



University of Sussex  
Business, Management & Economics

## Economics Department Working Paper Series

No. 6-2010

# Border Carbon Adjustments and the Potential for Protectionism

Peter Holmes, Tom Reilly and Jim Rollo,  
Economics Department, SPRU & SEI  
University of Sussex  
[p.holmes@sussex.ac.uk](mailto:p.holmes@sussex.ac.uk)  
[j.rollo@sussex.ac.uk](mailto:j.rollo@sussex.ac.uk)

**Abstract:** Balancing legitimate fears that carbon leakage could undermine the impact of any global climate change agreement are countervailing fears that leakage will be the excuse for protectionism in the guise of “Border Carbon Adjustments”. This would have dangers for the world trading system, risking disputes due to ambiguities in the details of WTO rules over what types of border measures are potentially and actually admissible. Even with good quality data, there is considerable potential for judgemental discretion, and hence opportunistic manipulation, in estimating the carbon charges to levy on an imported product. This is even with agreement on whether to use importer or exporter coefficients. A clear distinction needs to be made between environmental and competitiveness motives for border adjustments. The key argument is that the traditional symmetry between origin based taxes (production) and other charges and those based on the destination (consumption) principle breaks down in the case of carbon charges. This paper explores the potential for regional agreements to ensure origin as the basis for carbon levies in the aftermath of the Copenhagen Accord, while recognising the challenges that this poses for the mutual recognition of emissions regimes in particular.

**JEL Classification:** F180 Trade and Environment

**Key Words:** Competitiveness, carbon leakage, cap-and-trade (C&T), trade policy, WTO and regionalism.

## 1. Introduction

Border carbon adjustments<sup>1</sup> (BCAs) are measures applied by an importing country to penalise imports of products in cases where it is alleged that the exporting country has either failed to implement emissions controls equivalent to those of the importer. BCAs can be justified in the following three ways: by failure to comply with international emissions rules; by compliance in a manner that is deemed to affect the competitiveness of the importing country's producers of similar goods unfairly; or simply by a claim that "equivalent" measures have not been put in place. Both the economic and legal status of such BCAs are highly contentious.

BCAs were a particularly divisive issue in the run up to COP 15 in Copenhagen although the Copenhagen Accord does not address trade issues in an explicit manner. BCAs have been put forward in the USA as a way to address concerns over emissions targets disadvantaging US producers vis-à-vis producers in major emerging economies – especially India and China – with consequent carbon leakage<sup>2</sup>. Under the proposed Waxman-Markey bill, currently before Congress, BCAs would not be used before 2020 but developing countries still find the prospect of them objectionable. The USA wants the option to implement BCAs, in certain circumstances,<sup>3</sup> such as if it judges other countries GHG mitigation efforts not to be "at least as stringent as that of the United States" – even if they are in full compliance with an international agreement.<sup>4</sup> This has the potential to pit the trade and climate regimes against each other in a mutually destructive way.<sup>5</sup> In confronting the legitimate fear that carbon leakage potentially undermines emissions control measures, there is a countervailing fear that leakage will be the excuse for trade measures that go beyond the proportionate to the simply protectionist, leading to protracted legal wrangling. The EU, it should be noted, has not closed the door to BCAs but many proponents there have seen the US as a legitimate target<sup>6</sup>, being an Annex I<sup>7</sup> country that did not ratify the Kyoto Protocol. That is not to say that China's economic emergence, for example, is not a significant factor too,<sup>8</sup> but the EU approach appears to place more emphasis on border adjustments in the absence of international climate cooperation rather than unilaterally judging the comparative stringency of domestic climate policies.<sup>9</sup>

The legal context for BCAs is presented in section 2 followed by a brief literature review. Section 4 examines possible mechanisms for calculating BCAs. Section 5 demonstrates the wide potential range that even legitimately estimated BCAs might have in

---

<sup>1</sup> Sometimes referred to as, amongst other things, 'border tax adjustments' or 'border adjustment mechanisms' (for carbon).

<sup>2</sup> Carbon leakage herein is: an increase in carbon emissions in non carbon-constrained countries caused by reductions in carbon-constrained countries (the former is expressed as a percentage of the latter).

<sup>3</sup> Including whether countries are contributing 'equitably' to global GHG reduction efforts (ACESA, 2009: sec.7669(c)(1). (NB 'ACESA, 2009' is aka the 'Waxman Markey bill'.)

<sup>4</sup> Werksmann et al., 2009:2.

<sup>5</sup> '[BCAs] will provoke retaliation (i.e. a trade war). China has made it clear not only that it would immediately retaliate but even told us how – a retaliatory regime based on per capita emissions' (Groser, 2009).

<sup>6</sup> Houser et al., 2008:xviii.

<sup>7</sup> I.e. a country listed in Annex I of the UNFCCC (1992). This includes all OECD countries in 1992 and countries with economies in transition. For a full list go to:

[http://unfccc.int/parties\\_and\\_observers/parties/annex\\_i/items/2774.php](http://unfccc.int/parties_and_observers/parties/annex_i/items/2774.php)

<sup>8</sup> Dröge (2008); EurActiv (2008).

<sup>9</sup> Dröge, 2009:65-66.

the cement and car industries. Section 6 looks at how to mitigate the problems caused by BCAs and is followed by an analysis of possible ways forward and final remarks.

## 2. The legal context

Traditionally it was held that GATT rules forbade distinctions being made on the basis of the way goods are produced, i.e. so-called non-product-related production and process methods (NPR PPMs). The Appellate Body in its Shrimp-Turtle judgement overturned the absolute ban in earlier jurisprudence of the two Tuna-Dolphin cases<sup>10</sup> where the GATT panels had decided that the US could not apply import restrictions on tuna conditional on the way they had been caught. In the later WTO Shrimp-Turtle case, the WTO Appellate Body, whilst condemning the actual measures applied by the US as discriminatory between countries, nevertheless concluded that there might be grounds to allow regulations that distinguished between products on the basis of the impact on the environment of their method of production. The Shrimp-Turtle judgement did not explicitly approve NPR PPMs but provided that they could, in certain circumstances, be justified under the GATT's Article XX exception provisions. This opened up the possibility for imports made in environmentally unfriendly ways to be treated differently from 'greener' products. The judgement left the exact position unclear but countries seeking to impose trade restrictions on carbon-related grounds may be able to claim a legal justification, at least *prima facie*, as long as applied in a non-discriminatory manner.

Indeed, Pascal Lamy appears to maintain that the WTO can accommodate any policy measures that might affect trade that may be necessary to facilitate a climate change agreement, whether by flexible interpretation of Article XX or by additional modifications to the WTO texts. With respect to any prospective new agreements he stated:

If we look at the relationship between WTO rules and previous Multilateral Environment Agreements [MEAs], we see that while there may be theoretical issues here and there, in practice, MEAs that have a trade limiting component (e.g. MEAs on chemical substances, endangered species) there have been no problems of interaction between trade and these agreements. If there is an MEA post-Kyoto, I do not think we will have a problem adjusting. (Lamy, 2008)

This point was reinforced in a recent WTO UNEP study (Tamiotti et al, 2009). However, there will inevitably be complex frictions due to problems of detail. Even if certain trade practices are deemed to be not in compliance with any new global carbon regime and there is an agreement on what measures might be taken, there is still considerable room for dispute about whether a national policy is truly non-compliant and whether any trade response is legitimate. The recent WTO-UNEP Report concluded:

---

<sup>10</sup> United States — Import Prohibition of Certain Shrimp and Shrimp Products WTO case Nos. 58 (and 61). [http://www.wto.org/english/tratop\\_e/envir\\_e/edis08\\_e.htm](http://www.wto.org/english/tratop_e/envir_e/edis08_e.htm). Also on the original US Mexico-Tuna Dolphin case: [http://www.wto.org/english/tratop\\_e/envir\\_e/edis04\\_e.htm](http://www.wto.org/english/tratop_e/envir_e/edis04_e.htm).

