cumbrian coal

Why the intended market for coal from the Whitehaven mine is already declining fast

Communities Secretary Michael Gove will soon decide whether to grant planning permission for a controversial new coal mine near Whitehaven to provide coking coal for the steel industry. Friends of the Earth has opposed the mine since it was first proposed by West Cumbria Mining (WCM), because it would increase carbon emissions, because the market for coal is declining, and because it is not the right way to create long-term, sustainable jobs.

This briefing shows how current developments around green steel mean that demand for WCM's coal in its main markets is likely to fall steeply in the next 15 years, risking leaving the mine as a stranded asset.

What is green steel?

There are two main ways to produce "primary" steel from iron ore:

- Using an integrated blast furnace and basic oxygen furnace (BF/BOF). In this process, coke (derived from coking coal) is mixed in a blast furnace with iron ore. This melts the iron ore and removes its oxygen to produce hot metal. This is processed by a basic oxygen furnace into crude steel.
- Using an electric arc furnace (EAF) to produce steel from direct reduced iron (DRI). Direct reduction also uses iron ore as a raw material but uses gas to remove the oxygen from the solid ore without melting it.

"Secondary" steel production also uses an EAF but the raw material is scrap / recycled steel rather than direct reduced iron. EAFs can use a mix of scrap and DRI, according to availability.

In all three routes, the crude steel is further processed into rolls or sheets and then finished.

The BF/BOF process produces between 1.5 and 3 tonnes of carbon dioxide per tonne of steel manufactured[1]. Carbon emissions from this process can in theory be reduced by fitting carbon capture and storage technology, although in practice there are significant difficulties with this, as discussed further below.

The use of gas means that there are carbon emissions from DRI plants, but these are lower than from the use of coal in a BF/BOF process. However, the plants can also use hydrogen, meaning that the process can be zero or very low carbon if the hydrogen used is produced by electrolysis using renewable energy (known as "green hydrogen"). Modern DRI plants can use a blend of the gas and hydrogen until sufficient green hydrogen is available.

Using scrap steel as a raw material is also a very low carbon route, and so increasing the use of recycled steel is a key part of decarbonisation.

The main market for Cumbrian coal

WCM say that their Whitehaven mine would produce up to 2.78 million tonnes of coal per year until 2049, exclusively for the steel industry. Of this, WCM say that up to 360,000 tonnes (up to 13% of total production) would be used in the UK.[2]

The remainder of the coal (87% or more of total production) would be exported. WCM say their primary market would be "Northern, Southern, Western Europe and Turkey"[3]. This would mean the blast furnace steel plants in Austria, Belgium, Bosnia Herzegovina, Bulgaria, Czech Republic, Finland, France, Germany, Hungary, Italy, Luxemburg, Netherlands, Poland, Romania, Serbia, Slovakia, Spain, Sweden and Turkey.[4] Of these, all but three (Bosnia Herzegovina, Serbia and Turkey) are in the European Union.

The UK steel industry

WCM hope to sell up to 13% of their coal to the UK steel industry, split equally between the two remaining blast furnace steelmaking sites: Tata Steel in Port Talbot and British Steel in Scunthorpe.[5]

However, there are doubts as to whether both sites could use the Cumbrian coal. When the mine was being considered by Cumbria County Council in October 2020, the council's Director of Economy and Infrastructure reported that she had written to Tata Steel and British Steel asking if they would use coal from the mine and that British Steel had replied that "the sulphur content in the WCM coal as applied for in the current proposal is an issue for British Steel currently, due to their operations and blend sulphur limit",[6] in other words, the sulphur content of WCM coal could be too high for them to use. Tata Steel stated "an intention to use the product if the specification and price was acceptable."[7] Thus, it may be the case that the only site in the UK able to use WCM coal would be Tata Steel at Port Talbot.

But the UK steel industry has said it does not need a domestic source of coking coal. In oral evidence to the House of Commons Environmental Audit Committee, committee chair Philip Dunne MP asked "does [the UK steel industry] rely on continuous production

of coking coal domestically or can we relay on imports of coking coal while we need it?" In reply, Frank Aaskov of trade body UK Steel said "At the moment the UK steel industry buys its coking coal on the world market and it will continue to do so in the future. It doesn't necessarily rely on one source versus another." [8] Also, in evidence to the Environmental Audit Committee, British Steel was asked if it was lobbying for the mine to be built, and its representative simply answered "no".[9]

The government is currently hedging its bets on future steel production technology between continued use of coal with carbon capture and storage (CCS) or moving to the use of hydrogen or a mix of the two.[10] However the House of Commons Business, Energy & Industrial Strategy committee recently concluded that "CCS at the Port Talbot site presents a more difficult challenge", reflecting the fact that there is no readily available local storage site for the captured carbon dioxide which might have to be transported to north west England.[11] This point was also made by WCM's expert witness at the planning inquiry.[12]

Nor is it clear that coal with CCS would be the best option for the UK steel industry. Firstly, it could not capture all emissions: UK Steel has stated that CCS on the existing blast furnaces at Port Talbot would only capture 50-70% of emissions. [13] Secondly, the Materials Processing Institute, a globally-recognised centre for innovation in the steel industry, has written that "the addition of CCS to an existing blast furnace producing site 'locks in' the current technology, reducing incentives to invest. This would perhaps not be a problem if taken in isolation, except that switching to new low carbon technologies also results in gains in productivity and, potentially, capability. There is therefore a risk with CCS that the industry risks stagnating in terms of its global competitiveness."[14]

Also, the government's advisors, the Climate Change Committee have recommended that "UK ore-based steel-making be near zero emissions by 2035" and has said that "Coking coal use in steelmaking could be displaced completely by 2035, using a combination of hydrogen direct reduction and electric arc furnace technology". They say that "there may be no domestic use [of coking coal] after 2035." [15]

There is considerable potential for increasing the use of recycled steel in the UK: currently around 80% of UK scrap steel is exported.[16]

In conclusion, there are doubts about the size of the potential UK market for WCM coal both immediately and beyond 2035.

