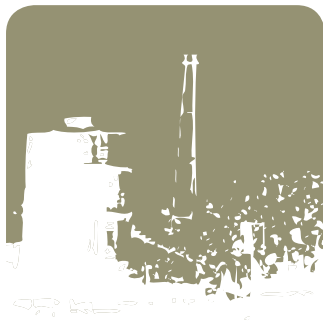


# Practical Aspects of Border Carbon Adjustment Measures

Using a Trade Facilitation  
Perspective to Assess Trade Cost



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# Summary

Border carbon adjustment (BCA) measures are being discussed as a response to concerns regarding carbon leakage and competitiveness in a number of OECD countries, although no country has implemented these types of BCA measures yet. This analysis aims to complement the studies done on legal and economic issues with a discussion on the practical challenges and costs relating to the different ways a BCA could be constructed. The objective is to shed light on the costs a BCA could bring to the private and public sector in the exporting and importing country. The study uses a trade facilitation perspective in the analysis of the cost a BCA could entail. Trade facilitation is a concept aimed at reducing administrative hurdles and cumbersome border procedures in international trade that can become non-tariff barriers, which slows down trade and creates transaction costs.

A BCA could either take the form of a carbon tariff or a requirement for importers to buy emissions allowances. A border carbon adjustment scheme can be applied to imports, exports or both. The scenarios in the study focus on border carbon adjustment measures for imports. However, it is not unlikely that a BCA would also include an export component under which carbon costs for exports of domestic greenhouse gas intensive goods would be reimbursed. The study presents three schematic designs for a BCA:

- The most ambitious approach is a border carbon tariff (or requirement to purchase emissions allowances), which adjusts the charges on imports according to the level of greenhouse gases emitted during the production of each specific imported product).
- In the second approach, the importing country sets a standardized tariff, or a number of emission allowances required for each product category under the BCA to be paid when importing the product, regardless of how “green” its production process has been. The standardized charge could either be based on the carbon content of domestic production or based on the carbon content embodied in imports.
- A third option is to set a standardized tariff, or emissions allowance purchase for each product under the BCA, but also to allow for producers in exporting countries that prove to be more efficient (i.e. emits less greenhouse gases during the production of their products than benchmark level) to pay a lower tariff.

In the second and the third option, it could also be possible to differentiate per country of origin.

A conclusion of this study is that if the aim of the BCA is to differentiate between high and low emission products, there must be very onerous requirements to make the BCA work. If the BCA is simplified, the environmental incentives are reduced.

A requirement to carry out a calculation of the greenhouse gas emissions – or a carbon footprint – and to get an accreditation that the calculation has been made according to the method stipulated by the implementing country, could potentially be very costly and complex for the exporting company. For companies that do not have the resources to carry out such a calculation, the requirement could become a barrier to trade. The study highlights that in addition to the administrative costs from new data and document submissions that a BCA scheme would entail, uncertainty on whether countries will introduce such a scheme, lack of transparency and differing requirements between countries, creates the risk of increased costs for exporters. In developing countries with a complex and cumbersome trading environment, this would add to already heavy trade transaction costs.

If the implementing country opts for the solution with standardized charges, the government would need to define benchmarks for all products covered by the scheme, possibly on a country level. To set these benchmarks, the implementing country would need to gather large amounts of information on greenhouse gas emissions and production methods from domestic and/or foreign producers. The implementing country must also put in place a system for controls at the border. Costs for border authorities are driven up under a BCA for several reasons, such as if: manual intervention is required to clear consignments at the border crossing, electronic submissions are not possible, large resources have to be devoted to prevent evasions, the BCA covers a large range of products, and if many companies are given individual treatment. Costs may also be driven up if the BCA results in a need for major IT development to deal with new processes. For the exporting country's authorities there can also be costs from a BCA. For instance, if an exporting country needs to put in place a scheme for rebates on exports or if the country's agency is responsible for the accreditation of the carbon footprint calculation, the result would be increased costs for border authorities.

Diverging requirements between countries and the distortions from the resulting market segmentation can create uncertainty for the economic operators and result in high compliance costs. A situation where two or more countries implement BCAs with different rules is no exception. International cooperation on border carbon adjustment could be one way to ensure simple and harmonized procedures, which would reduce the non-tariff barriers created by BCAs in different countries. However, at this point, countries would be wise to consider if BCA measures are a viable option, or if there are other ways to address competitiveness concerns and the issue of carbon leakage that do not entail the high administrative costs of a BCA.

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# 1. About the study

The global negotiations for a new climate agreement are on-going in the UNFCCC (United Nations Framework Convention on Climate Change). The outcome of these negotiations is still uncertain. Border Carbon Adjustment (BCA) measures are at the centre of the debate on climate change and trade as they are being considered in a number of OECD countries, including the EU and the US, as a response to a perceived risk of carbon leakage<sup>1</sup> and competitiveness concerns. They are also being considered as a way to achieve emissions reductions. In addition, border measures are seen by some as a negotiating chip to pressure other countries to make commitments in climate negotiations. There have been warnings that border carbon adjustment measures risk being perceived as a trade sanction and leave room for protectionist use, which could lead to trade retaliations and could risk becoming a stumbling block in the international climate negotiations.

Most of the discussions on BCAs have been centred around economic and legal issues: Are there risks of carbon leakage and would a BCA be an efficient way to address these risks? Under what conditions could a border carbon adjustment scheme be allowed under WTO law? In a study for the World Bank, Friis Jensen (2009) notes that “decision makers and academics alike have produced little evidence on implementation problems but appear to be discussing the very complex border tax adjustments with the implicit assumption that implementation problems can be solved if the need arises”.

This analysis aims at complementing the studies done on legal and economic issues with a discussion on the implementation challenges that a BCA could bring to both the public and the private sector.

## Outline of the study

The point of departure in the study is the current debate on Border Carbon Adjustment measures. After a short background on the policy discussions, three potential schematic scenarios of what a Border Carbon Adjustment scheme could look like will be presented. When deciding on the design of a BCA, there are a number of variables to consider. These aspects will be discussed under three broader headings on country scope, product scope and the adjustment base for charges under the BCA. These three design options will be the basis in the following discussion on different types of costs that the BCA will result in for the public and the private sector.



A BCA would be introduced to prevent carbon leakage and loss of competitiveness. However, studies on the WTO compatibility of border carbon adjustment measures have also found that the environmental argument could be decisive for the legality of the carbon adjustment scheme (National Board of Trade, 2009). This study will not discuss the *effectiveness* of the different ways to design a BCA – that is, if the measures have the right design to achieve the intended purpose of preventing carbon leakage; or if the design of the BCA would be compatible with the rules of the WTO. Instead, the focus will be on practical aspects, issues and challenges that a country deciding to implement a BCA would be faced with, and a discussion on the costs associated with these choices.

The report aims to use a trade facilitation perspective when discussing practical aspects of a BCA scheme. Trade facilitation is a concept that involves reducing the transaction costs in international trade by simplifying trade procedures. Various estimates have shown that the cost of trade procedures may range from 2 percent to 15 percent of the value of the traded goods (OECD, 2009b). Complicated and cumbersome trade procedures from a border carbon adjustment scheme could potentially become a trade barrier.

## 2. What are Border Carbon Adjustment measures?

Border carbon adjustment measures can take two forms: carbon tariffs and a mandatory requirement for importers to hold emissions allowances. A carbon tariff on imports would, in practice, work as a fee levied on imports at the border, very much like an ordinary tariff. If importers are introduced into a domestic emission allowance scheme, the importers would either purchase allowances in the existing domestic market for producers, or a separate marketplace for importers would be set up<sup>2</sup>. One of the differences between the carbon tariffs and emissions allowances is that in an emissions trading scheme the carbon price would fluctuate according to supply and demand in the emissions market, whereas a carbon tariff would be a fixed cost.