The general approach under WTO rules has been to acknowledge that some degree of trade restriction may be necessary to achieve certain policy objectives, as long as a number of carefully crafted conditions are respected. WTO case law has confirmed that WTO rules do not trump environmental requirements. If, for instance, a border measure related to climate change was found to be inconsistent with one of the core provisions of the GATT, justification might nonetheless be sought under the general exceptions to the GATT (i.e. Article XX), provided that two key conditions are met. (Tamiotti et al., 2009:xix)

These are: a clear link between the exception sought and the policy aims (which must be justifiable under one or more paragraphs in Article XX) and no *arbitrary* discrimination or disguised restrictions to trade.<sup>11</sup>

### 3. The evidence on competitiveness and carbon leakage

There are two distinct reasons for calling for BCAs. The first is to internalise the global environmental externality for consumers purchasing products originating in countries that do not apply a carbon charge. But the second is to protect domestic producers against low cost ‘unfair’ competition. Hourcade et al. (2007) find, however, in a UK-based study, that the potential competitiveness impact would fall only on a small number of industries – mainly cement, iron and steel, aluminium, paper and pulp, and chemicals – which account for less than 1% of GNP and employment. A study of German industry by Graichen et al. (2008) reached similar conclusions.

Demailly and Quirion (2008), looking at the EU’s iron and steel industry, conclude that competitiveness losses over phase 2 of the EU emissions trading scheme (ETS) will be small. They also estimate carbon leakage rates at between 0.5%-25%, at a CO<sub>2</sub> price of €20/tCO<sub>2</sub>, dependent upon the parameterisation of models. In an earlier study (Demailly and Quirion, 2006) they estimate leakage rates in the cement industry of around 50%, at the same CO<sub>2</sub> price, whereas Ponsard and Walker (2008) estimate a 70% leakage rate.

According to Reinaud (2009 and 2010), studies on competitiveness-driven carbon leakage show that cap-and-trade (C&T) schemes<sup>12</sup> have a net decreasing effect on an industry’s global carbon emissions and this is likely, but not certain, to continue into the future.

Taking into account specific design of the allocation mode (e.g. free allowances) yields much lower leakage rates than under a CO<sub>2</sub> tax..... Longer-term estimates of carbon leakage (i.e. changes in investment decisions) are less reliable than short-

---

<sup>11</sup> It is worth noting that most of the legal analysis implies that Border Adjustments would have to be defended under Article XX, and could not get away without further scrutiny by being judged non-discriminatory under Article III. Only a non-discriminatory tax per product with no reference to the production method seems likely to survive Article III – but this would have limited environmental logic.

term estimates, as little is known about ongoing structural changes in the manufacturing sector, especially in the current economic slow-down. (Reinaud, 2009:8)

A US study argued

The competitiveness of the U.S. economy as a whole is not at issue. According to a recent MIT analysis<sup>13</sup> for instance, meeting the emission reduction targets of S. 2191<sup>14</sup> would reduce GDP by less than 1 percent in 2050, by which time the U.S. economy will have more than tripled in size. (Pew, 2008:1)

Other US studies (e.g. Bordoff, 2008) estimate that only a small share of emissions would be likely to be 'exported' under realistic assumptions about carbon charges. Nevertheless, the US did not ratify the Kyoto Protocol because it was believed to exempt too many countries from targets and so would 'redistribute output, employment and emissions from participating to non-participating countries' (Hagel, 1997). Levinson (2010), however, looking at 'pollution in general' concludes:

Today the United States imports proportionately more clean goods and proportionately fewer polluting goods than was the case 30 years ago. Perhaps even more surprisingly, the green shift in imports is even larger than the green shift in domestic production.... The relatively clean industries also happen to be relatively labour intensive and geographically mobile, suggesting that other factors might be correlated with carbon emissions and trade growth, and may overwhelm any causal effect of pollution intensity on import patterns.... Whatever forces appear to have been at work over the past 30 years, the data and analysis presented here appear to indicate that, on balance, the United States has not been offshoring pollution. (Levinson, 2010:79)

Houser et al. (2008) suggest that a US BCA would not even provide much leverage over China, because the latter's exports to the US of the five products probably most at risk of leakage<sup>15</sup> account for only 0.2% of China's economic output.<sup>16</sup> Mattoo et al. (2009)

---

<sup>12</sup> 'C&T scheme' and 'emissions trading scheme' (ETS) are interchangeable terms.

<sup>13</sup> Paltsev et al. (2007)

<sup>14</sup> Lieberman-Warner Bill – which has subsequently failed to pass into law.

<sup>15</sup> Steel, cement, aluminium, paper and pulp, and chemicals. Together these industries account for more than half of all CO<sub>2</sub> emissions from the manufacturing sector, although their direct emissions are less than 6% of the US total (Houser et al., 2008:xvi).

<sup>16</sup> 'Even exports of these goods to all countries accounts for only 1 per cent of China's GDP.' (Houser et al., 2008:57)

argue that unilateral action by developed countries would have ‘minimal’ leakage-prevention effects, but they fear that there would be political pressure for additional border charges on imports for competitiveness reasons which would inevitably take the form of destination charges. They explore the implications for trade and leakage of alternative emissions coefficients (exporting country vs importing) as the basis for a border tax . If BCAs were to be implemented they believe that the adverse effect on developing country exports would be disproportionate if exporter country coefficients were used and they advocate the use of developed country coefficients as the least bad type of BCAs in the event that such a policy is used. There is no doubt that the use of importer country coefficients is likely to be less trade disruptive than exporter coefficients, if only because it minimises scope for opportunism. But it does not eradicate all the problems associated with destination taxes. It breaks the link between the border measure and the environmental cost of the good, and it also raises the possibility of accusations of discrimination if the exporter actually has lower emissions costs than the importer.

#### **4. How might BCAs be justified and what might they involve?**

Although overall the literature suggests the risks BCAs address are small, there may remain a case for introducing BCAs to ‘level’ the carbon cost playing field in specific sectors. This levelling has been done hitherto (and across all sectors) in the EU ETS through the allocation of allowances free of charge. There is no evidence of any push within industry in favour of BCAs for phase 3 of the EU ETS (see Appendix for UK steel industry position).<sup>17</sup> A C&T scheme allows countries to decide which industries are covered and who must buy allowances and who gets them free, offering perhaps even more scope than a carbon tax for special treatment of sectors and firms.<sup>18</sup> Free allocation can be seen as an implicit subsidy to exports or import substitutes by imposing cost of carbon emission reduction on non- or low-traded domestic activity.<sup>19</sup> The competitiveness implications of the distribution of the compliance burden was noted by Bordoff (2008) who observed that most US carbon emissions are in the non-traded sector. Wang and Watson (2009) showed that most Chinese carbon emissions embodied in exports from China are not in industries traditionally identified as high emitters. It follows that a government could in principle sincerely comply with a carbon reduction strategy whilst imposing a relatively minor burden on exporting industries.

The US’s Waxman-Markey bill would provide for the use of free allowances but also spells out plans for BCAs to be used from 2020 onwards to prevent competitiveness-based carbon leakage in energy-intensive, trade-exposed industries. Multilateral agreement regarding sectoral approaches has been sought in international fora<sup>20</sup> but the Kyoto Protocol itself involves internationally agreed and monitored emissions targets for Annex I countries, applied nationally on an economy-wide basis. The Copenhagen Accord has potentially brought nationally determined, bottom-up, targets across Annex I and non-Annex I countries within international agreement subject only to consistency with the objective of no warming above 2°C, with a view to reviewing a 1.5°C objective by 2015. Targets remain economy-wide. Thus the justification for applying unilateral BCAs to level

---

<sup>17</sup> Takamura and Kameyama (2009) observe that there has been a dearth of debate sought on BCAs in Japan despite its stringent climate targets and national C&T scheme, albeit a voluntary one.

<sup>18</sup> For a discussion on free allowances based on historical allocation (as in the EU ETS) vs. output-based allocation (as is proposed in the Waxman-Markey bill) see Quirion (2009).

<sup>19</sup> E.g. see the Carbon Trust (2010:8).

