Future of Welsh Steel

Evidence from Karen Turner Centre for Energy Policy, Strathclyde University & Max Munday, Welsh Economy Research unit, Cardiff Business School to the Welsh Parliament, Economy, Trade and Rural Affairs Committee.

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In a 2020 CEP policy briefing we considered the contribution of steel manufacturing to the Welsh economy and how new technological opportunities around decarbonising steel production – with opportunities to service the transitioning economy - might affect this contribution and the pattern of environmental effects connected to the industry. We addressed a series of factors at the time in connection with the future evolution of steelmaking in Wales. We set these in terms of considering the current economic contribution of the industry's primary steel production with focus on Port Talbot, setting this contribution against the associated point source emissions. This enabled consideration of the potential impacts and trade-offs in considering both the domestic impacts of industry change on jobs, incomes and regional unemployment challenges, and increased reliance on imported steel and its associated carbon emissions. We then considered potential options for, and implications of, decarbonising and/or change in the production profile of the Welsh industry, set in the context of potential market opportunities as economies move through the net zero transition.

The full Centre for Energy Policy briefing is available at https://doi.org/10.17868/74541.

Here we summarise some key points arising from this earlier briefing in context of current plans for Tata in Wales:

Several technological options were being 'discussed' in 2020 in the context of the future of the Welsh industry. These included decarbonisation of material inputs (including potential use of hydrogen) and/or the deployment of CCS in primary steel production[1], but potentially also a shift to secondary steel production involving the use of electric arc furnaces.[2] The original briefing considered how such options might impact on the levels and nature of activity supported by the sites currently owned and operated by Tata in Wales. Furthermore, what might be the expected role of the Welsh steel industry in servicing markets to support evolving demands for greener steel in industries such as electric vehicles and renewable energy technologies? Crucially in this context, if manufacturers begin to demand greener steel, will this effectively split demands between green and 'fossil' steel and how far might green steel attract a premium price? Even where opportunities to shift to green steel production can be exploited, to what extent will reliance on imported primary steel continue, and what are the net implications for jobs, incomes and global carbon footprints? Can competitive and sustainable green primary production be realised through on-site carbon capture or use of decarbonised hydrogen fuel? These questions are difficult to answer. However, it is valuable at the outset to consider the likely direction of travel on key steel industry indicators.

Future routes for steelmaking in Wales – some simple scenarios

Key factors	Continuation with current technology	Replacement of Blast furnaces with Electric Arc	Primary production decarbonisation (CCS or Hydrogen feedstocks)
Tata physical output kt steel and resulting GVA			
Tata Port Talbot and other company employment in Wales			
Indirect employment supported in Wales in supply chain and supported through wage spending			
Wales steel exports			
UK trade balance in iron and steel			
Production point carbon emissions – Wales			
Imported carbon emissions associated with Wales & UK steel consumption			

The figure above shows some first steps considered in our earlier briefing, in developing a 'scoreboard' linked to different technology options pursued in the heavy end of steel production in Wales. These are extremely broad scenarios and we accepted that the direction of travel in indicators of interest will be a contested issue, and that a fuller set of refined and more specific indicators would ultimately be required. At the very least we hoped the Figure would alert readers to some central variables that might be considered as the industry evolves around three possible pathways. We coded these pathways as (i) 'current technology'; (ii) replacement of blast furnaces with electric arc furnaces and iii) decarbonisation of primary steel production, potentially using perhaps hydrogen fuels or elements of carbon capture and storage on site.

Current technology… a possible scenario

Current technology embraces the continuation of the current blast furnace/basic oxygen process. At a Wales level, it was expected that continuation along these lines will lead to a continuation of existing trends. That is, a longer-term reduction in Welsh steel industry output, associated with falling direct and indirect employment supported. Clearly, existing steel quality might be maintained, but with the likelihood of falling market demand for such steel from new industries. Overcapacity and competitive pressures will remain prevalent in the industry, and one cannot discount swifter innovative advances from steel makers overseas, which will further erode UK and overseas market potential. A result could be falling Welsh steel exports, and potentially a worsening trade UK trade balance in iron and steel. This could be combined with more subtle socio-economic effects as new investment opportunities fall, accompanied by reduced contracting opportunities for the Welsh construction industry.

Critically, as the UK moves through the low/net zero carbon transition, markets for different transportation, energy and other goods/services will change and these will cause final and intermediate markets for steel to change. Were production to be maintained along current methods then an opportunity could be lost to play a role in servicing new markets.