The principle behind a border adjustment is that the goods are taxed in the country of consumption, the so called 'destination principle.' The objective of a border adjustment is to level the playing field between taxed domestic industries and untaxed foreign competitors. If products are only taxed in their place of consumption, countries can preserve the right to choose their own level of taxation and trade neutrality is maintained as all products in a given market compete on the same competitive terms.

A border carbon adjustment can apply to imports, exports or both. A BCA on imports would impose a cost on some greenhouse gas intensive imported products and a BCA on exports would entail a kind of rebate on exports of greenhouse gas intensive products.

## 3. The policy discussion on emission trading schemes and border adjustment measures

Border carbon adjustment measures are at the centre of the debate on climate change and trade. BCAs are being considered in a number of OECD countries although there is no country that has implemented border carbon adjustment measures as of today. However, it is difficult to say at this point whether it is likely that BCA measures will ever be implemented or if it is just one among many other options.

The EU, Norway, Switzerland and New Zealand have all put in place emission trading schemes. The EU was the first to launch a cap-and-trade scheme. In 2005 the EU implemented its Emission Trading Scheme (ETS) for the sectors that are the largest emitters of greenhouse gases such as steel, cement, aluminium and electricity producers. Norway declared that it would join the EU ETS in 2007 and has since 2008 been a full member. New Zealand's emission trading scheme (ETS) came into place in 2008. In 2015, all sectors and all greenhouse gases will be included in New Zealand's ETS.

In the EU, industry groups voiced concerns about the competitiveness of the EU industries that are a part of the ETS and concerns over the risk of carbon leakage (Nordström, 2009). As a response to this, the amended EU ETS Directive<sup>3</sup> identified a number of sectors that were deemed to be exposed

to a significant risk of carbon leakage. These sectors could either receive a higher amount of free allowances, or a *carbon equalisation system* could be introduced as a way to put installations from the EU on an equal footing with those from third countries.

However, in a report from May 2010 the EU Commission seems to suggest that the EU would not implement a BCA, citing mainly practical challenges with the implementation, although the option is not out of the question. On the issue of including imports into the ETS, the Commission notes that the system would have to be very carefully designed to ensure its compatibility with WTO requirements. The Commission further notes that '[i]t could be hard to implement a system which sought to define in detail the carbon content of each individual category of goods, but such precision might be required.' The Commission also notes that for each category of goods that are included in a border adjustment scheme, an average EU carbon content would have to be defined, which risks becoming a difficult and drawn-out process. Verifying the performance of individual installations in third countries would require sophisticated monitoring and reporting systems in place at the installation in order to be feasible. (European Commission, 2010)



Australia seems to have arrived at a similar conclusion as the EU Commission. In Australia, an ambitious climate bill with cap-and-trade has been rejected twice by the parliament. A BCA scheme seems unlikely at this point since the Australian Department of Climate Change has made the assessment that it would be very difficult to implement transparent, simple and verifiable, as well as effective border adjustments for imported goods. The department further acknowledged that border adjustments could be used for protectionist reasons and that this could be very costly for a small open economy like Australia's. (Department of Climate Change, 2008).

At the moment, the US seems to be the country that is most seriously considering a BCA as an option. Since 2007 a number of climate change bills and amendments have been introduced in the US Senate and the House of Representatives, such as the Lieberman-Warner Act, the Boxer Amendment, the American Clean Energy and Security Act (also called the Waxman-Markey Bill), the Kerry-Boxer Bill and the American Power Act. The Waxman-Markey bill proposes that the US introduces a cap-and-trade scheme. The aim would be to achieve a 20 percent reduction in greenhouse gas emission relative to the

2005 level in 2020. In addition to other policies to deal with carbon leakage and loss of competitiveness, such as rebate on allowances, the Waxman-Markey bill also provides for an "international reserve allowance program." This means that if US international negotiating objectives on climate change are not met by January 2018, the President could decide to establish a programme to adjust energy-intensive imports at the border. The subsequent bills propose changes to the Waxman-Markey Bill, but it seems as though border carbon adjustment measures are still being considered as an option.

Canada has declared that it will await US legislation before a climate bill is discussed. Recently, the Democrats decided to drop a cap-and-trade bill in the Senate.

In Japan, the Council for Global Warming was founded in March 2008. In June of the same year, the Council presented a proposal that acknowledged the potential problem with carbon leakage and also opened the possibility of imposing border taxes to reduce the risk of carbon leakage. In South Korea, an act has been passed that provides legal framework for the government to implement an emissions trading scheme in 2012.

## 4. Different ways to design a Border Carbon Adjustment scheme

This section will discuss different approaches in designing a Border Carbon Adjustment scheme. How a Border Carbon Adjustment measure is designed will have an impact on its effectiveness in achieving the intended objectives and for WTO compatibility. However, this study focuses on administrative costs and implementation challenges for the public and the private sector from different design options.

First, three schematic design options for a border carbon adjustment scheme will be presented. We will look at three variables that will have an impact on the costs: the *country scope*, the *product scope* and the *adjustment base*. The charges under BCA can either be adjusted to the greenhouse gas emission of the specific products, or standardized charges can be set by the implementing country. These standardized charges for imported products can either be based on the *carbon content of domestic production* or based on the *carbon content embodied in imports* (Matoo et al, 2009).

A Border Carbon Adjustment scheme can be applied to imports, exports or both. The scenarios in the study are focused on border carbon adjustment measures for imports. However, it is not unlikely that a BCA would also include an export component under which costs for exports of greenhouse gas-intensive goods would be reimbursed. Matoo et al (2009) note that neither the US nor the EU legislative initiatives explicitly provide for export rebates. One explanation for this is that it could look odd, from an environmental perspective, to be taking action on environmental grounds and yet exempt some part of domestic production (namely, exports) from carbon taxes or an emission trading scheme. The adjustment base for an

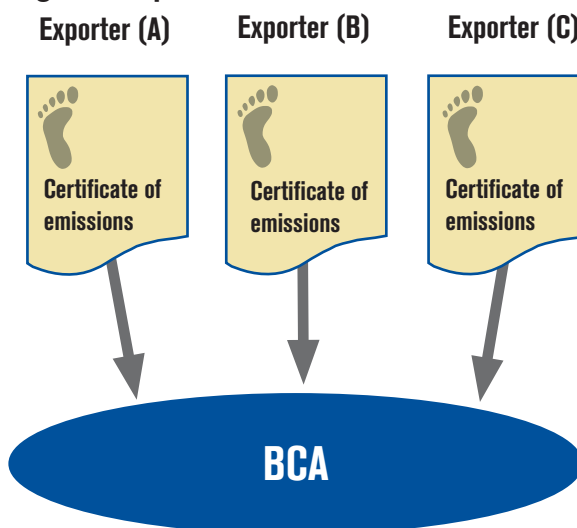
export rebate under a BCA would be the carbon content in domestic production. Matoo et al (2009) suggest that for reasons of consistency and symmetry, the adjustment base for import and export should then be the same. Hence the import adjustment would also be based on domestic carbon content if the BCA has an export component. (Matoo et al, 2009).

### Option I

The most ambitious approach is a border carbon tariff (or requirement to purchase emissions allowances) that varies according to the level of greenhouse gases emitted during the production of each specific imported product. In practice, it seems unlikely to have individual charges for all imported products. So to facilitate the administration of the BCA, three categories could be set for each product category (high, medium or low greenhouse gas emissions) and then the exporting company would have to show which category its product belongs in.

To realize this, each exporter would need to be able to demonstrate the level of greenhouse gas emissions – or the carbon footprint – that its product has. Therefore, it is assumed that each imported product would have to be accompanied by an emissions certificate stating the carbon footprint of that particular product. Under such a Border Carbon Adjustment scheme, there are incentives for an exporter/producer to reduce its greenhouse gas emissions in order to pay lower charges when exporting.

