CRU Consulting

Leveraging a Carbon Advantage: Impacts of a Border Carbon Adjustment and Carbon Fee on the US Steel Industry

For Climate Leadership Council

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1. Executive summary

- **A domestic carbon fee and border carbon adjustment (BCA) is a key potential enabler of future US climate leadership and economic growth.**
- **The US steel industry has a major carbon advantage. Steel exporters to the US emit 50-100+% more CO_2 emissions per tonne than US producers on average.**
- **A carbon fee and BCA policy, applied in the context of the 2019 steel market, could increase the US steel industry margin by 32-41% and value add by 45-52%, driven by higher US steel sales and a moderate increase in steel prices, well within the range of historical price volatility.**
- **This policy package also has the potential to reduce imports by around 50%, reflecting the higher carbon emissions from imported steel.**
- **The economic benefits to the US steel industry and are likely to be broad based, with mills in the South Central and Great Lakes regions being notable beneficiaries. Western mills become newly competitive and benefit as well but to a lesser extent.**

1.1. Introduction

An economy-wide climate policy is required to deliver new US emissions reduction goals. The US government recently re-joined the Paris Agreement, setting an ambitious goal to achieve a 50-52% reduction in economy-wide net greenhouse gas pollution from 2005 levels by 2030. While considerable progress has been made in reducing the carbon intensity of the US economy in recent decades, achieving this goal will require a significant intensification of policy implementation to begin decarbonising all sectors of the economy in the coming years.

Carbon pricing is key to achieving these objectives at least cost, but the potential impacts on industrial sectors need to be considered carefully. Carbon pricing creates efficient market-based incentives for households and firms to reduce their emission. However, its implementation varies widely across countries and regions. This exposes energy-intensive and trade-exposed (EITE) sectors, such as steel, in countries with relatively high carbon prices to competitive disadvantages. This in turn risks displacing industrial production, investment and jobs to countries with zero or lower carbon prices.

A border carbon adjustment (BCA) is a key potential enabler of future US climate leadership and economic growth. At a conceptual level, a BCA is a specific levy charged on the carbon embodied in imported products and a corresponding rebate on any domestic carbon charges associated with the manufacture of goods which are exported. A BCA thus has the potential to ensure a level playing field for US industries under a carbon price – so that all competitors face the same carbon fee. It may also unlock additional competitive advantage of some industrial producers resulting from their early deployment of low carbon production technologies and higher carbon efficiency.

In this context, the Climate Leadership Council proposes implementation of a carbon price and BCA policy with the following core design features:

a) a $43/t$CO_2$ economy wide carbon fee;

b) a border carbon adjustment (BCA) of $43/t$CO_2$ on the emissions associated with the manufacture of products entering the US;

c) a full rebate of domestic carbon fees paid to US exports; and,

d) all revenue is recycled as "carbon dividends" to households on an equal basis per capita.

The economic impacts and implications of this policy proposal are explored below.

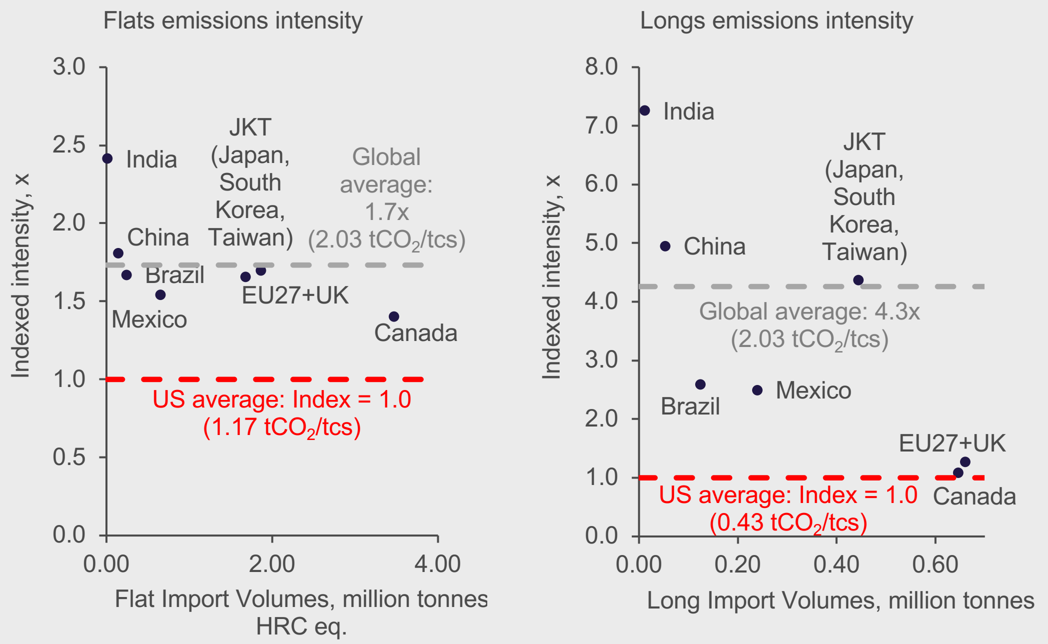
1.2. Impacts of CLC policy proposals on US Steel industry