<sup>20</sup> See Meckling and Chung, 2009:654.

carbon costs in specific industries is unclear if a country is hitting its announced (but perhaps not internationally agreed) targets. Against this it must be acknowledged that the absence of any internationally agreed national targets in all likelihood increases the pressure for unilateral action against trading partners whose emissions are deemed to be equivalent to the importers, whether overall or in particular sectors subject to competitive pressures. In the absence of any international agreement, the accused party cannot easily point to compliance as a defence. This issue is discussed further below.

Even if the Copenhagen Accord is the precursor to an agreement with agreed targets and monitoring for all ratifiers, pressure for BCAs could still arise in a variety of circumstances and take a variety of forms. Targets could be:

1. Free riders who do not sign up to any deal on carbon reduction, ETS etc.
2. Countries that do sign up to a deal but who are held not to comply with their obligations, either in aggregate or at sectoral levels.
3. Countries that do sign up and comply but in such a way as to create what are perceived as unfair competitive advantages. The most obvious way this could occur is through the allocation of permits in a C&T scheme.

The extreme version of trade measures would be *generalised* sanctions directed against states not ratifying an international climate agreement. This idea has been advocated by Stiglitz (2006) but heavily criticised by Bhagwati and Mavroidis (2007).<sup>21</sup> It would have no *direct* basis in WTO rules and would seem to be relevant only in a context where either a very strong environmental regime had been agreed (e.g. the Montreal Protocol or CITES<sup>22</sup>), or if the rules-based system had already fallen apart. Targeted BCAs, by product and/or by country, for specified non-compliance could be an average across the board figure or specific product tariffs, and could be calculated using methodologies already applied in existing trade defence instruments.

The most common way for economies to address the perception that their partners are exporting at a price that does not reflect the true cost of exports is to use anti-dumping (AD) or countervailing duties (CVDs) on the basis of GATT Art. VI. It is a tricky legal issue whether these instruments, as they are currently used, could provide the basis for action but the principles underlying them and the methods by which they are applied would be likely to be invoked. The focus is first on AD.

Consider the general case of a claim that the price of imports from country X does not reflect 'normal value' (true costs plus 'reasonable' profit). How is it possible to determine a correct cost, and when the absence of a carbon charge is a subsidy? If the country has no carbon tax or ETS then the carbon price is zero, but this may implicitly favour some sectors more than others. More problematic is the case where a scheme exists and meets overall targets but with the costs being loaded on particular sectors. This will show up as a price distortion, i.e. an alleviation of the charges to one sector. How might anti-dumping be used in any or all of these situations?

There are several methods of estimating the 'normal value' of a product to be compared with the export price: The normal value can be based on the actual ex-factory

---

<sup>21</sup> They are less scathing about charges directed at the externalities due to particular imported products.

<sup>22</sup> Convention on International Trade in Endangered Species of Wild Fauna and Flora.

price of the good in the home market. There is dumping if this is higher than the export price. But if the exporting country is not charging the correct price for carbon then the price in the home market can be seen as artificially low, in which case the anti-dumping authorities will not use the actual cost plus a profit margin as the normal value. Rather they may add some estimate of the imputed carbon charge to the price and profit margin to reach a 'constructed' normal value.

In the case of a non-market economy they may compare the export price with 'normal value' in an analogue country. In the cases discussed here the analogue country would be a country with attributes as similar as possible to the exporter but where there is a carbon regime closer to that of the country considering AD. However, the choice of analogue country is fraught with controversy. Defenders of the system argue that it is the overall competitiveness of the analogue that matters but that surely is moot in a case specifically about carbon charges?

A relevant example of anti-dumping being used in a similar context was the EU case against imports of Ukrainian Ammonium Nitrate (AN). The basis of this case was that Ukrainian gas prices were deemed to be artificially low. The relevant extracts of the EU Commission assessment are:

(18) When assessing the cost of production of the applicant, it was found that gas costs were not reasonably reflected in the records of the applicant. It should be noted that energy costs, such as gas, represent a major proportion of the manufacturing cost and a significant proportion of the total cost of production.

(19) As regards gas costs, it was found that Ukraine is importing the majority of the gas consumed in the production of AN from Russia. In this regard, all available data indicates that Ukraine imports natural gas from Russia at prices which are significantly below market prices paid in unregulated markets for natural gas. The investigation revealed that the price of natural gas from Russia when exported to the European Community was approximately twice as high as the domestic gas price in the Ukraine. Therefore, as provided for in Article 2(5) of the basic Regulation, the gas costs borne by the applicant were adjusted on the basis of information from other representative markets.<sup>23</sup>

The result was a 43% anti-dumping duty. This type of process could be used to claim that energy prices were too low due to the absence of ETS or a carbon tax, or even

---

<sup>23</sup> COUNCIL REGULATION terminating the partial interim review pursuant to Article 11(3) of Regulation (EC) No 384/96 of the anti-dumping duty on imports of ammonium nitrate originating, inter alia, in Ukraine <http://209.85.229.132/search?q=cache:UUwIvchOpTEJ:eur-lex.europa.eu/LexUriServ/LexUriServ.do%3Furi%3DCOM:2008:0083:FIN:EN:DOC+EC+anti-dumping+ammonium+nitrate+ukraine+constructed+values&hl=en&ct=cInk&cd=2&gl=uk>

perhaps where free allocations were deemed to be biased. AD duties have the ‘advantage’ that they can be tailored to individual producers. It seems likely that such arguments would be used in cases where the producer industry is itself highly energy intensive. Anti-dumping calculations of this sort do not necessarily require full calculations of direct and indirect carbon footprints, which are needed for an emissions-based levy. Where a high share of direct inputs are energy intensive this might be enough to create a case.

AD might appeal to jurisdictions with C&T schemes that apply to a limited number of industries. Imports from such industries in countries that do not have such schemes would be likely targets, along with products whose direct inputs were covered by a C&T scheme. AD targets impose very costly compliance procedures for exporters who may raise prices rather than incur them, thus taking the equivalent of the carbon charge as part of a higher price and profit. This presents no competitive threat or injury to domestic production and so may not trigger an AD action but it does represent a potential cause of leakage, in which case the importing country might attempt to snatch the rent back via a BCA based on AD methodology - all justified on environmental grounds.<sup>24</sup>

Countervailing duties (CVDs), which are designed to compensate for explicit subsidies, are more specific than those for AD and rely on legal definitions of subsidies, while AD relies on the vaguer difference between export price and ‘normal value.’ The heart of the CVD regime is arbitrary discrimination in favour of a certain products, including arbitrary tax exemptions. Countries alleging that an arbitrary subsidy had been given (e.g. by unreasonably low emissions charges on exporting sectors) can impose offsetting CVDs which can, of course, themselves be challenged. Alternatively they can bring a case at the WTO under the agreement on Subsidies and Countervailing Measures (SCM),<sup>25</sup> which specifies the types of subsidies that are illegitimate. If successful the complainant may impose sanctions against the loser. These rules might form the inspiration for future BCA regimes. The WTO SCM agreement addresses ‘specific’ subsidies and whilst it includes foregone tax revenues, it exempts ‘regulatory measures.’ If requirements to buy emissions allowances were seen as a regulation, not a tax, it might be harder to use CVDs, but more favourable treatment of one sector over another could be the basis of an anti-subsidy case. Within the EU, the French and Danish carbon tax proposals have been legally challenged in national courts and by the EU Commission respectively, because exemptions from the disciplines are seen as subsidies. Free allocations can be seen as subsidies, as can rebates of domestic taxes paid under a consumption/destination based carbon tax that exempts exports. It might be possible to apply CVDs to a country with a carbon charging system but which discriminated among products rather than a country that had no scheme at all and which would not then be judged as discriminatory.