The EU steel industry

The EU27 currently has 95 Mt per annum of blast furnace steel-making capacity.[17] Of this, it is estimated that by 2030, 74% (approximately 70 Mt) will have reached the end of its working life and require reinvestment. By 2035, the share rises to 90% (85.5 Mt).[18]

Steel manufacturers in Europe are already making reinvestment decisions. Two key factors driving these decisions are:

- The European Commission's "Fit for 55" package proposals, which aim to reduce carbon emissions by 55% by 2030. These include proposals to phase in a Carbon Border Adjustment Mechanism (CBAM) from 2026 and, in parallel, to phase out the

free allowances that steel manufacturers currently receive under the EU's Emissions Trading System (EU ETS). The free allowances will be cut by 10% a year starting in 2026, meaning that the steel industry will have to buy permits at the EU ETS carbon price for 50% of its emissions in 2030 and for all of its emissions in 2035.[19] This weakens the business case for the continued use of blast furnaces and if steelmakers decide in the 2020s to re-line blast furnaces to extend their lifetime, then these risk becoming stranded assets.
- The demands of the industry's customers, particularly vehicle manufacturers such as Volvo[20], Volkswagen[21] and BMW[22], for green steel.

As a result, the vast majority of EU steelmakers are choosing to replace blast furnaces that reach the end of their working life in the 2020s with low-carbon technologies. Announcements made to date total 49.7 Mt of steel-making capacity – well over half of the capacity needing reinvestment by 2030. Of this, 36.7 Mt is for direct reduction and 13 Mt is for secondary steel production with an electric arc furnace. Recent announcements include:

- ArcelorMittal has said that its Sestao site in Spain will, by 2025, be the world's first full-scale zero emissions steel plant.[23]
- German steelmaker Salzgitter has said it will move fully to hydrogen and renewable energy-based steelmaking by 2033.[24]
- Swedish steelmaker SSAB has announced that it will transform all its production in Scandinavia to electric arc furnaces powered by fossil-free energy and largely eliminate its CO2 emissions by 2030 – much sooner than its original 2045 target date.[25]

No EU steelmaker so far has announced the deployment of CCS, which would mean a continued use of coking coal: Tata Steel originally announced that its IJmuiden steel plant in the Netherlands would continue to use coal with carbon capture and storage, but has now decided to use hydrogen instead.[26] However, AreclorMittal has announced a CCS demonstration project at its Dunkirk plant which it plans to be in operation with storage capability by 2035.[27]

From announcements already made, the market for coking coal in the EU will decline significantly by the end of the decade. And if, as seems likely, the trend of current developments continues, the market will decline further by the mid-2030s.

Other countries

The remainder of WCM's main market is Bosnia & Herzegovina, Serbia and Turkey:

- The coal-fired steel industry in Bosnia & Herzegovina and Serbia consists of just one plant in each country and is therefore not a significant market.
- Turkey is not a member of the EU but would be directly affected by the Carbon Border Adjustment Mechanism. If its steel industry does not decarbonise, then it faces steep charges to export to the EU, which could add 9% to the cost of steel.[28] Turkey has recently ratified the Paris Agreement on climate change, which could speed up industrial decarbonisation.

Replacing Russian coal?

Some supporters of the Cumbria mine have suggested that it should be given planning permission to avoid countries having to import coal from Russia.[29] However, this view is inaccurate: steel producers use a blend of different types of coal, and the coal from the Whitehaven mine is comparable to, and in competition with, coal from the US east coast, rather than coal from Russia. In evidence to the planning inquiry, experts for West Cumbria Mining stated "West Cumbria Mining is expected to take market share from high cost US HV HCC producers that currently supply the region."[30]

Conclusions

It is clear from the announcements of European steelmakers to build low-carbon steel plants and the broad direction of travel that demand for coking coal in Europe – WCM's primary market – is going to fall sharply, well before the mine's intended end-of-life in 2049.

WCM have said that the coal might be exported to Asia[31] but there is no guarantee that it would have a market there and this would undermine their claims that the use of WCM coal would have a climate benefit due to shorter transport distances.[32]

With a rapidly declining or no market for its coal, there is a major risk that the Cumbrian mine would become a stranded asset, potentially by 2035 – only halfway through its intended lifetime. This would have serious knock-on consequences for the 500 jobs that WCM say the mine would create.

The International Energy Agency has said that, if the world is to be on track for net zero by 2050, then "No new coal mines or extensions of existing ones are needed…. existing sources of production are sufficient to cover demand through to 2050" [33]. UN Secretary General Antônio Guterres has said that investing in new fossil fuel infrastructure is "moral and economic madness."[34]

The mine's climate impacts have been clearly stated by the Climate Change Committee: it would "increase global emissions and have an appreciable impact on the UK's legally binding carbon budgets." [35] Approving the mine would also damage the UK's credibility as president of the COP climate talks until the autumn. Efforts to encourage other countries to take the urgent action needed to cut emissions would be a case of 'do as we say, not as we do'.

The conclusion is clear: planning permission should not be granted for the Whitehaven coalmine and the government should instead ensure that areas such as West Cumbria are at the heart of the green industrial revolution that the UK desperately needs.

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