Many US industries are highly energy efficient compared to global producers. Steel producers in the US, for example, have some of the lowest CO_2 emissions intensities anywhere in the world: CRU's analysis shows, for example, that leading exporters of flat steel products (used, for example in the manufacture of automotive body sheets) to the US such as Canada, Mexico, Japan, South Korea and China emit 50-100% more CO_2 emissions per tonne of output than US producers on average. In the case of long steel products (widely used in many construction applications), of the regions studied, only Canada and Europe are close to the US in terms of carbon intensity which is 4 times less than the global average (see Box 1).

Box 1: Carbon competitiveness of the US steel industry

According to CRU, production of steel flat products in the US generates ~1.2 tonnes of CO_2 per tonne of crude steel (tcs) and US long products manufacturing generates around 0.4 t CO_2/tcs. The US average is half of the global average emissions intensity for flat products and just a quarter in the case of long products (see Figure i). This significant carbon advantage reflects the high share of scrap-based electric arc furnaces (EAF) – which are less emissions-intensive than blast furnace-based manufacture (that converts new iron units into steel using coal) – compared to other trading partners.

Figure i Indexed average scope 1 and 2 emissions intensity for flat and long products by region (Index: US average = 1.0)



DATA: CRU.

A BCA thus presents substantial economic opportunities for the US steel industry. The imposition of a US domestic carbon price, in conjunction with a BCA, has the potential to increase the cost of imported steel products relative to domestic producers due to the higher carbon embodied in their manufacture. This in turn creates opportunities for US steel producers to take greater market share, displacing imports and fuelling domestic economic growth and employment. Drawing on CRUs cutting edge data and market evaluation methodologies (outlined in Box 2), this white paper quantifies these potential impacts.

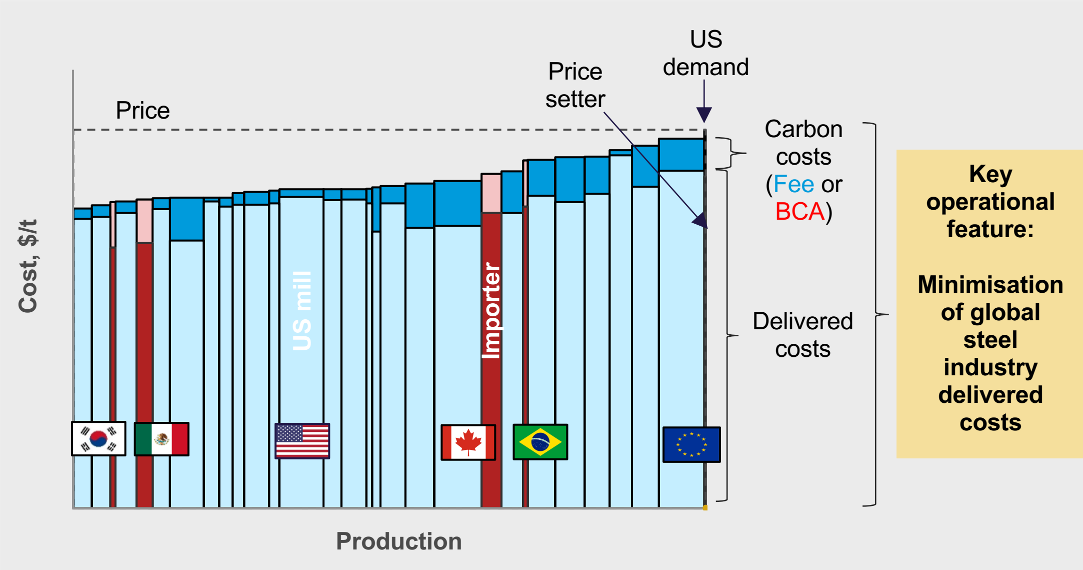
Box 2: CRU's BCA scenario impact assessment methodology

CRU simulated the impact of BCA policy implementation on steel production and trade responses based on a ranking of the implications for steel production costs (inclusive of BCA and domestic carbon prices). The impact on future US market access assumes that US steel demand is fulfilled from the global market on the basis of minimising total delivered costs (reflecting the commoditised nature of these industries).

