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The new era of carbon accounting: issues and implications for Latin American and Caribbean exports

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Abstract

While governments negotiate a multilateral agreement on climate change, private initiatives have moved forward that have an effect on trade. Private initiatives have built upon previous experience in labeling and certification to provide information about the environmental impact of goods and services. This is designed to inform consumers and to allow companies to reduce inefficiencies and their impact on the environment. These initiatives are being supported by government-led efforts to develop and standardize methods to measure the environmental impact of goods and services. The design of these methodologies and how to harmonize them into one international standard are significant ongoing challenges for the global trading system and will have an impact on exports from Latin America and the Caribbean.

It is clear that whether the initiative is led by governments, the private sector, or both, the region will be affected by the growing demand for detailed carbon footprint accounting in many aspects of economic activity. Policy makers and industry representatives must be prepared for these new requirements and their implications for exports, technical capacity for monitoring, verification and implementation.

This paper focuses on the recent trends of private and unilateral efforts to account for the carbon emissions of traded goods, with the objective of identifying possible risks and opportunities for Latin American and Caribbean exporters. It presents a description of the ongoing initiatives, standards and proposed legislation that are relevant to the discussion. It follows this by identifying the shortfalls and challenges of carbon footprinting, and the implications for Latin American and Caribbean export competitiveness. Finally it provides policy suggestions for the region, assuming the growing demand for carbon emissions accounting.

I. Introduction

Over the last decade environmental sustainability has gained importance in economic and political agendas, particularly in light of the climate change phenomenon. Development strategies are being carefully reviewed to determine their environmental impact, and new strategies are being developed to reduce the emissions footprint of industries, sectors, and entire economies. Trade adds an extra dimension of complexity to this already formidable challenge: how to ensure that multilateral, national and private initiatives to reduce emissions do not distort, favorably or unfavorably, a complex network of trading relationships.

At the multilateral level, climate change is being addressed under the United Nations Framework Convention on Climate Change (UNFCCC) and in the World Trade Organization (WTO). The UNFCCC negotiations aim to define national commitments to reduce greenhouse gas (GHG) emissions by 2012, when the first commitment period of the 1997 Kyoto Protocol ends. In particular, broader reductions are being sought from all the largest polluters, unlike the Kyoto Protocol whose binding commitments apply only to the industrialized countries. The underlying issue is the balance between the need to foster economic growth and the need to cap carbon dioxide (CO_2) emissions. Generally speaking, the disagreement between the participants stems from the fact that the industrialized countries want significant reduction commitments from all the main emitting countries (including the emerging economies), whereas the developing countries do not want to curtail their growth and development possibilities by agreeing to stringent reductions. The developing countries stress that they need technical and financial assistance in order to assume greater commitments. Thus far, the OECD countries account for 77% of all GHG emissions, but emissions from developing countries are steadily increasing. Between 2005 and 2030, the volume of GHG emissions from OECD countries is projected to increase at an average annual rate of 0.5%, while that of developing countries will rise at 2.5% per year.

The inability of the 2009 Copenhagen Summit to reach a multilateral agreement on binding cuts in GHG emissions was a significant setback to the efforts to address climate change. Since the Copenhagen summit, there have been ad hoc meetings in Washington, D.C. and Cochabamba, Bolivia, but these have only exacerbated the impasse between developed and developing nations. In addition, the continuing global economic recession and high rates of unemployment have made the expansion of production paramount for national governments and this has perhaps diffused the political will to join climate change initiatives.[1]

At the same time, and partly as a result of the difficulties in reaching an international agreement, various national, state and municipal governments have moved forward with their own climate change policies. The United States and European countries are actively examining policy proposals to mitigate carbon emissions in their economies, which would most likely include some trade-related measures (ECLAC, 2008, 2009). However, concerns regarding competitiveness and carbon leakage have arisen and policy makers are looking for ways, whether unilateral or through cooperation, to protect and support their domestic industries. Policies that have an impact on trade will need to be compatible with existing bilateral and multilateral agreements. For example, border adjustment measures designed to penalize products with a high environmental impact may run afoul of existing WTO agreements (see Section 4).

Some private initiatives have had greater success than multilateral and national initiatives because they haven't had to deal with competing interests. Private initiatives have built upon previous experience in labeling and certification of goods and services (e.g.: organic, fair trade) in response to consumers' demand for more information about the sustainability and environmental impact of their purchases. At the same time —and perhaps with a greater potential to reduce anthropogenic GHG emissions— companies are attempting to limit their impact on the environment, hoping to improve their corporate image and to identify inefficiencies in their processes and supply chains. Governments are also starting to include environmental performance in their procurement requirements and in their operational plans.

These initiatives are being supported by government-led efforts to develop and standardize methods to measure the environmental impact of goods and services. The United Kingdom, the European Commission, and the International Organization for Standardization (ISO) are actively developing methodologies and standards to measure the Product Carbon Footprint (PCF) of goods and services, as well as other measures of importance to climate change. Many national and private initiatives are utilizing these methodologies to design programs and build their capacity to account for the carbon footprint of their economies and industries. The design of these methodologies and how to harmonize them into one international standard are significant ongoing challenges that will have an impact on Latin American and the Caribbean exports.

The region will be affected by the growing demand for carbon footprinting and sustainability requirements in the industrialized world in a number of ways. Eventual national emissions reduction commitments negotiated in a post-Kyoto agreement will require a detailed accounting of each economy's GHG emissions. In addition, a growing number of private requirements to document the carbon footprint and sustainability of the region's exports will also require detailed accounting. Exports from the region will either gain or lose competitiveness depending on their carbon footprint. The choice of methodology for both these instances will be of great significance to each country.

