Making the UK a world leader in the production of clean steel

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Summary

The UK's steel industry is at a crossroads. This industry was once the envy of the world but it is in decline. It is also a polluting industry, at odds with UK climate change commitments. But the UK can both invest in its industrial heartlands and take climate action, with clean steel produced with hydrogen rather than coal. This technology is well on the way with trials underway in Germany, Sweden and China. It is time for the UK to join the race, before it is left behind.

The government should commit to achieving near zero emission steel production by 2035, and to measures to ensure more efficient use of steel. This should be accompanied by support for the trial and commercialisation of hydrogen-produced steel, recognising this as a potential promising route to both decarbonisation and modernisation of this and other sectors.

To achieve this, the government should commit to a phased plan for the industry, bringing forward ambitious targets along with trials which could then lead to the possible commercialisation of this new technology. The timescales for this plan should be:

- 2021: a new commitment and plan for the steel industry.
- 2021-22: a pilot trialling hydrogen-based steelmaking in the UK.
- Mid 2020s: a clean steel hub and agreed delivery strategy for near zero steel.

This could be delivered through a competitive tender, administered by the government or through a private-public partnership, with large scale private funding supported by funds from the government. The government has already earmarked £250 million to help the steel industry decarbonise through its Clean Steel Fund. A new at scale direct reduced iron (DRI) plant could cost around £500 million, but an initial, small scale proof of concept pilot would cost vastly less than this.

If the government invests in clean steel it could see benefits across:

- Innovation and jobs: clean steel could help to revive UK industry, protecting and creating jobs.
- Reaching net zero: clean steel could help the UK reach its emissions reduction targets.
- Levelling up: clean steel could increase investment and level up left behind areas.
- Global Britain: Britain could lead the world on clean steel, potentially increasing trade and exports.

Background: the UK clean steel revolution

There are many issues the government is grappling with, but two stand out. One is reversing the continued decline of the country's industrial heartlands, perhaps no better exemplified than by the UK's steel industry. Once the envy of the world, it supported jobs, communities and manufacturing, and played a huge part in our cultural, economic and social heritage. Today, however, the industry in the UK is in decline and is struggling to survive. The future of this strategically important industry is going to be green. To secure its future, it is important that action is taken now, before the UK is left behind in the world and while discussions about the future of the industry are centre stage.

The second issue is meeting our climate change commitments. At home, the UK has already committed in law to reach net zero carbon emissions by 2050. Globally, 2021 marks the UK's presidency of the Glasgow climate summit (COP26) and the UK is a key steering member of the Clean Energy Ministerial. The UK's two remaining primary steelworks are the two largest single point sources of UK carbon emissions, contributing 15 per cent of UK industrial emissions.[1] The Climate Change Committee has recommended UK steelmaking should reach near zero emissions by 2035.[2] Inaction would put additional pressure on other parts of the economy to reduce their emissions. With the UK hosting COP26, it is critical that it underpins its leadership ambitions on climate change with definitive steps towards achieving net zero across as many sectors as possible.

Against this backdrop, it is vital the government adopts an ambitious decarbonisation plan for the steel sector so that the industry is properly futureproofed. This means using and reusing steel as efficiently as possible, so less primary steel production is required. It also means maximising the use of scrap steel within the UK rather than exporting it as waste only to re-import the high value products other countries turn it into.[3] These actions alone could deliver a significant reduction in UK steel emissions and ensure that the UK is able to export high value steel products, where it is best placed to compete globally.

However, there remains a case for the UK production of primary steel too. In 2018 only 20 per cent of global steel production was from scrap steel, and the International Energy Agency believes that, even at higher recycling rates, scrap availability will put an upper limit on the potential for recycled production globally.[4] Although some experts believe that the amount of steel available for recycling could triple by 2050.[5]

It is here that hydrogen-based steelmaking can help: replacing coal as the reduction agent in a dedicated plant, it can produce new primary steel with near zero emissions. This technique would need to be coupled with electric arc furnaces, retaining and strengthening the UK's steel recycling capacity. Trials of this technology in other countries are underway, including in Germany, Sweden, China and France.[6,7] It is time for the UK to join the race or risk being left behind. With the correct action, the UK can exploit this nascent market and become a world leader, futureproofing the steel sector and the UK's pathway to net zero industry.

A plan to decarbonise steel

The government has made available a range of different funds to support industrial decarbonisation, including the Industrial Energy Transformation Fund and Industrial Strategy Challenge Fund's support for clusters.[8] It has also specifically committed £250 million to a Clean Steel Fund to help the UK steel sector to decarbonise.[9] More support is needed to drive the efficient use, reuse and recycling of steel including further investment in R&D and recycling policy.

There have also been commitments on hydrogen, including a target for 5GW of low-carbon production capacity by 2030, technology trials and a £240m fund. A hydrogen strategy will be published in the summer.