Figure 1: Option I

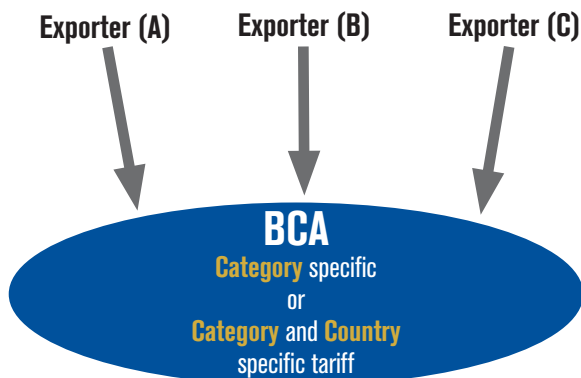




### Option II

A second approach would be for the importing country to set a standardized tariff (or requirement to purchase emissions allowances) under the BCA to be paid when importing the good, regardless of how “green” its production process has been. These standardized charges for imported products can either be based on the carbon content of domestic production or based on the carbon content embodied in imports. If the adjustment base is the carbon content in imports, the BCA charges can either be on a product category level or they could be differentiated between countries. Under this BCA design there is no need for the individual exporter/producer to calculate its greenhouse gas emissions.

Figure 2: Option II

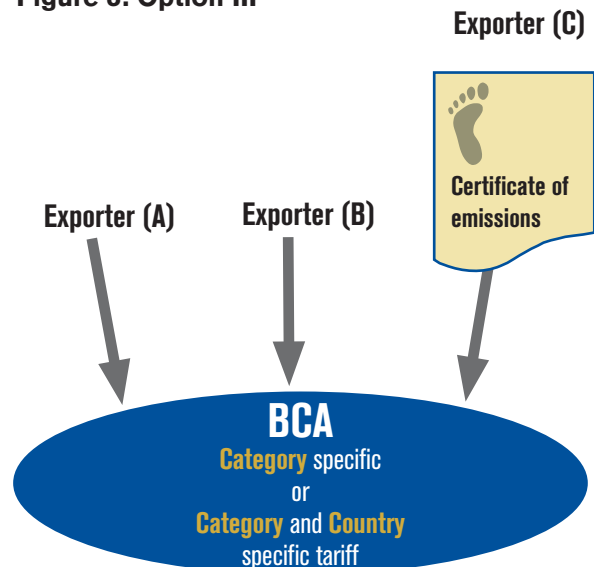


### Option III

A third design option, combining the two previous ones, is to set a standardized tariff, or emissions allowance purchase, for each product under the BCA, but also to allow for producers in exporting countries that prove to be more efficient (i.e. emits less greenhouse gases during the production of their products) to pay a lower tariff. The tariff can be set at product category level or product category and country level.

In this scenario, there are incentives for exporters/producers to cut their greenhouse gas emissions.

Figure 3: Option III



## 4.1 Country scope

The objective of a BCA would be to address asymmetries between different countries' policies on the issue of climate change and reduction of greenhouse gas emissions. One option could therefore be to discriminate between countries depending on whether they have implemented a unilateral climate policy on the emission intensity of their products or have undertaken commitments under a new climate agreement. Any differentiation of countries would risk becoming arbitrary if it is not based on clear and objective criteria. In the US Boxer Amendment, it was suggested that imports from countries that have not taken 'comparable action' to the US would be required to purchase emission allowances. Comparable action is defined as a situation where the percentage change in greenhouse gas emissions in the exporting country is equal to, or better, than the percentage change in greenhouse gas emission in the US during the same time period. However, countries that emit less than 0.5 percent of global greenhouse gas emissions and less than 5 percent of US imports of covered goods in the sector would not be covered by a BCA according to the Boxer Amendment. A problematic aspect of a differentiation between countries along the lines suggested in the Boxer Amendment is that it would make the BCA less transparent for both exporters and importers. A country could suddenly become a part of a BCA if their imports to the US increased or if their percentage share increased due to a decrease in imports from other countries.

Under a BCA that differentiates between countries, there will always be a risk of circumvention, especially if the BCA fees are high. The implementing authorities would then need to take precautionary measures and devote resources to prevent evasion of the BCA.

One way to avoid the problem of circumvention is to apply the BCA in such a way that all imports of a product category would have to pay the same charges, regardless of the exporting country. The import taxes under the BCA would be based on the carbon content of the domestic production of the product category. To avoid a situation where exports from countries with climate change policies and carbon taxes pay are penalised, the exporting country would rebate the exports from its domestic carbon tax in the home country. From the implementing country perspective, administering the BCA at the border would be easier because it would not have to make any distinctions based on the origin of the import since all countries would be covered by the BCA (Pauwelyn, 2007). For the export-

ing country this would entail an obligation to put in place an export rebate system for some of its exports, which of course would be an additional cost for the exporting country. It would also seem likely that the implementing country would want to verify that the imported goods had not received any hidden subsidies as a part of the export rebate. How this would be carried out in practice is not clear, though one solution could be that the imported product must be accompanied by a document with information on the export rebate the goods received.

## 4.2 Product scope

Carbon leakage and the risk of decreased competitiveness of certain products are the main reasons for imposing a Border Carbon Adjustment scheme. The product coverage in a BCA could range from a maximalist approach which includes many products, including downstream products, to a limited list of products such as steel, aluminum, cement and chemicals.

How to treat downstream products is one issue facing a country considering imposing a BCA. Imposing a carbon tariff or requirement of emissions allowances on greenhouse gas intensive basic products but not on downstream products could lead to a change in trade patterns and carbon leakage. For instance if a BCA on steel in the EU, but not on cars, causes firms to move the production of cars outside the EU to avoid the BCA costs and then import the products instead (Monjon and Quirion, 2010).

The product scope of the BCA will have impact on the overall administrative burden of the scheme. The more products that are covered by a BCA, the higher the administrative burden will be for agencies responsible for implementing and supervising the BCA. A relatively small-scale Border Carbon Adjustment scheme targeting a few countries and products should, in principle, not be too burdensome and costly to implement in terms of the day-to-day management of the scheme.

## 4.3 The adjustment base of BCA charges

The BCA charges can either be adjusted to the level of the greenhouse gas emissions of the imported products or standardized charges can be set by the implementing country. In the following two sections these two different options will be presented

## **The product scope in a possible EU BCA – from a maximalist to a minimalist approach**

A closer look at the discussion on the product scope in a possible BCA in the EU gives some insight into the span of products that are being considered.

In 2009, the EU Commission identified a list of sector and sub-sector products that were deemed to be in risk of carbon leakage. Products considered to be exposed to this risk were in sectors and sub-sectors where the production costs increased as a result of the implementation of the EU ETS (Emission Trading Scheme) and that are exposed to international competition (i.e. a high trade intensity)<sup>4</sup>. The increased production costs from the ETS could come in both the form of direct costs of the required allowances and the indirect costs from higher electricity prices resulting from the implementation of EU ETS. The Commission identified 164 sectors or sub-sectors<sup>5</sup> deemed to be at risk for carbon leakage. The majority of the sectors were put on the list because they had a high trade intensity. The Commission's list of products was comprehensive and not only included energy-intensive sectors such as manufacturing of aluminum, steel, cement and chemicals, but also manufacturing of down-stream products such as textiles, pulp, machines and electronic domestic appliances.<sup>6</sup>

Other research, by, for example, Hourcade et al. (2007) and CE Delft (2008), suggest that a much shorter list of sectors would be enough to deal with most of the leakage in the UK and the Netherlands respectively. Hourcade et al. (2007) use data from the UK and look at the sectors which as a result of the EU ETS will have higher direct costs for CO<sub>2</sub> emissions in combustion and process, or higher indirect costs from increased electricity prices. They found that only in a few subsectors are CO<sub>2</sub> costs significant relative to the value added and could therefore influence trade patterns and location decisions. Two sectors stand out in terms of added costs from direct CO<sub>2</sub> emissions under the EU ETS: the cement sector and the basic iron and steel sector. The sectors that stood out in terms of increased costs from an electricity price increase were aluminum and various chemical sectors. There are also non-trade aspects that restrict the likelihood for trade and thus reduce the concern over leakage in some sectors, such as high transport costs for cement and lime and high security costs for transport of certain chemicals. CE Delft (2008) has carried out a similar analysis of industries in the Netherlands and identifies almost the same sectors as Hourcade (2007), namely aluminium, fertilizer, iron and steel, inorganic and other base chemicals sectors. According to the study, profitability in these sectors may be reduced and the risk of carbon leakage may increase. One aspect that CE Delft and Hourcade do not take into their analysis is how exposed these sectors are to international trade. Generally higher leakage would be expected for more trade-intensive sector (National Board of Trade, 2009).

in some detail. It is important to understand the two options because they have different cost implications for the concerned parties.