## **5. Estimating the potential range of charges in cement and cars**

This section attempts to illustrate how hard it is to get unambiguous estimates of the carbon footprint of two products. It does not seek to identify the correct estimates, but rather to illustrate the variation in estimates from reputable sources. This will have

---

<sup>24</sup> It is worth noting that China has voluntarily imposed export taxes on steel, aluminium and cement. From 2006-2008 these were equivalent to a CO<sub>2</sub> price of €30-€43/t, €18-€26/t, and €2.5-€3.5/5t, respectively<sup>24</sup> (Voituriez and Wang, 2008:25). This may form a basis for negotiating an interim solution, but the first best solution requires emissions taxes/charges should be put on all production of exporting countries not merely that production which is exported.

<sup>25</sup> For a full explanation see [http://www.wto.org/english/tratop\\_e/scm\\_e/scm\\_e.htm](http://www.wto.org/english/tratop_e/scm_e/scm_e.htm)

obvious implications for the degree of discretion available to those engaged in the calculation of border adjustments whether for taxes, C&T charges, anti-dumping or CVDs.

**Cement:** Several studies were examined which give different estimates of the carbon ‘content’ of cement. Illustrative calculations based on two of these studies are presented in Table 1 and demonstrate that standard methods could easily justify emissions in the region of 700kg to 1200 kg of CO<sub>2</sub> per tonne of cement.<sup>26</sup> At a price of €10 per tonne of carbon, for example, importing a tonne of cement would lead to something of the order of €7-€12 in ETS charges (i.e. between 10% and 17% of the average price of a tonne of European cement (€70<sup>27</sup>), or between about 21% and 36% of the typical European cement producer’s marginal cost of production of a tonne of cement<sup>28</sup>). Any change in carbon price would affect these figures linearly. This range thus gives an estimate of the scope for estimating the difference between the exporter’s price of cement and a ‘normal’ value,’ which included the true cost of the carbon incorporated in the product, leading to a range of AD (or CVDs) margins that could be generated.

Avoiding different charges to different exporters when using a border adjustment in conjunction with a C&T scheme can be done by setting the adjustment based on best available technology - which may be a WTO-compatible option according to Ismer and Neuhoﬀ (2007). This implies a charge set at about 0.7tCO<sub>2</sub>/t cement, which might substantially under-charge inefficient producers.

**Table 1** Approximate range of CO<sub>2</sub> emitted during cement production

	Per tonne of Portland Cement (i.e. 0.95 clinker:cement ratio)
Process emissions	500kg
Emissions from energy	155kg - 630kg
<b>Total direct emissions</b>	<b>655kg - 1130kg</b>
Indirect emissions from electricity usage	40kg - 110kg
<b>Grand total</b>	<b>695kg - 1240kg</b>

(Sources:<sup>29</sup> Taylor et al (2006) and Reinaud (2005)).

<sup>26</sup> Looking at emissions during clinker production and assuming a 95% clinker to cement ratio – i.e. a typical bag of Portland cement (N.B. clinker production is the most emissions-intensive phase of cement production). We accept that actually defining what a carbon footprint is could create enormous difficulties in itself and lead to much more room for dispute and variation in the calculation of border adjustments. ‘Despite its ubiquitous use...there is an apparent lack of academic definitions of what exactly a ‘carbon footprint’ is meant to be. The scientific literature is surprisingly void of clarifications, despite the fact that countless studies in energy and ecological economics that could have claimed to measure a ‘carbon footprint’ have been published over decades.’ (Wiedmann and Minx, 2007:abstract)

<sup>27</sup> Figure from Cembureau, January 2008, at:

[http://www.cembureau.be/Cem\\_warehouse/EMISSION%20TRADING%20SCHEME%20-%203RD%20PHASE.PDF](http://www.cembureau.be/Cem_warehouse/EMISSION%20TRADING%20SCHEME%20-%203RD%20PHASE.PDF) ).

<sup>28</sup> Using the calculations of McKinsey & Ecofys (2006:5).

<sup>29</sup> Using conversion factors, where appropriate, from Defra (2008) and BERR, (2007).

**Cars:** For the car industry it is even harder to make emissions, and therefore border adjustment, estimates. A car imported into the EU could theoretically be dealt with in two stages: First, evaluate the car as a bundle of imports of products directly covered by the EU ETS, such as steel, iron, rubber and glass. Second, the consumption of electricity needs to be calculated for the manufacture of all the other inputs used in a car as well as the electricity consumption at every other stage in a car's production (i.e. parts-making and final assembling). But this two-step process is enormously complicated in reality because of the large number of components in a car, which may be sourced from all over the world.

Furthermore, the emissions from the manufacture of steel and aluminium will vary significantly depending upon whether or not they have been made via the recycling route. Weiss et al. (2000) note that energy requirements of recycled materials are 30-40% of those for producing primary materials. Just as steel may be made from scrap or ore, aluminium may be produced using hydro- or coal-generated electricity. Ideally, a tax should be based on the marginal contribution to carbon emissions of an extra unit of electricity. If this comes from an isolated hydro plant it is presumably zero. However if the hydro plant is or could be attached to a grid then producing more aluminium increases demand from the marginal electricity generation set on the grid which is likely to have a positive carbon emission.<sup>30</sup>

Recent estimates for the total emissions generated in car production published by the car manufacturers themselves, indicate a wide range of variation but the absolute numbers are often barely larger than for a tonne of cement, and are sometimes less. The lowest estimate found is by Volvo who claim vehicle-production emissions figures that have been falling continuously from their plants from 450kg<sup>31</sup> in 2003 to 151kg<sup>32</sup> per vehicle in 2007. A Belgian study<sup>33</sup> drawing on Volvo and other firms' data from the late 1990s, cites numbers of between 1 and 2 tonnes of carbon dioxide per car. Further sources of variation would clearly be introduced by data for China or India. Customs services could clearly avail themselves of any estimates they found convenient.

Volkswagen publish individual car assessments. Their estimates for the VW Passat Blue Motion<sup>34</sup> are the basis for what follows. Interpreting a diagram for its lifecycle assessment suggests that there might be around 6 tonnes of CO<sub>2</sub> emitted per car in its production process (VW, 2007:23). However the striking conclusion here is that even if this relatively high VW figure were taken the total numbers are still small, relative to the price of a car: At a €20 carbon price, 6 tonnes of emissions would only create an ETS charge/ dumping margin of about €120 on a Passat Blue Motion worth around €22,000<sup>35</sup> retail. This equates to an impact of 0.55% at retail level. The best Volvo estimate would generate an even more negligible carbon cost. This is even without worrying about what is and what is not covered by the EU ETS which, as has been pointed out above, would

---

<sup>30</sup> For example, hydro power used to produce aluminium in Mozambique could have been transmitted to South Africa which is dependent on coal including lignite for electric power.

<sup>31</sup> See:

<http://www.volvocars.com/intl/corporation/Sustainability/SustainabilityScorecard/Pages/CarbonDioxideEmissions.aspx>

<sup>32</sup> Volvo (2009:28).

<sup>33</sup> Albrecht (1999).

<sup>34</sup> VW (2007).

<sup>35</sup> Blue Motion TDI 1.6 at <http://cdn.volkswagen.co.uk/assets/common/pdf/brochures/passat-estate-brochure.pdf> [accessed 30<sup>th</sup> October 2009] assuming an exchange rate of €1=£0.9.

reduce the impact even further. It is not so much the scale of these charges but the scope for argument they give rise to that causes a problem. Products where the per unit carbon cost is quite small should not necessarily be excluded from any border adjustment regime if large quantities of trade are involved. The key point is the difficulty of estimating the correct carbon emissions.