Inputs to the model include US demand and supply, steel production costs,[1] transport costs, scope 1 and 2 carbon emissions and associated policy costs, and trade duties (current trade measures on steel imports are assumed to remain in place). These inputs are principally drawn from CRU's market leading data on steel demand, trade, production costs and CO_2 emissions for US and global steel mills.

Output metrics for US mills and major importer regions (including the EU, Japan, China, Mexico, Brazil and Canada) are generated to assess the impact of the BCA, e.g. US sales, capacity utilization, mill costs, product price, margins and value add. These outputs are tested, validated and sensitised as part of a robust evaluation process. A graphical representation of CRU's approach is shown in Figure ii.

Figure ii Illustration of CRU's behavioural model of Carbon cost impacts (fee or BCA)



In particular, CRU's simulations suggest that BCA implementation increases US steel industry value add, and corresponding reduces imports, by around 50%. US steel industry profitability rises by 32% and 41% across flat and long products respectively, which, coupled with a 7-9% increase in domestic sales, and an almost halving of steel imports, yields an overall increase in industry value add of up to 50% (see Table i). Lower relative costs of domestic steel manufacture under the BCA reduce steel imports from both developed

[1] We assume importers sell into the US market at variable costs, i.e. at a discount to full costs, in order to remain competitive. All other things being equal, this may imply long term import displacement could be higher than is simulated under the assumption that importer investment costs are ultimately recovered.

economies (such as Canada and Japan) as well as major emerging markets such as China, Mexico and Brazil.

Table i Summary of impacts of a BCA and carbon fee on the US steel market:

Output metric	Unit	Base Case		BCA policy simulation		*% change vs Base Case*	
Product		Flats	Longs	Flats	Longs	*Flats*	*Longs*
Importer sales	Mt	9.2	2.7	4.5	1.29	*(51.2%)*	*(51.8%)*
Importer market share	%	15.3%	12.9%	7.5%	6.2%	*(51.2%)*	*(51.8%)*
US sales	Mt	50.6	18.1	55.2	19.4	*9.3%*	*7.7%*
US mill value add	$m	3,375	2,569	4,899	3,905	*45.1%*	*52.0%*
US mill unit margin	$/t	67	142	89	201	*32.8%*	*41.2%*
Product price	$/t	616	705	690	790	*12.0%*	*12.1%*

DATA: CRU.

As with any simulation, these conclusions are subject to a number of key risks and dependencies, including the precise design of the BCA and the prevailing market and broader policy conditions when it applies. Importantly, this paper only simulates the short term impacts of introducing a BCA and carbon fee in the 2019 market (of which the trade measures like Section 232 tariffs and quotas are a key feature since implemented in 2018). These impacts are likely to depend on: i) the level of carbon prices, ii) the relative carbon intensity of US compared to imported steel producers,[2] and, iii) the policy rules determining the basis of any BCA (some core sensitivities are explored in the full analysis that supports this summary). However, trade and technology adoption has the potential to shape longer term outcomes for both domestic and importers. For example, a BCA could ultimately restrict access to the US steel market for carbon-intensive importers or incentivize importers to heavily decarbonize to mitigate the burden of the BCA. These longer-term trends may limit the uplift in US domestic value add but will nonetheless create potential benefits for global decarbonization efforts.