### **4.3.1 Product-specific BCA charges – using a carbon footprint calculation in a BCA**

In two of the scenarios for the design of a BCA, the BCA charges would be adjusted to the level of greenhouse gases emitted during the production phase. These are the scenarios where every product is accompanied by an emissions certificate (option I) and the scenario where it is optional for more efficient producers to submit an emissions certificate and pay less than the stipulated benchmark (option III). Instead of referring to the level of greenhouse gas emitted during the production of a product, many studies use terminology such as *carbon footprint*, *embedded carbon*, *embodied carbon* or the *carbon content* of a product.

It is not possible to assess the level of greenhouse gas emissions emitted during the production of a product by merely inspecting the product at the border because the level of emissions depends on the production process. Instead the importing country could require that all imported products be accompanied by some sort of certificate outlining its greenhouse gas emissions. The exporter would be required to do a calculation of the greenhouse gas emissions resulting from the production of the product and the carbon tariff, or level of emission allowance, would then be adjusted based on this calculation.

While climate change is high up on the political and corporate agenda and carbon footprint calculations are in strong demand, there is still no common definition of exactly how a carbon footprint should be determined (Wiedmann and Minx, 2007). Therefore, the implementing country must define the rules on how the greenhouse gas emis-

## Carbon footprint standard and Product Category Rules (PCR): How to calculate the carbon footprint of a product?

A *carbon footprint scheme or standard* is basically a methodology on how to calculate and communicate the carbon footprint of a product. These schemes or standards often use *Life-cycle analysis (LCA)*, which is a production-based analytical tool to perform a systematic evaluation of the environmental aspect of a product or service system through all stages of its life-cycle: extraction and processing of raw material, through the manufacturing until the use, re-use, maintenance, recycling and final disposal. The carbon footprint consists of the sum of greenhouse gas emissions and greenhouse gas removals that result from the production process, which are then expressed in CO<sub>2</sub> equivalents.

To be able to use a carbon footprint to compare between product/production methods, consistency in the use of the methodology is necessary. To achieve this, standards/methodologies for calculating carbon footprints should refer to specific *product category rules (PCR)*. A product category rule (PCR) is a set of specific rules, requirements and guidelines on how to calculate the carbon footprint of that particular product category. The PCR sets the boundaries of the variables to include in the carbon footprint calculation of a particular product. When product carbon footprints are used in labeling for the consumer market, PCRs are necessary to be able to compare between products. PCRs are traditionally developed by industry groups and/or national carbon footprint schemes. As a consequence, many different rules often exist for a certain product category internationally. There are efforts to achieve harmonization between the different sets of PCR schemes.



sions for a product should be calculated. The implementing country could choose to make a reference to an existing carbon footprint standard<sup>7</sup> or to define its own rules. From a trade perspective, one potential risk is that different countries could choose different methods for calculating the carbon footprint in their BCAs. A producer exporting to these two markets would then have to do different calculations and this could potentially create trade barriers, increased costs, and less predictability.

There are a number of challenging technical aspects in the calculation of a carbon footprint. One challenge is to define the boundaries of a production process. For a comparatively easy production process, such as the manufacturing of steel, a calculation of the environmental impact can be done quite easily with a process analysis. However, calculating the carbon content for more processed products higher up in the value chain – for instance where steel is an input component in the manufacturing of other products – quickly becomes a very complex task. To do this calculation, the company would also need to collect large amounts of information from outside suppliers.

The energy used in the production process is another complex issue in the calculation of the environmental impact of a product. The greenhouse gas emissions from a production process depends, inter alia, on the quantity of the fuels used, the production process of that particular good, the energy efficiency of the production proc-

ess and the type of fuel or energy used, that is, the particular energy mix used in the country of production (WTO-UNEP, 2009). Ismer and Neuhoff (2004) write that production processes not only differ in the amount of energy required, but also in fuel type used. The largest variations are in the sector of electric energy, which can be produced with very low emissions from renewable energy or nuclear power, or with high greenhouse gas emissions from brown coal. Iron and steel production is a coal-based process and the calculation of CO<sub>2</sub> emissions are quite straight forward. It is more difficult with processes that are not fuel-specific, but can be produced in different ways.

To carry out a calculation of greenhouse gas emissions from a product, the producer has to collect a large amount of information. Both primary and secondary data is needed. It is preferable to use primary data that are specific to the production process of the particular product in question. In addition to data that the producers have access to through their own systems, it might be necessary to also get data from other producers involved in the process, for instance on energy input. Secondary data can be drawn from databases and literature. However, data is mainly available for technologies used in OECD countries and the generic data available often represent conditions in developing countries poorly (Friis Jensen, 2009). Data used to assess emissions in developing countries might overestimate the energy used in production because the

production is often less energy-intensive than in developed countries. (Brenton et al., 2009a) The producer also needs to be able to validate the data since the quality needs to stand up to legal review.

A BCA that includes a carbon footprint component also needs to have procedures stipulating how to verify the calculation process of greenhouse gas emissions. This could be done by the exporter using an accredited third party. Third-party accreditation means that consultants or companies independent of those making the carbon footprint calculation perform a check on the calculations. A parallel can be drawn to the EU regulation of chemicals (REACH) where the burden of proof – and the costs for accreditation – has been shifted to the producer, away from relevant governmental agencies.

An alternative option to using third-party accreditation is to use an agency or accreditation body in either the importing or the exporting country to carry out the certification. However, there are a number of difficulties with these options. One of the main challenges is that the producers may not be willing to share confidential information on the make-up of their products (WTO-UNEP, 2009). If the task of assessing the carbon content is assigned to an agency in the importing country the cost burden could quickly become quite high, especially if the agency would be called upon to perform many investigations. If the exporting country is assigned the responsibility for accreditation, it could risk becoming a trade constraint for the developing countries where the certification infrastructure is under-developed (see section 5.2).

Calculating the carbon footprint of the production process is a complex task that is both time and resource demanding. The cost of calculating the greenhouse gas emissions from a production process could potentially be high. This issue will be further discussed in the section on costs from a BCA.

Finally, it can also be noted that process and production methods, whose environmental impacts are only felt at the processing and production stages (called *non-product related PPMs*) and do not affect the characteristics of the product, raise a number of legal issues for international trade (OECD, 2010). In the WTO, there is a debate on the use of non-product related PPM-based trade measures. It is unclear whether it is legitimate under WTO rules to treat two products differently based on their production methods.

#### **4.3.2 Standardized BCA charges**

One way to avoid the practical complications that come from requiring that all, or some, of the imported products calculate greenhouse gas emissions

is to set standardized BCA charges. These charges could be based either on the *carbon content in domestic production* or on the *carbon embodied in imports*.

There are a number of challenges for the implementing country in setting these standardized charges. One challenge is that for many products there are several production processes or technologies to produce identical final products.