## 6. Mitigating the problem

Having identified some of the problems that could lead to accusations and realities of protectionism associated with BCAs, this section will now discuss different ways of reducing the potential conflicts between the trade and environment regimes. The first issue to look at is the use of origin vs destination principles. Secondly, the kind of dispute settlement system might curb the arbitrary use of BCAs without ruling them out entirely in cases where they are warranted. The starting point is that in some circumstances cross-border environmental externalities can lead to a case for border adjustments. The concern here is to prevent abuse rather than use of this argument.<sup>36</sup>

**Origin vs. destination measures:** There are two linked issues that must be separated: first, whether responsibility for emissions lies with producers or consumers; second where should taxation or control occur. Some observers argue that emissions from major exporters, particularly in East Asia, should be attributed to consumers not the producers. Dröge (2009) notes:

‘.... attributing emissions to consuming countries should mean either that producers enter the regulatory structures of consuming countries, or that there is a formal agreement of ‘mutual recognition’ of some kind of regulatory equivalence.....In its most logical form, this last step is exactly the equivalent of the mutual recognition systems around value added taxation: any VAT levied in the exporting country is deducted from that payable in the consuming country.’ (Dröge, 2009:73-74)

Unlike VAT however, where market valuation is enough, far more information is needed to correctly value an item for carbon charging purposes. By definition, with carbon charges it cannot be assumed that market prices reflect true costs and the level of the charge must depend on detailed upstream input-output information, with correct valuations. The use of the destination principle may subject every traded commodity to two border adjustments: It receives a rebate from the exporter on charges paid in the producing country and then it is subject to a charge on importation. The existence of this latter charge is what makes the destination principle attractive to those concerned with competitiveness, but perhaps too attractive. Note also that it requires at the limit different taxes for each and every product imported from each and every origin if the aim is to accurately reflect the carbon content of imports, and it raises the question of how to treat exports by countries with C&T schemes including free allocations, which could be regarded by partners as export subsidies unless somehow adjusted for.

---

<sup>36</sup> The case for such border adjustments is examined in a study by Holmes et al. (2008).

It would be helpful if there were clear agreement on whether to use a destination or an origin principle (equivalently: ‘a consumption vs a production’ principle) for carbon charges. Under the destination principle, border adjustments entail the exemption of exports but imports must pay. Under the origin principle exports pay charges (by virtue of a domestic policy already being applied to all of the production of that particular good) but imports do not (by virtue of there already being a mutually recognised domestic policy in the country being imported from) – unless there is a failure to comply. It seems clear that in practice that the best system is to use the origin principle. Countries are best placed to monitor their own emissions.<sup>37</sup> Imports would only be chargeable if non-compliance could be shown. This would minimise the scope for charges which could be arbitrary on imports. Destination based taxes require all traded goods covered by the scheme to go through border adjustments on export and on import and in fact raises the question of how to treat exports by countries with ETS schemes including free allocations, which could be regarded by partners as export subsidies unless somehow adjusted for. Origin based schemes however, require serious commitment to compliance by exporters and complex inspection and certification. A commitment to only charge on production means that there is no need to tax imports but a corresponding need for a clear set of principles to establish equivalence and mutual recognition. Nevertheless even if this were agreed, there could still be disputes about whether principles globally agreed were being implemented. However, it is important to notice that the issue of equivalence does not go away if destination taxes are used, since the tax on imports can only ignore the carbon regime in the exporter by imposing taxes that are not related to the carbon content of the imports, and destination taxes give rise to the potential for dispute on export rebates.

## 7. Possible ways forward

The *competitiveness* case for border carbon adjustments is weak, except for certain ‘sensitive’ industries and even these have hitherto been protected by free allocation of emissions permits. The ideal way to address the *environmental* case for border adjustments is to make them unnecessary by a firm agreement on the use of the origin principle. If there are exporting countries that fail to apply appropriate measures pressure will undoubtedly arise for adjustments at destination. There is however enormous scope for dispute about the correct values of carbon ‘footprints’ that might be attributed to specific products.

***The dangers of the destination principle:*** It should be recognised that where political pressure for BCAs arise for competitiveness reasons a destination based tax may be inevitable<sup>38</sup> as it gives maximum ‘reassurance’. For the reasons stated above, however, the potential to disrupt trade is great. Mattoo et al. (2009) make a compelling case that *if* competitiveness pressures make a destination tax unavoidable, then using importing country’s coefficients as the base for the tax would overall minimise the adverse effect on developing country trade without creating serious leakage problems. This is because importer coefficients are likely to be lower and more predictable than estimated exporter values. It also maximises transparency and minimises scope for opportunism. Problems

---

<sup>37</sup> This is, of course, the convention in the UNFCCC GHG Inventories, i.e. that countries monitor and report their own emissions within their national, geographic, borders.

<sup>38</sup> ‘An emissions trading scheme in the US will not be passed without some border adjustment measures.’ (Dröge, 2008:8). ‘In the US, it is understood that no climate legislation stands a chance in Congress unless it contains significant protection of this sort.’ (Cosbey, 2009:1)

remain with this approach, however, as such a rule breaks the link between the tax and the environmental impact of the emissions associated with the good.

***The Copenhagen Accord, the incentives for BCA and the DSB:*** A preferable solution is a comprehensive and credible agreement on emissions controls including clear compliance criteria and a comprehensive moratorium on the unilateral use of BCAs as a possible incentive to countries to sign it. The Copenhagen Accord provides a commitment for signatories to construct their policies around a common scientific target for global temperatures on the basis of equity. However, it does not contain any commitments, neither non-binding nor of principle, with respect to policy actions and contains no references to trade. This suggests that the limited and non-binding character of the Accord does not render the above argument irrelevant, but rather strengthens it - for two main reasons.

First, the absence of a comprehensive agreement potentially heightens pressures for BCAs. The absence of agreed targets and monitoring procedures may encourage countries with C&T or carbon tax schemes already in place to threaten the use of BCAs against perceived non-compliers. Following the Accord and despite Commission opposition,<sup>39</sup> France has recently revived its proposals for BCAs and has sought allies in the USA.<sup>40</sup> India has threatened to take any developed countries that implements BCAs to the WTO's Dispute Settlement Body (DSB)<sup>41</sup> and the Chinese have threatened retaliation based on emissions per head.<sup>42</sup> Trade war is in the air. At a process level the EU Commission is mandated to report on the potential for the use of BCAs in early summer 2010. Although the Waxman-Markey bill which passed in the US House of Representatives in June may not survive negotiations with the Senate, any US legislation is likely to provide for BCAs.

Second, if such measures do proliferate, the absence of any international agreement or multilateral framework increases the problems facing the WTO. The DSB would be obliged to decide the legitimacy of any BCAs in the light of only the very broad principles of the GATT (1947) and the complex relationship between Article III (the basic non-discrimination provision) and Article XX (the general exception provision). All that can be stated with confidence is that some BCAs *may* be approved, but only so long as they are clearly related to environmental aims and do not arbitrarily discriminate; but the devil will be in the detail.

### **The potential for a regional approach to climate and trade:**

The question therefore arises as to whether there is any scope for the emergence of bottom up custom and practice to minimise the disruptive effects of BCAs. Pending a comprehensive agreement, emerging practice around bilateral trade disputes will be a major determinate of approaches to applying BCA. This will place a heavy responsibility on the DSB of the WTO. The only guidance from the Copenhagen Accord is that parties have 'noted' an objective of avoiding global warming of more than 2oC (with a review in 2015). Whether, as Grubb (2010) suggests, there may eventually be a degree of reconciliation between bottom up parties (notably the US and China) and top down parties

---

<sup>39</sup> EC (2010)

<sup>40</sup> EurActiv (2010)

<sup>41</sup> IIFT (2009)

<sup>42</sup> Groser (2009).

(EU, and others) through having broadly equivalent commitments, is an open question. Absent such an agreement, the DSB will soon face a dilemma. The only route from the target limitation on warming to abatement measures is through the climate science.<sup>43</sup> The practice of the DSB has been to avoid judging on the substance of scientific evidence and to restrict itself to adjudicating on the process through which scientific evidence has been used, or not, in formulating trade policy. In the Beef Hormone case<sup>44</sup> the WTO Appellate Body did not pronounce on whether hormone-treated beef was safe but rather whether the EU had undertaken a genuine scientific risk assessment, and in doing so it laid down a fairly broad definition of what this might consist of.<sup>45</sup> As long as the parties to any dispute on the level of carbon charge (whether domestic or at the border) consistent with the 2oC limit had used acceptable process to assess the scientific evidence, the DSB would have difficulty determining whether these charges were in some sense correct in the context of attaining the ultimate environmental objective. Moreover, as Groser (2009) points out, one could only find out if a country has really fulfilled its commitments after the event.