1.3. Distributional effects of BCA implementation

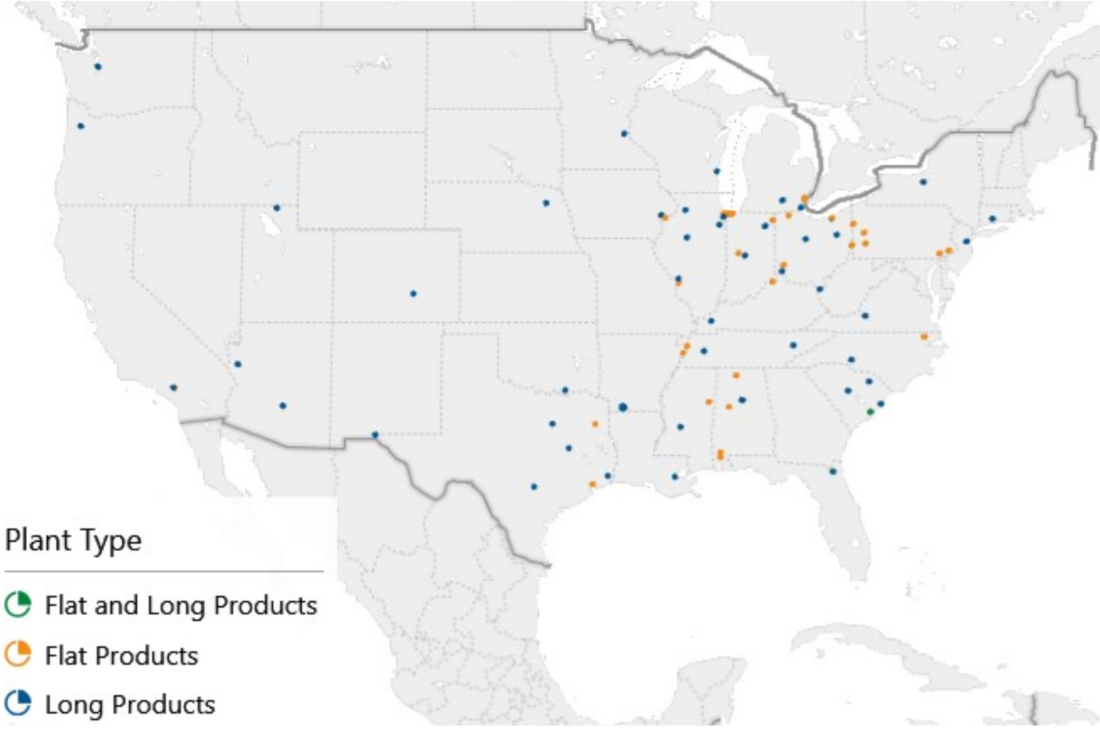
The net benefits of BCA implementation are likely to accrue most to carbon-efficient producers. Among steel producers, some industrial segments are better placed than others to benefit from a BCA: EAF-based producers, for example, generally have more to gain under a BCA scenario than those using blast furnace technologies. EAF-based flats producers that typically compete against imported product using more carbon-intensive blast furnace technologies, are particularly well positioned to benefit from the fee and BCA policy.

The economic benefits to the US steel industry are likely to be relatively broad based, with mills in the South Central and Great Lakes region expected to be notable beneficiaries. In CRU's BCA policy simulations, the value adds of South Central and Great Lakes' mills both increase by nearly one billion dollars across product segments. Value add gains are driven by low-cost production and increased margins for the South Central mills, while the Great Lakes' mills which enjoy a 2.6 Mt increase, for example, in domestic sales of flat products (equivalent to a 7% uptick). This is due to the concentration of installed capacity in this Great Lakes region (see Figure iv) and the fact that some of these mills act

[2] For example, significant increases in US steel industry value in part depend on the continued penetration of carbon intensive (particularly high cost) importers into the US steel market.

as “swing producers” given their relatively high production costs. Other US regions, such as the West, also see significant growth in production and value add (albeit from a much lower base). In particular, some of these Western mills become newly competitive under a BCA given their carbon advantage relative to international steel producers.

Figure iv Distribution of US steel producing facilities



DATA: CRU.

Purchasers of steel (and ultimately the US consumer) are projected to see moderately higher steel prices. However, these effects fall well within the range of typical steel price volatility and are smaller in magnitude than existing trade measures: the simulated price increases from a BCA and carbon fee are roughly one-third less than the current Section 232 levies. Moreover, the impacts on final consumers are likely to be limited, in part, by the modest share of steel compared to total production costs or final product prices. For example, CRU’s BCA scenario implies a roughly $65 increase in the cost of the steel required to produce a standard sized car[3], which – while not inconsequential – is nonetheless a relatively small fraction of the overall sales price. **Critically a carbon fee could also generate billions of dollars in carbon dividends to help mitigate such impacts on the US consumer.**

1.4. Conclusions

A domestic carbon fee and BCA may yield significant economic benefits and increase US steel industry competitiveness. Carbon pricing is key to low-cost delivery of US emissions reduction targets, but raises competitiveness and carbon leakage issues particularly in EITE sectors. A BCA is a key means to level the playing field and has the potential to confer significant benefits in the case of US steel producers.

CRU’s analysis suggests that BCA implementation both increases US steel industry value add and correspondingly reduces imports by around 50%. US steel industry profitability rises by 32-41% across flat and long products respectively, which, coupled with

[3] This estimate assumes 0.9 tonnes of steel is used for a standard sized car and looks at a differential in flats price of $74/t (between Base Case $616/t and BCA policy’s $690/t as displayed in Figure iv).

a 7-9% increase in domestic sales, and an almost halving of steel imports, yields an overall increase in industry value add of up to 50%. Lower relative costs of domestic steel manufacture reduce steel imports from both developed economies (such as Canada and Japan) as well as major emerging markets such as China, Mexico and Brazil. Importantly, this paper simulates the short-term impacts of the implementation or a BCA and carbon fee. Maintaining the current US carbon advantage in the long term will be key to sustaining these benefits and will depend, in part, on the relative pace and associated productive efficiencies of decarbonisation domestically and in importing regions.