If the standardized charges are set to the level of carbon embodied in imports, the implementing country could either assume that the imported products have been produced using the “best available technology” or “the average (or predominant) method of production.” Monjon and Quirion (2010) points out that to set the benchmark, a best available technology means that, for some products, the emissions would be assumed to be almost zero; for instance in the case of steel made with sustainable charcoal in Brazil, or of aluminum made with hydro power in Canada or Iceland. To set the benchmark at the level of average emissions for a product category could be difficult because of the large variation between countries. For example, the carbon intensity of steel in the US is, on average, 60 percent less than that of Chinese steel production. The major part of the difference is due to the much higher share of recycled steel in the US than in China. The EU and the US have almost the same carbon intensity of steel, which is around 30 percent of that in Russian steel production. (Wooders, Reinaud and Cosbey, 2009) Since there are such large differences between countries, one option could be to differentiate between countries. Setting the standardized charges on country level would therefore seem to better reflect the relative emissions differences, but it is likely that there are also large variations in terms of greenhouse gas emissions between plants in one country.

For the implementing country, setting standardized BCA charges for all product categories – possibly on a country-level – in the BCA would be a complex task. The country would need to rely on information from both domestic and foreign producers, depending on how the adjustment base is chosen, and these are parties that all have a high stake in the outcome of the assessment. It has been suggested that for credibility reasons, stipulating the benchmarks for all the products covered by the BCA should be entrusted to an independent body. This body would then do all the calculation but it would need input from the industry. (WTO and UNEP, 2009). Friis Jensen (2009) notes that given the potential economic importance of the benchmarks, there is a risk of vested interests influencing the policy process in a protectionist direction.

## 5. Analysing the trade costs of a BCA

This section will discuss the costs associated with a BCA. First, a trade facilitation perspective will underline some important aspects to consider for a country that chooses to implement a BCA. The costs for the public and the private sector and consumers from a BCA will then be discussed next.

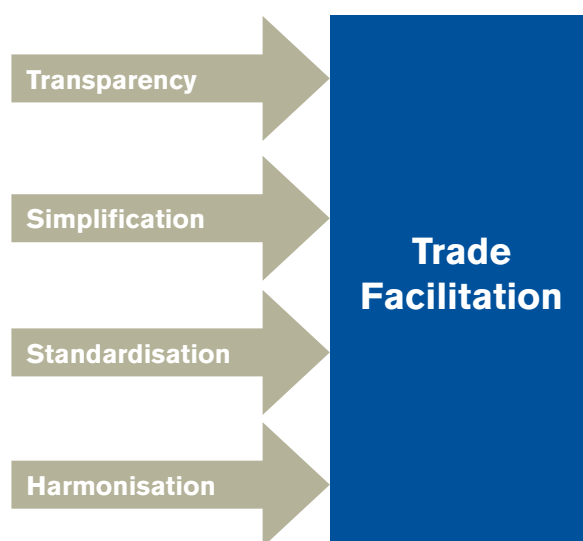
### 5.1 A trade facilitation perspective on Border Carbon Adjustment measures

Trade facilitation is a concept aimed at reducing administrative hurdles and cumbersome border procedures in international trade. Administrative requirements and procedures can become non-tariff barriers to trade. These hurdles slow down trade and create transaction costs. In a globalised world, where trading on time is increasingly important, time spent on imports and exports represents a cost to trade. Hummel (2001) has translated this cost into an equivalent tariff and found that adding an extra day to the total time that goods are in traffic equals a tariff of 0.8 per cent. A World Bank study shows that for each day that a shipment of goods is delayed due to import or export procedures, trade decreased by at least one percent (Djankov, Freund and Pham, 2006). These results show that transaction costs can have an important impact on trade and that efforts to reduce or prevent costs from arising through trade facilitation measures can yield concrete results in trade.

Like any concept, trade facilitation needs to be defined and its meaning clarified. The UN/CEFACT<sup>8</sup>, the UN body that works on trade facilitation through the development of tools and recommendations, defines trade facilitation as: ‘the simplification, standardization and harmonization of procedures and associated information flows required to move goods from seller to buyer and to make payment.’ The UN/CEFACT definition is broad and relates to a range of areas and activities that encompasses the whole trade transaction process; from the placement of an order, the preparation for exporting, the border crossing and associated controls, transport and – finally – payment. The WTO member countries are currently negotiating multilateral rules on trade facilitation. In these negotiations, trade facilitation is more narrowly defined and the negotiations focus on export

and import procedures, transparency issues and transit. This analysis uses trade facilitation as a perspective when discussing various options in the design of a border carbon adjustment scheme. Ways to achieve trade facilitation is through simplification, standardization and harmonization – from the UN/CEFACT definition – as well as transparency – from the WTO definition (see figure 4).

Figure 4: Trade facilitation principles



A problem that many traders face is that they do not know what rules and requirements they have to fulfill to import and export. This is a problem for companies that are not accustomed to importing and exporting, in particular, but even more experienced companies face this issue when exporting to new markets or when new rules and regulations are introduced. Large companies often have less problems since they can afford to have in-house competence to deal with trade related rules and regulation, whereas smaller companies do not have the resources to do this. Previous sections of the study have shown that a BCA risks becoming very complex. Lack of *transparency* can become a trade barrier. If information on the rules, requirements and decision-making under a BCA are not made available to all actors in the market-place – for instance through information on the internet and enquiry points – it could become problematic, especially for small and medium-sized companies. Another central transparency measure is to provide traders with the possibility to appeal decisions under a BCA.



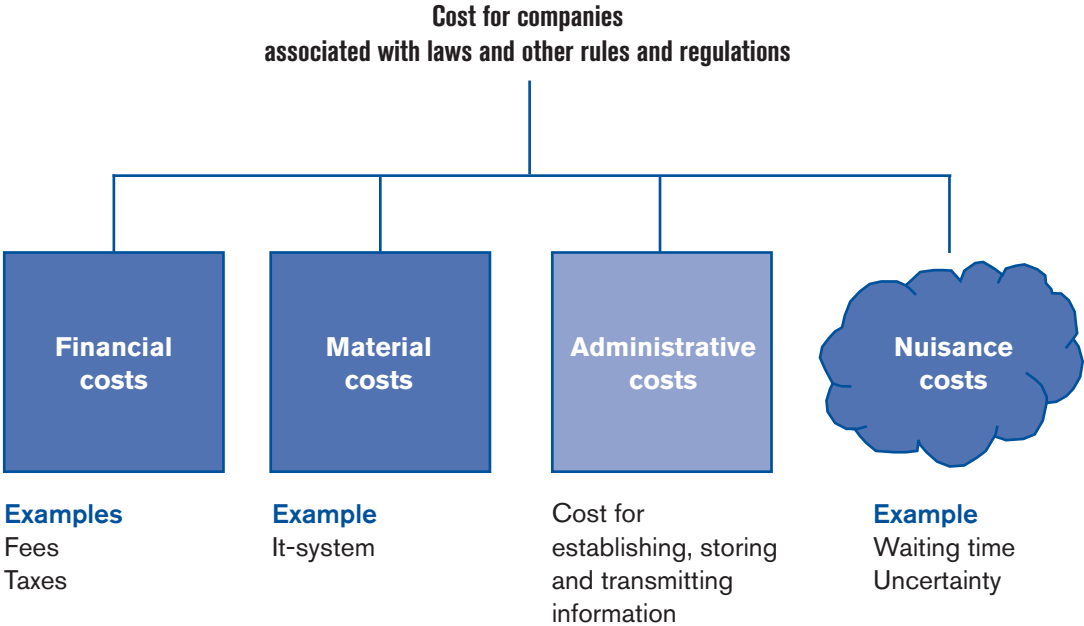
Looking at the whole trade transaction process, it is clear that there are many actors involved in the trade chain. Between these actors there are two flows: a flow of goods and a flow of information. Trade facilitation is about ensuring that these two flows are as efficient and easy as possible. This can be achieved by reducing the transaction costs of international trade by *simplifying* trade procedures and the requirements for documents and data the traders have to submit. Cumbersome and complicated import and export procedures and burdensome requirements for submitting information can easily become trade barriers. Like any regulation, a BCA will require exporters to submit documents and data, as well as to fulfill other procedural requirements. In some countries, this risk is adding to already high transaction costs for trading. In many developing countries a large number of documents and signatures are required when trading. A trader in Mozambique has to submit seven documents to export and ten documents to import. Another obstacle in many developing countries is that a large number of controlling agencies are involved in the trade transaction process. As many as 15 agencies can be present at the border.