In the absence of clear read-outs from the WTO DSB, and perhaps after a few rounds of tit-for-tat protectionism, the parties might look to bottom-up bilateral agreements on acceptable practice in these cases that could, perhaps, eventually become codified multilaterally. Equally, regional agreements might form the focus of practice in this contested area. The EU already has a C & T scheme covering 27 member states.<sup>46</sup> This might be extended to other regions or other regions might also form such bubbles, most notably in the context of integrated supply chains and region-to-region agreements. Trade disputes between regions might then help to develop jurisprudence. Ultimately this might allow an inter-regional agreement based on mutual recognition of equivalent effort to reduce carbon emissions that included an origin based approach to trade and BCAs. The mechanics of this are difficult to predict.

According to King (2010:3),<sup>47</sup> Mexico is interested in a NAFTA based C & T system and there is some discussion within the ASEAN group of countries on carbon trading. The US however is not yet committed to a C & T system, nor is Canada. Neither does ASEAN have a strong record in creating rules based intergovernmental institutions. In any case the logic of integrated supply chains and indeed sheer economic weight suggest that China, Japan, Korea and Taiwan would need to be included alongside ASEAN in a wider East Asian bubble.

King recognizes that such regional agreements might well have different carbon prices based on attitudes to burden sharing. This he sees as necessitating destination based BCAs. This paper suggests that BCAs would threaten increased protectionism, trade wars and the world trade system. To be stable and to avoid the threats to the world trade system inter-regional agreements would be needed based on mutual recognition that different

---

<sup>43</sup> See Rogelj et al. (2010)

<sup>44</sup> European Communities — Measures Concerning Meat and Meat Products (Hormones)  
[http://www.wto.org/english/tratop\\_e/dispu\\_e/cases\\_e/ds26\\_e.htm](http://www.wto.org/english/tratop_e/dispu_e/cases_e/ds26_e.htm)

<sup>45</sup> See Young & Holmes (2006). Alasdair R and Peter Holmes 'Protection or Protectionism? EU Food Safety and the WTO' pp 281-306 in *What's the Beef? The Contested Governance of European Food Safety* edited by [Christopher Ansell](#) and [David Vogel](#) MIT Press 2006

<sup>46</sup> Plus Norway, Iceland and Liechtenstein.

<sup>47</sup> See also the accompanying reports in *New Scientist*, June 19, 2010 page 8

carbon prices represented equivalent effort to abate carbon. This approach could eliminate the pressure for BCAs.

If there were explicit multilateral carbon commitments, a set of rules could be envisaged that would allow action to be taken against a non-ratifying country or in the face of unambiguous evidence of a ratifying country failing to comply with multilateral rules. This would require a detailed agreement allowing certain BCAs in very specific circumstances and without further authorization, once an adverse judgment had been made by an independent international monitoring body. Such a monitoring body would decide whether a BCA is chargeable and which countries can charge it. If there were a multilateral decision, measures would not need to be unilateral. The target country of such measures could then appeal to WTO in case of abuse of enforcement rules.

### **The WTO and a comprehensive climate agreement**

An alternative approach would be to have a comprehensive and binding post-2012 climate change agreement that members of WTO would be obligated to comply with. Non-compliance would be a breach of WTO rules if the WTO Appellate Body then judged this agreement to be relevant public international law.<sup>48</sup> Compliant member states could apply to the WTO for the right to apply measures (e.g. SCM) but promise not to do so until authorised. Those who claim injury due to the non-compliance, or biased compliance, of others could bring cases under WTO rules. The WTO website informs us:

Most subsidies, such as production subsidies, fall in the ‘actionable’ category.

Actionable subsidies are not prohibited. However, they are subject to challenge, either through multilateral dispute settlement or through countervailing action, in the event that they cause adverse effects to the interests of another Member.<sup>49</sup>

A possible approach would be that WTO members agree to refrain from countervailing action but retain the right to bring cases to the WTO DSB against ‘carbon subsidies’. The question arises whether ‘injury’ would be the right basis here: trade injury would be appropriate if the focus was on ‘competitiveness,’ but less so if the objective was protection of the environment itself. All Members would need to agree not to introduce any BCAs until a panel had heard a case, judgement would be based on existing rules, e.g. the subsidy code and WTO jurisprudence. Unilateral use of CVDs, AD and Art XX measures are to be avoided.

The WTO Subsidies and Countervailing Measures agreement could be used in conjunction with a post-Kyoto agreement (as in the WTO Uruguay Round Agreement on Agriculture of 1994) to spell out what carbon regimes are deemed compliant.<sup>50</sup> and cannot give rise to counter-measures. Other measures would be actionable. Parties would need to agree that there will be no border adjustments without authorisation from the DSB. But if

---

<sup>48</sup> But see Dawar and Holmes 2009 on this.

<sup>49</sup> [http://www.wto.org/english/tratop\\_e/scm\\_e/subs\\_e.htm](http://www.wto.org/english/tratop_e/scm_e/subs_e.htm)

<sup>50</sup> See [http://www.wto.org/english/tratop\\_e/agric\\_e/agboxes\\_e.htm](http://www.wto.org/english/tratop_e/agric_e/agboxes_e.htm)

injury and non-compliance with obligations can be shown, sanctions could be authorised (with some rules laid down about what might be allowed).

Ideally one would wish to see a full multilateral environmental agreement (MEA) with its own dispute settlement system that would not involve the WTO DSB deciding who had complied with carbon rules, but with agreement by WTO members on the relationship between the agreements. Adding yet another burden to the WTO DSB would be very challenging. The burden on panels and the Appellate Body to decide what was and what was not acceptable as an environmental measure would be greater, the less specific any MEAs are. Nevertheless, if WTO members impose restrictions on imports, the target country will have the right to complain at the WTO's DSB. The more an MEA spells out what is required and allowed by way of environmental obligations the less the challenge for the DSB. But it is difficult to expect soon a system that will not put Pascal Lamy's optimistic view set out above to the test.

## 8. Conclusions

The evidence strongly indicates that the case for border adjustments on grounds of carbon leakage and hence lost competitiveness is weak. But it is politically salient, with backing from both industry and environmentalists, and may be a price demanded by the US Congress for action on emissions. But such moves would generate a strong reaction by potential target countries and there is a serious systemic risk to the multilateral trading system from the degree of uncertainty that the use of such measures could create even when their scale is modest. BCA measures are not always violations of GATT and assessing compatibility would create serious challenges if left solely to the Dispute Settlement System of the WTO. Moreover the least disruptive and most legally defensible measures would be the least environmentally friendly.

In fact any destination (consumption) based emissions charge systems necessarily imply border adjustments, on *all* relevant imports (which must be charged under the domestic regime) and exports (which should have any taxes rebated). There may be domestic taxes charged on imports but countervailing duties could also be justified on the basis of many *seemingly* uncontroversial things such as free allocations, carbon tax exemptions which might lead to the EU becoming a target, and which indeed have already created issues within the EU under state aid rules. EU policy makers need to take heed of this in a single market context. On the other hand, origin (production) based systems do not require any BAMs *from an environmental* perspective provided that there is recognition of some kind of equivalence among trading partners. From the environmental perspective mutual trust is only needed with regard to *overall* emissions charges or the existence of broad equivalence achieved by other means. but from a competitiveness perspective it is possible that 'sensitive' sectors may still express concerns if burdens are distributed differently within trading partners.

Therefore the priority must remain some form of overall global agreement on emissions reductions which, even if it is not an agreement on uniform emissions taxes at source or detailed targets, still creates a framework within which mutual recognition and equivalence can be established. Failing this, the major players need to seek bilateral or plurilateral mutual recognition frameworks upon which a wider system might eventually be based.



## References:

ACESA (2009) 'The American Clean Energy and Security Act of 2009', H.R. 2454, June 26.