BUT what of emissions? Clearly any depreciation of the scale of the Welsh industry will result in falling PAP/territorial emissions *within* both Wales and the UK. There would be secondary effects associated with this, not least negating health issues in the areas around heavy steel making, but, at the same time, one cannot discount the heavy social and health costs on any employees displaced through time from the plant. Moreover, there is the equally depressing prospect that consumption accounted emissions are maintained – or even increased - with domestic firms sourcing and transporting greener or, worse, cheaper 'old technology' steel from overseas with the implication that the

global emissions that are the central concern of international UNFCCC agreements may rise. In many ways it might be argued that more polluting processes around steel are better carried out where regulatory mechanisms are stricter and, thus, closer to where value added is gained from the process.

In short, any displacement of emissions to other states could be an important issue for Welsh Government with its sustainable development duty. In this context, we note that among the Welsh SD indicators are ones that link to consumption such as the ecological footprint.

Electric arc steel making

While electric arc steel making may have the effect of producing 'greener' steel, we showed that this depends in part on how that electricity is generated, and more generally on the supply chain and lifecycle emissions involved.

Moreover, we showed that a move to electric arc furnaces might secure the future for the Port Talbot plant but might in practice lead to falling output and employment simply because volumes of steel produced would be lower, and with, consequently, lower exports. There are also quality issues associated with steel made from scrap steel that could limit domestic and export markets for such steel downstream. Potentially, the productivity (simply measured) of the Port Talbot mill might increase. However, high demands for scrap could cause indirect effects for other industries as prices rise, while still leaving a problem of the scrap resource still being connected to basic iron production 'elsewhere'.

In summary, electric arc production may give rise to new steel markets with some exports maintained but with a fine balance between quality, volumes and trade expected with a move to electric arc technology. The new opportunities brought by different technology may also require new skills and new research, particularly around maintaining steel quality. On the other hand, the key benefit would be a large fall in production point emissions (assuming electricity use is in large part connected to renewables), and potentially some reduction in aggregate Wales and UK steel consumption related emissions, even where some firms are obliged to source raw steel from elsewhere.

Decarbonisation of primary production

Decarbonisation of basic iron and steel production might work to secure output and gross value added generated by the steel industry in Wales if this can be done in ways that ensure continued competitiveness. It would require significant levels of new investment in adapting production methods and in decarbonised energy supply and/or carbon management infrastructure. Ensuring competitiveness may require at least transitory public support, but over time would carry the implicit assumption that there are growing markets for greener steel, thus incentivising similar costly decarbonisation activity in other steel producing nations.

Notwithstanding, it is difficult to see any significant direct employment growth under such a scenario as productivity in integrated steel mills continues to improve, and new developments are expected to involve more capital-intensive production involving fewer workers. Even so, here there is a route to higher levels of safeguarding of direct and indirect employment, particularly if greener steels also find their way into secondary steel processing and metal goods production activity in Wales.

In terms of trade, the implication of adopting new decarbonisation technology may provide a route to safeguarding of Welsh steel exports (and extending to metal products made from decarbonised steel in the region), and, thus, an improved trade balance for the UK in the iron and steel sector. As importantly, decarbonisation of primary production is a route to both falling production and consumption emissions, particularly of greener steel displaces imports.

4. Conclusions

The aim of our original briefing note was to alert the reader to questions that needed to be asked about the future of steel production in Wales. Clearly any technology pathway will not be costless in environmental terms, but the steel case is connected to subtle issues over responsibility for carbon emissions, and indeed reveals that depreciation in production point emissions would potentially link through to a growth in consumption accounted emissions.

Thus, there is a challenge for policymakers of not merely focusing on the regional employment contribution of steel but also in terms of:

- Awareness of more subtle economic, social and environmental factors connected to changing or maintaining technology in Welsh and UK steel making. Here, it is critical to understand how a focus on production accounting emissions ignores both global emissions and regional economic transition problems associated with an offshoring of carbon intensive elements of steel production.
- Understanding that, in terms of a global net zero standpoint, steel making might be better placed in a more regulated context where there is more scope for technological innovation to reduce the industry's carbon footprint, while improving the quality of the product for evolving new industry and greener market demands.
- Attention to changing traditional political economy narratives associated with steel production in Wales/UK, which have tended to be focused primarily on employment issues.

The authors

Karen Turner is Professor and Director of the Centre for Energy Policy at the University of Strathclyde. Email: [redacted]

Max Munday is Professor and Director of the Welsh Economy Research Unit at Cardiff Business School, Cardiff University. Email: [redacted]

[1] See for example the £35m Sustain Research hub involving Swansea, Sheffield and Warwick Universities seeking to assist the iron and steel industry become carbon neutral by 2040

[2] See Tata Steel: Job fears at Port Talbot over furnace plan 19th July 2020.