If many countries implement border carbon adjustment schemes, each with their specific design, a company exporting goods under these schemes would face a complex situation where they would need to adapt to the different rules for each country that they export to. This could quite quickly become burdensome and costly for the private sector and a potential barrier to trade. If countries use *international standards* – for instance on the calculation of embedded carbon in a product – in their

BCA, parts of this problem could be avoided and costs cut. In two to three years, there will be at least two international standards on carbon footprints: the ISO carbon footprint standard (ISO 14067) and the WRI-WBCSD product carbon footprint standard. These standards could be used for all products – even complex products made from input components. It would thus seem that some of the potential trade barriers that a BCA might create could be avoided through the use of an international carbon footprint standard. However, it is by no means certain that the existing methodologies/standards for calculating carbon footprints are appropriate to use in a BCA.

Previous sections have shown how Border Carbon Adjustment measures risk creating unintentional trade barriers. Having an international agreement on border carbon adjustment measures could be one way to resolve this issue and to achieve *harmonization* between various countries' systems. (OECD, 2009a). In the EU Commission's analysis on the issue of carbon leakage and border carbon adjustment measures it is noted that similar proposals are being discussed in the United States and that it would be desirable for such initiatives to be taken together (European Commission, 2010). An international agreement could set some basic guidelines that a country wanting to implement a BCA could follow. For the exporting companies, an international agreement could improve the transparency and predictability of Border Carbon Adjustment schemes. However, given the tensions surrounding this issue in the UNFCCC, an international agreement seems like a rather unlikely scenario at this point.

**Figure 5: Different types of costs for companies**



**5.2 Costs for the private sector**

How regulations affect the regulated entities – in this case the private sector – is complex to assess. In the following, a model from the Swedish Agency for Economic and Regional Growth will be used (see figure 5). According to the model, costs associated with a particular regulation could be divided into financial, material, administrative and nuisance costs. Material costs are often one-time costs, whereas administrative and financial costs are recurring, periodical costs. Financial costs are the result of a concrete and direct obligation to transfer a sum of money to the government or the competent authority. Administrative and material costs can be characterized as compliance costs to businesses that result from complying with the regulation. Uncertainty on the rules that apply and time-consuming procedures are examples of nuisance costs.

It seems probable that the highest costs for companies under a BCA would be carrying out an assessment of the greenhouse gas emissions; and certifying the calculations according to the method stipulated by the implementing country. This is a set-up cost that only occurs once, although the calculations would need to be updated to reflect changes in the production process. Using the cost model, this cost could be characterized as a material cost. Although it is a one-time investment cost, a requirement to carry out carbon footprint calculations could become an important trade barrier for some exporters.

According to one estimate, the cost of doing a life-cycle analysis under a carbon footprint scheme that can be used both for agricultural and manufactured products would range between 5,000 USD and 15,000 USD, but that it could cost up to 70,000 USD depending on the complexity of the product and its supply chain (OECD, 2009). Two factors that have an impact on the cost is if the company uses primary data from its own systems or if databases are used and also the degree of detail of the calculation<sup>9</sup>. To calculate the greenhouse gas emissions – or the embedded carbon – of a product is expensive and demanding on human resources. This tends to favour large producers with more resources, who may benefit from economies of scale.

To measure the cost for a carbon footprint calculation, the cost of verification should be added. An OECD study looked into the cost of verification. In one scheme the cost of certification was between 2,000 and 6,500 USD per product. Another estimate for verification of larger businesses that require on-site audits – which would probably be the case in a BCA – is between 1,000 USD and 5,000 USD. (OECD, 2009).

Administrative costs are ongoing costs for establishing, storing and transmitting information, and are difficult to capture and measure. Lately there has been increasing focus on administrative costs in many countries, which is a result of the realization that there are gains to be made through the reduction of these costs. Sweden and many other



## Measuring greenhouse gas emissions from a steel manufacturing – an example

The input products in steel manufacturing are scrap or iron ore and coal. The emissions vary between the two different methods (iron or scrap) and also between different plants. It is possible to monitor the environmental impact of the production process and identify the environmental impact of each batch produced in a steelwork. Monitoring the greenhouse gas emissions is done through using the existing data and control systems for production (including materials), business management and maintenance of the steelwork. An IT-company offering this service - called *Environmental control concept* - estimates that it takes around three to four months to put the monitoring system into place, and it often requires work from outside expertise and employees from different parts of the organization. A number of measuring points are identified and data from these measurements are continuously monitored and logged. Since the monitoring uses the existing IT-systems, no major changes need to be made in that respect. One of the positive side effects of monitoring the emissions is that the steel production plant gets a good overview of their emissions and can manage their processes more efficiently, thereby reducing emissions. Having a clear perspective of the environmental impact of a plant and being able to show that emission reductions are being pursued can also serve as a marketing tool.<sup>10</sup>

countries in the EU have set goals on reducing administrative costs.

The extra administrative burden from a BCA would not seem to be substantial compared to the existing cost from other trade-related rules and regulations. But like with any regulation there will be costs and the magnitude of these costs will depend on how the BCA is designed. So what could be the administrative costs for companies under a BCA? Examples of extra administrative costs are:

- From an administrative point of view, a requirement to purchase emission allowances for imports would entail higher administrative costs than a carbon tariff. In a BCA that requires importers to purchase emissions allowances to cover the emissions induced by the production of the imported products, the importer would have to submit documentary evidence of the emissions allowances to the controlling agency at the border when importing. This is similar to how VAT for imports are collected.
- If the charges under the BCA are based on the greenhouse gas emissions of the product, the imported goods would have to be accompanied by data on the level of emission of greenhouse gases. It is difficult to say at this point if this information could be included in the existing trade documents or if a new import document would be required.

- If the charges under the BCA are standardized, the importer would probably not have to submit any additional data since it would seem that all the data needed (product classification and country of origin) is information that is already submitted in a normal customs declaration.

Administrative costs are not proportional to the charges to pay under a BCA, thus even if the charges were very low there would still be administrative costs.

There are no financial costs associated with a BCA that we can identify at this point.

Nuisance costs that occur as a result of lack of transparency and time-consuming procedures are difficult to estimate and are therefore often forgotten. Uncertainty on whether some countries will introduce a BCA can have an effect in terms of nuisance costs. Both the EUs and US have indicated that border trade measure could be one option to deal with carbon leakage and competitiveness concerns. This could have an effect in terms of investment decisions and strategies for companies. It is, of course, very difficult to assess what effect these assertions have had on exporting countries in terms of uncertainty. The previous discussion on transparency and simplification has a link to the concept of nuisance costs. If the rules and decision-making under the BCA are unclear and if the procedures and documentary requirements are complicated, it will add to the costs for companies under the BCA.



### 5.3 Costs for the government

Most of the cost for a BCA would, not surprisingly, be borne by the implementing government, but a BCA could also entail costs for the exporting country's government.