Albrecht, J. (1999) 'Making CO2 Emission Trading More Effective: Integrating Cross-sectoral Energy Efficiency Opportunities', in: Carraro, C. (ed.) *Efficiency and Equity of Climate Change Policy*, Kluwer Academic Publishers.

BERR, (2007) 'Digest of United Kingdom Energy Statistics', Department for Business Enterprise and Regulatory Reform, London. Available at: <http://stats.berr.gov.uk/energystats/dukes07.pdf> [Accessed October 6th 2009]

Bhagwati, J. & Mavroidis, P.C. (2007) 'Is action against US exports for failure to sign Kyoto Protocol WTO-legal?', *World Trade Review*, 6, 299-310.

Bordoff, J.E. (2008) 'International Trade Law and the Economics of Climate Policy: Evaluating the Legality and Effectiveness of Proposals to Address Competitiveness and Leakage Concerns', Prepared for Brookings Forum: 'Climate Change, Trade and Competitiveness: Is a Collision Inevitable?', June 9, Brookings Institution, Washington.

Carbon Trust (2010) 'Tackling Carbon Leakage: Sector-specific solutions for a world of unequal carbon prices', The Carbon Trust, London.

Cosbey, A. (2009) 'Border Carbon Adjustment: Questions and Answers (but more of the former)', Background paper prepared for the GTDF/IISD Round Table Discussion: 'Toward International Agreement on Border Measures for Climate Change', November 12, WMO, Geneva

Defra (2008) 'Guidelines to Defra's GHG Conversion Factors', Department for Environment Food and Rural Affairs, London. Available at: <http://www.defra.gov.uk/environment/business/reporting/pdf/ghg-cf-guidelines-annexes2008.pdf> [Accessed October 6th 2009]

Demailly, D. & Quirion, P. (2006) 'CO2 abatement, competitiveness and leakage in the European cement industry under the EU-ETS: grandfathering vs. output-based allocation', *Climate Policy*, 6(1), pp. 93-113

Dawar, K. and Holmes, P. (2009) 'Negotiation or litigation? The curiously evolving governance of the WTO' Pp 93-117 in Yueh, L (ed) *The Law and Economics of Globalisation, New Challenges for a World in Flux*, Edward Elgar Publishing

Demailly, D. & Quirion, P. (2008) 'European Emissions Trading Scheme competitiveness: A case study on the iron and steel industry', *Energy Economics*, 30, pp. 2009-2027.

Dröge, S. (2008) "'Climate Tariffs" and the Credibility of the EU Climate and energy Package', SWP, German Institute for International and Security Affairs.

Dröge, S. (2009) 'Tackling Leakage in a World of Unequal Carbon Prices', *Climate Strategies*, September 2009.

EC (2010) 'Innovative financing at a global level', European Commission. Available at: [http://ec.europa.eu/economy\\_finance/articles/international/2010-04-06-global\\_innovative\\_financing\\_en.htm](http://ec.europa.eu/economy_finance/articles/international/2010-04-06-global_innovative_financing_en.htm) [Accessed April 20th 2010]

EurActiv (2008) 'EU warned of trade war over climate measures', Article updated 29<sup>th</sup> January, 2010. Available at: <http://www.euractiv.com/en/trade/eu-warned-trade-war-climate-measures/article-169878> [Accessed 20th March, 2010]

EurActiv (2010) 'France takes carbon tariff campaign to Washington' April. Available at: <http://www.euractiv.com/en/climate-environment/france-takes-carbon-tariff-campaign-washington-news-425425> [Accessed April 20th 2010]

Graichen, V., Schumacher, K., Matthes, F.C., Mohr, L., Duscha, V., Schleich, J. & Diekmann, J. (2008) Impacts of the EU Emissions Trading Scheme on the industrial competitiveness in Germany, öko-Institut.

Gros, D. (2009) 'Global Welfare Implications of Carbon Border Taxes', Working Document No. 315, Centre for European Policy Studies, Brussels.

Groser, T. (2009) 'Trade and Climate Change: A Negotiator's Perspective', Talk delivered at Chatham House, London, December 8<sup>th</sup> 2009. Transcript available at: [http://www.chathamhouse.org.uk/files/15570\\_081209groser.pdf](http://www.chathamhouse.org.uk/files/15570_081209groser.pdf) [Accessed February 10th 2010]

Grubb, M. (2010) 'Copenhagen: back to the future?' *Climate Policy*, 10(2), pp. 127-130.

Hagel, R.C. (2007) 'Senator Hagel Speech to the US Senate', Congressional Record: October 3, 1997 (Senate), Page S10308-S10311, as quoted in: Kuik, O. & Gerlagh, R. (2003) 'Trade liberalization and carbon leakage', *The Energy Journal*, 24(3), pp. 97-120.

Holmes, P. Rollo, J. Winters, A. Dawar, K. & Mathis, J. (2008) 'Qualified Market Access', University of Sussex, CARIS Centre. Available at: [http://trade.ec.europa.eu/doclib/docs/2009/february/tradoc\\_142341.pdf](http://trade.ec.europa.eu/doclib/docs/2009/february/tradoc_142341.pdf) [Accessed November 25th 2009]

Hourcade, J.-C., Demailly, D., Neuhoff, K., Sato, M., Grubb, M., Matthes, F. & Graichen, V. (2007) 'Differentiation and Dynamics of EU-ETS Industrial Competitiveness Impacts', *Climate Strategies*.

Houser, T., Bradley, R., Childs, B., Werksman, J. and Heilmayr R. (2008) 'Leveling the Carbon Playing Field: International Competition and US Climate Policy Design', Peterson Institute for International Economics and World Resources Institute.

IIFT (2010) 'WTO Compatibility of Border Trade Measures for Environmental Protection', Centre for WTO Studies, Indian Institute of Foreign Trade, New Delhi. Available at: [http://wtocentre.iift.ac.in/FAQ/english/Environment\\_FAQ.pdf](http://wtocentre.iift.ac.in/FAQ/english/Environment_FAQ.pdf) [Accessed April 20th 2010]

Ismer, R. & Neuhoff, K., (2007). 'Border tax adjustments: A feasible way to support stringent emissions trading', *European Journal of Law and Economics*, 24(2), pp. 137-164.

King, David, (2010). No cause for Climate Despair, *New Scientist*, 19 June

Lamy, P. (2008) 'Introductory remarks to the High-Level Panel on Mutual Supportiveness of Trade, Climate Change and Development Objectives and Policies', WTO Public Forum, September 24. Available at: [http://www.wto.org/english/news\\_e/news08\\_e/remarks\\_lamy\\_forum08\\_24sept\\_e.pdf](http://www.wto.org/english/news_e/news08_e/remarks_lamy_forum08_24sept_e.pdf) [Accessed 24<sup>th</sup> October 2009]

Levinson, A. (2010) 'Offshoring Pollution: Is the United States Increasingly Importing Polluting Goods?', *Review of Environmental Economics and Policy*, 4(1), pp. 63-83.

Mattoo, A., Subramanian, A., van der Mensbrugghe, D. & Jianwu He (2009) 'Reconciling Climate Change and Trade Policy', World Bank Policy Research Working Paper 5123, November.

McKinsey & Co. & Ecofys (2006) 'Report on International Competitiveness', Report prepared for the European Commission's review of Directive 2003/87/EC on emissions trading.

Meckling, J.O & Chung, G.Y (2009) 'Sectoral approaches for a post-2012 climate regime: a taxonomy', *Climate Policy*, 9(6), 652-668.