The Industrial Decarbonisation Strategy, published earlier this year, set out a promising range of steps that could make the policy landscape more favourable for clean steel, including continued funding for industrial decarbonisation, a more ambitious emissions trading scheme coupled with a review of measures to protect against carbon leakage, plans to help create a market for clean steel through product labelling and public procurement, and a commitment to look at the competitiveness of industrial electricity prices. All of these could be helpful, but progress is relatively slow with no new funding actually provided in the strategy or clarity on what support would be available for switching fuels to hydrogen, and only one call for evidence launched alongside the strategy. Measures to create a market for clean steel should also be put on a mandatory footing where possible, for instance through construction standards that could also drive better resource efficiency.

Not explicitly mentioned in the strategy but also worth exploring is the option of new border carbon adjustments to level the playing field between imported, polluting products, and cleaner, domestically produced steel.

The government should formally commit to achieving near zero emission steel production by 2035, and to measures to ensure more efficient use of steel. This should be accompanied by support for the trial and commercialisation of hydrogen-produced steel, recognising this as a promising route to both decarbonisation and modernisation of this and other sectors. The plan for the early 2020s should be as follows:

- 2021: a new commitment and plan for the steel industry. By COP26, the government should have set out its commitment to achieve near zero emissions for steel production by 2035 and begun detailed negotiations with the sector and other stakeholders on a delivery timeline and supporting policies. It should also be taking concrete steps to improve the resource efficiency of steel use in the UK.

- 2021-22: a pilot trialling hydrogen-based steelmaking in the UK. With plans to trial hydrogen reduction progressing rapidly in other countries, the government should not wait to have a full decarbonisation plan in place before kickstarting a UK pilot. The main aim of the trial would be to test production, create initial capability, develop world-leading expertise and create a new anchor market for hydrogen. This should be in a strategically important location in the UK and could then be ramped up.

- Mid 2020s: a clean steel hub and agreed delivery strategy for near zero steel. The long term vision for the government should be to build a clean steel hub in the UK that can provide low carbon, hydrogen reduced iron around the country as needed. Ideally, this would be powered exclusively with renewable (green) hydrogen but fossil (blue) hydrogen could be used as an interim solution. The hub could be built in a strategic part of the country, where local resources and steelmaking expertise can be maximised. With at least some clean primary steel production secured, plans could be finalised for managing an equitable transition to low carbon production at other UK steelmaking sites. An agreed delivery strategy for net zero steel should make use of recycled steelmaking in the UK and press for more efficient use of steel in the longer term.

How will it be delivered and how much will it cost?

Our proposal could be delivered through a competitive tender, administered by the government and with private funding backing initial funds from the government. A new at scale DRI plant could cost around £500 million, but an initial, small scale proof of concept pilot would cost much less than this.

The initial pilot trialing clean steel could be funded in partnership with any number of interested businesses, possibly including the Jingye Group, the owners of the Scunthorpe steelworks plant, or Tata Steel, the owners of Port Talbot.

Crucially, existing government commitments could provide much of the funding. The government has already set aside £250 million in the Clean Steel Fund and may also be able to make use of funds committed to industrial clusters and hydrogen. Given the lack of consensus on the Clean Steel Fund's best use and developments since the previous consultation, it could use at least some of this money for the purpose. More importantly, the initial cost of getting clean steel production off the ground will pale in comparison with the economic benefits it will bring, in investment, jobs and exports.

What this means for the UK

If the government invests in low carbon steel manufacture and use it will see social, economic and cultural benefits. As noted above, the two key objectives that can be met are:

- Innovation and jobs: low carbon steel will revive UK industry, and protect and create jobs

The UK is facing a post-Covid19 jobs crisis, and jobs in traditional industries like steel are also under threat from automation and the transition to net zero. Investing in lower carbon manufacture and use of steel can help to revive the UK's strategically important steel industry and protect and upskill existing jobs in steelmaking areas. Measures to encourage efficient use and reuse of steel in the construction sector and other downstream uses would create new areas of expertise for UK workers, generate new jobs and improve productivity.

- Decarbonising steel will help get the UK on track to net zero.
  Rapid reduction of emissions from UK steelmaking would have a significant impact on the UK's total emissions. A clear net zero plan for the sector would also show the way for other industrial sectors. The UK could make a substantial dent in emissions by investing in hydrogen steelmaking, alongside reducing demand for steel where possible and maximising reuse and recycling. This can also help to anchor and drive growth in the UK's burgeoning hydrogen industry at a critical time, creating new markets and lowering costs.

In addition, this plan for clean steel could:

- Help to level up
  Investing in the infrastructure to make low carbon steel could help level up regions in need of investment, such as Port Talbot and Scunthorpe. Average wages in the steel sector are 28 per cent higher than the national average and 46 per cent above the regional average.[10] These places have a rich industrial history but their high skilled jobs are now in need of futureproofing as Britain develops the industries of tomorrow.

- Advance global Britain
  Investing in hydrogen-produced steel, alongside a clear transition plan for the whole sector, would modernise UK steelmaking, making it fit for the 21st century. Few other industries have made as big a mark on world history as UK steel, and the country should capitalise on its expertise to build new markets at home and abroad for high quality, near zero carbon steel.

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Endnotes

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