If the implementing country opts for the solution with standardized charges, the government would need to define benchmarks for all products covered by the scheme, possibly on a country level. To set these benchmarks the implementing country would need to gather large amounts of information on greenhouse gas emissions and production methods from domestic and/or foreign producers. A parallel example can be drawn to the on-going work in the EU to set benchmarks for free allocation of emission allowances under the new EU Emissions Trading Scheme. This is a complex and time-consuming exercise. There would also be a need to update the charges with a regular interval to reflect changes in greenhouse gas emissions due to technology advances etc.

Once all the preparatory work for a BCA is in place, the implementing country would have recurring costs for the administration at the borders, controls and audits. How high these costs would be for the implementing country is difficult to say since it depends on the design of the BCA. The administrative burden for the implementing country would rise with the number of products covered by the BCA. But even if the BCA only covers a few products, the implementing government would have costs for putting in place a basic infrastructure for the administration and control of the BCA.

The most likely scenario is that customs would be responsible for controls at the border, although it is possible that another agency could be appointed for documentary and physical controls. The customs administrations in most parts of the world are undergoing an important modernization process. Customs administrations are working towards a paperless environment where all trade documents are submitted electronically. Customs is also trying to minimize the manual intervention and base all controls on risk-management analysis. In many countries, customs have decreased the number of border posts where they are present physically; instead customs agencies are performing post-clearance audits at the premises of the companies.<sup>11</sup>

Costs for customs administrations under a BCA are driven up: if manual intervention is required to clear consignments at the border crossing, if electronic submission is not possible, if large resources have to be devoted to prevent evasions, if many products are covered by the BCA and if many companies are given individual treatment, or if the BCA will result in a need for major IT development to deal with new processes.

If the vision of a paperless customs environment is to be realized, any document that the importer is required to submit under the BCA should be in electronic format. In line with the current way customs is working, the importer would also keep all the records (such as supporting documents of the carbon footprint calculation) at the company and be obliged to share them with customs, or another agency responsible, when requested or in the event of an audit. Not having to submit a lot of information when exporting would reduce the administrative burden for the exporting company.

If the BCA required manual interventions, for instance to check the emission allowances against a database or the need to physically check if a product is covered by the BCA, the administration would be more costly. A few years ago the EU had a quota license system for all textiles, clothing products and shoes. This is one example of a system under which customs needed to do a manual intervention for each consignment with a license and check the license against the EU quota and, as a result, decrease the quota. It is possible that a BCA, under which the importers need to submit certificates of their emission allowances, would create a similar situation as a textile and clothing license system, requiring customs to do manual interventions to check the reference number for each emission allowance. This would add time to the trade transaction.

Another instance where manual intervention could be necessary is if not all sub-categories of products classified under an HS-4 heading are covered by the BCA. Customs would then have to do a documentary or physical inspection for every import to determine if the products fall under the BCA or not.

The workload and costs for customs would increase with the number of products covered in the BCA. If the BCA also gives individual treatment to a large number of companies, the administrative burden for customs increases even more. The regulations in the anti-dumping area shows that it is possible, from a customs point of view, to give individual treatment to companies that fulfil certain criteria. But if the number of companies receiving

this treatment is high it could quickly become difficult for customs to manage.

If the carbon tariff or the cost of buying emissions allowances is high or if the costs for exports from some countries are a lot higher than for other countries, the incentives for companies to try and circumvent the BCA and avoid paying the costs of the BCA would increase. To maintain the integrity of the BCA scheme, customs would need to devote resources to address the risk of circumvention (see experience from the US Ozone-Depleting Chemicals tax).

One scenario where a BCA would also create costs for the governments of the exporting countries is if the exporting country is assigned with the task of accrediting carbon footprint calculations. It seems probable that the country implementing the BCA would then set requirements which the agency in the exporting country would need to fulfil in order to be granted accreditation status under the BCA. In a country with a weak certification

infrastructure, these requirements could be costly since it would require the country to build new capacity in the area. If the country implementing the BCA, assumes the responsibility of accrediting the carbon footprint calculation, that country will of course also bear the costs. Once again, we can draw a parallel to anti-dumping investigation where trade officials from the EU Commission and the US International Trade Commission carry out investigations on the premises of companies in countries suspected of dumping export products. Both countries have been forced to set up special units and devote a lot of resources to these investigations.

Another instance under which a BCA would entail costs for the exporting government is if the implementing country imposes a BCA charge on all imports, regardless of whether the exporting country has put in place a climate-mitigation policy or not. Then the exporting country would need to implement a rebate system for exports of its domestic carbon taxes.

### **Evasion under the UD Ozone-Depleting Chemicals tax**

A study by Hoerner (1998) discusses the experience of evasion under the US Ozone-Depleting Chemicals (ODC) tax. The ODC is a tax on national consumption of a number of ozone-depleting chemicals, primarily chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs) and halons. The ODC also includes a border adjustment measure for imported products. When chemicals under the ODC are imported, the importer has to pay a tax equal to the domestic tax on that chemical at the first sale or use. Imports of products that contains ODCs, like refrigerators, or that are manufactured with ODCs are also taxed.

Hoerner notes that like all taxes, environmental taxes require enforcement to prevent evasion. If the tax is a significant percentage of the price, there will be evasion efforts. In the years 1994-95, the taxed price for two chemicals under the ODC (namely CFC-11 and CFC-12) were three times higher than the untaxed price, making the incentive to evade the ODC tax for these chemicals high. Estimates by industry and government sources assessed that in 1994-95 the evasion of the chemicals amounted to 10 to 20 percent of the legal production, thus creating a major loss of revenue for the government and increasing the volume of the ODC chemicals in the marketplace. The evasion of the ODC could take several forms. The importer could mislabel the contents of the imports in order to evade the ODC tax. The only way to detect this is by customs inspection. Companies could also evade the ODC tax by diverting goods that are trans-shipped through the US into the domestic market or to import goods and then, falsely, claim that the goods were exported, thus receiving a credit or a refund on the exports. So-called 'daisy-chaining' was another method of evasion whereby a shell company without assets is used as the importer. The importing company sells the goods and falsely certifies that tax has been paid. Daisy-chaining can be prevented through carefully choosing the point of taxation or by licensing importers.

In response to the evasion problem under the ODC the US created an interagency task force which set up a system for information sharing, training and enforcement coordination of the tracking records of the Environmental Protection Agency (EPA) and those of customs. The US customs officials were trained by the Environmental Protection Agency (EPA) on how to identify and test suspect shipment activities. Evasion is estimated to have fallen to less than one third of its former level as a result of the coordinated enforcement. Hoerner concludes that the experience from the ODC shows that evasion can be avoided through careful administrative design and proactive enforcement cooperation among responsible agencies, and also through cooperation between governments and legitimate traders.

## 6. Conclusions

Previous studies on Border Carbon Adjustment (BCA) measures have shown that the legal compatibility of border carbon adjustment with WTO rules is uncertain and that the design of the measures will be an important factor both in regard to effectiveness in preventing carbon leakage and in achieving emission reductions. It has also been noted that these types of schemes would be complex and costly for both the public and the private sectors. This analysis concentrates on the latter aspect and discusses the practical aspects and related costs of implementing border carbon adjustment (BCA) measures for both the trading community and governments in the implementing and exporting countries.