Paltsev, S. Reilly, J. Jacoby, H. Gurgel, A. Metcalf, G. Sokolov, A. & Holak, J. (2007) 'Assessment of U.S. Cap-and-Trade Proposals' MIT Joint Program on the Science and Policy of Global Change Report 146, in: Pew (2008). Available via: <http://globalchange.mit.edu/pubs/> [Accessed November 25<sup>th</sup> 2009]

Pew (2008) 'Response of the Pew Center on Global Climate Change to the Committee on Energy and Commerce and its Subcommittee on Energy and Air Quality U.S. House of Representatives on the Climate Change Legislation Design White Paper: Competitiveness Concerns/Engaging Developing Countries', Pew Center on Global Climate Change. Available at: <http://www.pewclimate.org/docUploads/Pew%20Center%20on%20Competitiveness-Developing%20Countries-FINAL.pdf> [Accessed October 24<sup>th</sup> 2009]

Ponssard, J.-P. & Walker, N. (2008) 'EU emission trading and the cement sector: a spatial competition analysis', University College Dublin and Ecole Polytechnique, Paris

Quirion, P. (2009) 'Historic versus output-based allocation of GHG tradable allowances: a comparison', *Climate Policy*, 9(6), pp. 575-592.

Reinaud, J. (2005) 'Industrial Competitiveness under the European Union Emissions Trading Scheme', International Energy Agency, Paris.

Reinaud, J. (2009) 'Trade, Competitiveness and Carbon Leakage: Challenges and Opportunities' Energy, Environment and Development Programme Paper: 09/01, Chatham House, London.

Reinaud, J. (2010) 'Competitiveness and Carbon Leakage: Lessons Learnt in the EU and Key Issues', ClimateWorks Foundation, Presentation at IFRI Annual Conference, Brussels, 11<sup>th</sup> February.

Rogelj, J., Meinshausen, M., Nabel, J., Chen, C., Hare, W., Markmann, K., Schaeffer, M., Macey, K. & Höhne, N. (2010) 'Copenhagen Accord pledges are paltry', *Nature*, 464(7292), pp. 1126-1128.

Stiglitz, J. (2006) 'A New Agenda for Global Warming', *The Economists' Voice*, 3(7), Article 3.

Takamura, Y. & Kameyama, Y. (2009) 'Border Adjustments in Japanese Climate Policy: Policy discussion and perception of stakeholders', Climate Strategies Working Paper, March.

Tamiotti, L. Teh, R. Kulacoglu, V. Olhoff, A. Simmons, B. & Abaza, H. (2009) 'Trade and Climate Change', United Nations Environment Programme and the World Trade Organization. Available at:

[http://www.wto.org/english/news\\_e/pres09\\_e/pr559\\_e.htm](http://www.wto.org/english/news_e/pres09_e/pr559_e.htm) [Accessed 24<sup>th</sup> October 2009]

Taylor, M. Tam, C. & Gielen, D. (2006) 'Energy Efficiency and CO2 Emissions from the Global Cement Industry, International Energy agency', Draft version 30/8/2006, Paper prepared for: 'IEA-WBCSD workshop: Energy Efficiency and CO2 Emission Reduction Potentials and Policies in the Cement Industry', 4-5 September 2006, IEA, Paris.

UN (1992) 'United Nations Framework Convention on Climate Change', United Nations.

van Oss, H.G. & Padovani, A.C. (2003) 'Cement Manufacture and the Environment Part II: Environmental Challenges and Opportunities', *Journal of Industrial Ecology*, 7(1), pp.93-126

Voituriez, T. & Wang, X. (2009) 'Can unilateral trade measure significantly reduce leakage and competitiveness pressures on EU-ETS-constrained industries? The case of China export taxes and VAT rebates', *Climate Strategies Working Paper*, January.

Volvo (2009) 'Volvo Car Corporation 2008/09 Corporate Report with Sustainability', Available at: [http://www.volvocars.com/de/footer/about/environment/Documents/Sustainability\\_Report\\_08\\_09.pdf](http://www.volvocars.com/de/footer/about/environment/Documents/Sustainability_Report_08_09.pdf) [Accessed 24th October 2009]

VW (2007) 'The Passat Environmental Commendation – Background Report', Available at: [http://www.volkswagenag.com/vwag/vwcorp/info\\_center/en/publications/2008/04/environmental\\_commendation.-bin.acq/qual-BinaryStorageItem.Single.File/Passat\\_UP\\_Hintergrundbericht\\_GB.pdf](http://www.volkswagenag.com/vwag/vwcorp/info_center/en/publications/2008/04/environmental_commendation.-bin.acq/qual-BinaryStorageItem.Single.File/Passat_UP_Hintergrundbericht_GB.pdf) [Accessed November 20th 2009]

Wang, T. & Watson, J. (2009) 'China's Energy Transition Pathways for Low Carbon Development', Sussex Energy Group, SPRU, University of Sussex and Tyndall Centre for Climate Change Research.

Weiss, M.A. Heywood, J.B. Drake, E.M. Schafer, A. & AuYeung, F.F. (2000) 'On The Road In 2020 A Life-Cycle Analysis of New Automobile Technologies', MIT Energy Labs. Available at: <http://web.mit.edu/energylab/www/pubs/el00-003.pdf> [Accessed 24th October 2009]

Werksman, J., Bradbury, J. & Weischer, L. (2009) 'Trade Measures and Climate Change Policy: Searching for Common Ground on an Uneven Playing Field', World Resources Institute, Working Paper, December

Wiedmann, T. & Minx, J., 2007. 'A Definition of a 'Carbon Footprint'', ISA UK Research and Consulting, Research Report 07-01.

Young, A.R. & Holmes, P. (2006) 'Protection or Protectionism? EU Food Safety and the WTO', in: Ansell, C. & Vogel, D. (eds.) *What's the Beef? The Contested Governance of European Food Safety*, MIT Press.



## **Appendix: The UK Steel Industry Position<sup>51</sup>**

The industry is considering the environmental impact of steel production and the implications of carbon leakage but given the size of carbon footprints of a tonne of steel and the low margins, the cost of carbon charges can make a crucial difference to the viability of operations. Free allocation would, of course, help considerably especially with the survival of traditional blast furnace “virgin steel” manufacture where extensive use of coke is an inherent part of the production process and the carbon footprint cannot be reduced much further by energy efficiency. Corus and other UK producers have reduced their CO<sub>2</sub> emissions per tonne of steel. Corus figures for typical blast oxygen furnace steel are 1.8 tCO<sub>2</sub> per tonne of steel, and for electric arc furnace (the “recycled” route) 0.1 tCO<sub>2</sub> per tonne of steel (plus indirect emissions from electricity usage<sup>52</sup>). Corus are looking to reduce emissions from steel output by 20% by 2020 vis-à-vis 1990 levels.<sup>53</sup>

It is understood that a benchmark at best available technology will be set in order to decide what firms shall be allocated in phase 3 of the EU ETS. The planned ratcheting down of emissions on a year-by-year basis, it is felt, would leave even the ‘cleanest’ steel producers short of permits and thus at a competitive disadvantage. The industry is willing to call for anti-dumping duties where it thinks there has been injury caused by dumping, but its representatives feel that the impact of border carbon adjustments would be different and inappropriate. There are basically three reasons for this.

Firstly, the British and European industries are internationally owned and trade oriented and do not wish to create precedents for market closure.

Secondly, and equally important, are the complexity arguments highlighted above. The actual emissions per tonne of steel vary enormously according to the method of production, depending on what the source of power is and above all whether scrap was used or not. It is impossible to tell by physical inspection what the production method was. The result of carbon charges would be to introduce scope for total arbitrariness.

Finally, competitiveness of exports does not appear to be addressed by border adjustments. Free allocation is very much preferred to the potential vagaries of border adjustments.

---

<sup>51</sup> This Appendix is based on interviews with UK steel industry representatives in March 2009.

<sup>52</sup> One tonne of EAF steel requires approximately 650kWh of electricity on average in the EU according to Reinaud, 2005:36, and assumptions regarding average EU emissions for the electricity supplier lead Reinaud to an estimate for indirect emissions of 0.25tCO<sub>2</sub>/t steel.

<sup>53</sup> For more information see:

[http://www.corusgroup.com/en/company/divisions/strip\\_products\\_division/corus\\_strip\\_products\\_uk/the\\_environment/environmental\\_faqs/#40459](http://www.corusgroup.com/en/company/divisions/strip_products_division/corus_strip_products_uk/the_environment/environmental_faqs/#40459)