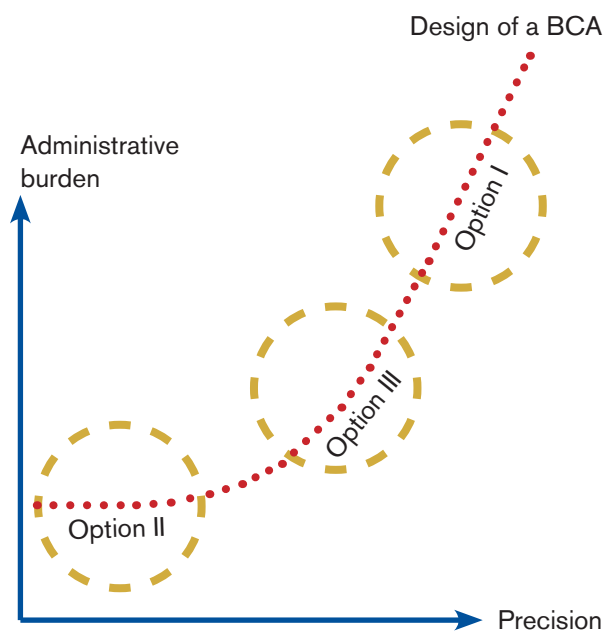
A conclusion is that if the aim of the BCA is to differentiate between high and low emission products, there must be very onerous requirements in order for the BCA to work. If the BCA is simplified, the environmental incentives are reduced. In the study, this point was illustrated through the use of three schematic design options for a BCA:

- The most ambitious approach is a border carbon tariff (or requirement to purchase emissions allowances) that charges imports according to the level of greenhouse gases emitted during the production of each specific imported product (option I).
- Another design option is that the importing country sets a standardized tariff, or emission allowances required for each product category under the BCA to be paid when importing the product, regardless of how “green” its production process had been. The standardized charge could either be based on the carbon content of domestic production or on the carbon content embodied in imports (option II).
- A third scenario is to set a standardized tariff, or emissions allowance purchase for each product under the BCA, but also to allow for producers in exporting countries that prove that they are more efficient (i.e. emits less greenhouse gases during the production of their products than the benchmark level) to pay a lower tariff (option III).

A conclusion is that the more precise the BCA is, the higher the administrative costs are for both the public sector responsible for implementing the scheme and the private sector (see figure 6). Preci-

sion is the extent to which the BCA adjusts the carbon tariff, or emissions allowance, according to the actual greenhouse gas emissions of the imported goods. The trade-off between precision and administrative burden is inherent to much of the legislative process, regardless of the area. Policy-makers want to make the rules as precise as possible, but run into problems when this creates too much of an administrative burden. When designing a Border Carbon Adjustment scheme it is important to take into consideration the administrative costs that may arise from burdensome rules, especially for small and medium-sized companies and companies in developing countries.

**Figure 6: Schematic illustration of the relation between precision and administrative burden when designing a BCA**



Border carbon adjustment measures could come in two forms; either as a carbon tariff at the border or as a requirement for importers to purchase emissions allowances. In this study, we have not looked closer at the practical aspects of introducing imported products into a domestic carbon emission trading scheme. However, it would seem as though a BCA under which importers are introduced into an emission allowance scheme would be more burdensome than a carbon tariff for the importers and also for the agency performing the controls at the border.

A border carbon adjustment scheme can be applied to imports, exports or both. The scenarios in the study are focused on border carbon adjustment measures for imports. However, it is not unlikely that a BCA on imports would also include an export component under which costs for exports of greenhouse gas intensive goods would be reimbursed.

In option I and III the exporting producers would be required to assess the greenhouse gas emissions – or carbon footprint – from their exported products. To do this type of calculation the producers are required to undertake complex and time-consuming monitoring and calculations. Studies have shown that the costs for doing a carbon footprint calculation could vary between 5,000 and 70,000 USD. One explanation for the wide range of possible costs is that since there is no commonly accepted methodology for the calculation, there are large differences in the degree of detail in the calculations and what is included in the calculations. The difficulty of performing a calculation on greenhouse gas emissions rises with the complexity of the product. On the other hand, if the BCA does not differentiate between products based on their emissions, there would be no incentives for producers to cut their emissions. The study has highlighted that in addition to the administrative costs from new data and document submissions that a BCA scheme would entail, uncertainty on whether countries would introduce such a scheme, lack of transparency and differing requirements between countries, risk creating increased costs for exporters. In developing countries with a complex and cumbersome trading environment this would add to already heavy trade transaction costs.

In order for a scheme that relies on carbon emissions calculations to keep its integrity and credibility, the implementing country must set clear rules for how the calculation should be performed and formalities for how controls of the calculations should be done. All these aspects drive up costs under the BCA. In a BCA that does not adjust the carbon tariff to match the actual emissions of the imported or exported products, the implementing country would set standardized levels for the BCA charges. The standardized charges could either be based on the carbon content of domestic production or be based on the carbon content embodied

in imports. If the adjustment base is carbon embodied in imports the charges could be product category specific or, possibly, product category and country specific. To set the benchmark charges, the implementing country would need to gather and analyze a lot of information from both domestic and foreign producers. The administrative costs for the implementing country in option II would then possibly be higher than what is indicated in figure 6. In setting these benchmarks, the regulating country also needs to be careful to not create unnecessary barriers to trade.

This study has discussed some situations under which a BCA could entail costs for the exporting countries' administration. One instance is if the implementing country imposes a BCA charge on all imported products covered by the BCA, regardless of whether the exporting country has put in place a climate change mitigation policy or not. Then the exporting country would have to put in place a rebate system for exports of its domestic carbon taxes. Another instance is if a BCA is implemented that adjusts the charge based on the carbon footprint of the imported product. An agency in the exporting country could be responsible for accrediting the calculation. This could potentially be difficult in countries with a low capacity in their certification infrastructure.

There is no country that has implemented border carbon adjustment measures yet. At the time of writing this paper, the US seems to be the country that is most likely to implement a BCA, whereas both the EU and Australia have cited implementation challenges with BCAs. Experience shows that diverging requirements between countries and the distortions from the resulting market segmentation can create uncertainty for the economic operators and result in high compliance costs. A situation where two or more countries implement BCAs with different rules is no exception. Ismer and Neuhoff (2004) discuss international cooperation on border carbon adjustment as a way to ensure simple and harmonized procedures, which would reduce the non-tariff barriers created by BCAs in different countries. But that situation is still far in the future. Presently, countries would be wise to consider if a BCA is a viable option at all, or if there are other ways to address the issues of competitiveness concerns and carbon leakage that do not entail the high administrative costs of a BCA.

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# Endnotes

- 1 Carbon leakage can be defined as the situation when the imposition of climate related taxes in one country results in the relocation of production, and hence of carbon emissions, to other countries. This can happen through the actual relocation of industries or through a transfer of market shares in greenhouse gas intensive goods from countries with emission caps to those without. Investment leakage is a situation where investments are redirected from countries with emission caps to regions without similar climate policies. Investment leakage is a more long-term occurrence (Graicher et al ,2008 in Monjon and Quirion, 2010).
- 2 The study will not look into practical aspects of introducing imported products into a domestic emission trading scheme.
- 3 Directive 2009/29/EC of the European Parliament and of the Council, of 23 April 2009, amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community
- 4 The criteria for determining the sectors or sub-sectors at significant risk for carbon leakage are those where (1) the trade intensity is over 30 %, or (2) additional costs from implementing the EU ETS Directive are over 30 % of Gross Value Added or (3) trade intensity is over 5% and additional costs from implementing the EU ETS Directive over 5 %. Some of the products on the list satisfy several of the criteria, while others only satisfy one criterion.
- 5 At NACE-level
- 6 [http://ec.europa.eu/environment/climat/emission/pdf/draft\\_dec\\_carbon\\_leakage\\_list16sep.pdf](http://ec.europa.eu/environment/climat/emission/pdf/draft_dec_carbon_leakage_list16sep.pdf)
- 7 In two to three years, there will be two or more international standards on carbon footprints, alongside with national carbon footprint initiatives. The international standards are the ISO standard on carbon footprint (ISO 14067), which will be published in 2012, and The Greenhouse Gas Protocol (GHG Protocol) which is developed by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD), to be published in late 2010.
- 8 UN/CEFACT – United Nations Centre for Trade Facilitation and Electronic Business
- 9 Interview Svenska Miljöinstitutet, 4 October 2010
- 10 Interview with Peter Sjölund, Argentum, Stockholm, September 9, 2010
- 11 The whole section is based on an interview with Swedish Customs, May 20, 2010



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