This paper focuses on the recent trends of private and unilateral efforts to account for the carbon emissions of traded goods, with the objective of identifying possible risks and opportunities for Latin American and Caribbean exporters. This paper will present the various initiatives, standards and proposed legislation that are relevant to the discussion. It will present some of the shortfalls and challenges of carbon footprinting, discuss the implications for Latin American and Caribbean exports and provide policy suggestions for the region.

1 Despite the distinction between short-term adjustment policies needed to stimulate the economy and longer-term policies to restructure a country towards a less carbon-intensive production base, politically, the arguments for one often interfere with the other.

II. The objective of tracking emissions and product labels

As the issue of climate change has gained prominence, consumers in high income countries are increasingly monitoring the impact of their purchases on the environment. Customers are demanding more information on the environmental impact of the goods they buy, including on the production process and the emissions related to transporting products to the point of sale (also known as food miles). At the same time, companies see value in improving their environmental profile and are stepping up efforts to identify inefficiencies.

As a result, many initiatives, some led by the private sector and others by governments, have emerged that attempt to measure the environmental sustainability of goods and services. By one account, there are over 330 different labels covering 40 industry sectors in 211 countries (World Resources Institute and Big Room Inc., 2010). These range from simple labels that detail how far a supermarket product has travelled to more complex methods that calculate the carbon emissions of a product during its entire life cycle, using carbon registries and published accounting standards. These fragmented and incompatible methodologies have led to additional burdens on companies, confusing information for consumers, and potential trade diversion effects (for more on efforts to develop standard and harmonized methodologies for measuring and labeling products, see Section 2.4 below).

However, the benefits of having more and improved information about the environmental impact of goods and services can be significant:

- Governments will benefit from a better-informed population with greater awareness of the impact of their decisions on the environment. This can help in designing and implementing reforms.

- Widespread carbon accounting may generate a significant amount of data that can be used to inform policy, particularly in light of any emissions reduction commitments.
- Consumers with environmental concerns will have additional resources with which to make informed choices.
- Producers and retailers will be able to better price goods and services according to their environmental impact, helping allocate resources toward a greener economy.
- Producers and retailers will be able to identify inefficiencies in their supply chain and processes, helping reduce costs and creating a new standard of sustainability throughout the production process (MacGregor, 2010).

A. Company processes and supply chain management

Although product-labeling schemes are mostly customer-oriented, the information generated by measuring the Product Carbon Footprint (PCF) of goods and services —as well as the impact on water tables, sustainability, and others— is beneficial to producers and distributors. Companies are able to track and reduce their emissions, differentiate their products, capture environmentally sensitive markets and craft an image as a sustainable or ‘green’ business. For many firms, achieving carbon neutrality, or having zero emissions, is often a result of corporate social responsibility policies as well as customer demands. To achieve this, companies may purchase carbon offsets to neutralize their supply chain’s impact on the environment; this requires a proper accounting of the environmental impact of their operations. The firms that use environmental labels range from small, innovative firms like Patagonia and Timberland, to multinational giants such as Tesco, Wal-Mart, and France’s largest retailer, Casino (Paul Brenton, Gareth Edwards-Jones and M. F. Jensen, 2009; Ball, 2009).

B. Consumer behavior

The environmental purpose of labels is to affect customer behavior and purchasing decisions, thereby reducing the demand for goods and services that have a relatively higher impact on the environment. A number of labels already exist that provide customers with information about production processes, the most popular of which are the Organic and Fair Trade labels. However, in many countries labels exist to identify products that meet requirements for energy efficiency, recycled content, wildlife preservation, and others.

Empirical evidence shows that eco-labeling can alter consumer behavior. In a study of consumers’ reactions to dolphin-safe labels on canned tuna, consumers responded positively to information on eco-labels about the production process (Teisl, Roe and Hicks, 2002). Although this is encouraging, the study did not present any evidence as to how general this reaction might be across product types (such as food, electronics, or inferior goods) or across income levels. In a 2010 study of US consumers, over a third of those surveyed were willing to pay a premium for eco-friendly products (Mintel, 2010).

Another study looked at specific product types and found that, in the case of televisions, more than half would be willing to pay a premium for a product with a lower environmental impact (Consumer Electronics Association, 2008). A study of consumers in the United Kingdom also found evidence that consumers consider the environmental impact of products in their decisions, with 44% of those surveyed wanting more information on companies’ efforts to reduce the emissions of their products and processes. The same study also found that most consumers do not feel they have sufficient information with which to identify companies that are taking proper action (Carbon Trust, 2009).

1. Unintended consequences

Despite the clear desire for customers to factor environmental concerns into their purchasing decisions, eco-labels can have unintended consequences. Some examples of this are the use of the Food Miles label and the Air Freighted label. These focus on a single issue (in these cases transport distance and method) that may not be the most important determinant of the product's emissions. The production methods for a locally produced good may generate more emissions even after considering the reduction in transport emissions.

The concept of food miles has existed since the 1990s; it tracks the distance travelled by food from the farm gate to the consumer's table. The idea has been endorsed and adopted by many producer and consumer groups. Other concepts, such as buying local and the 100 mile diet[2] have emerged from food miles, as a way to limit an individual's emissions and aid in the battle against climate change. Although these initiatives allow consumers to reconnect with where their food comes from and help small farmers and the surrounding local communities, food miles do not properly gauge a product's relative environmental impact because they do not take into consideration the type of transportation used or the methods of production (UK Cabinet Office, 2008). Different forms of transport have varying effects on emission intensity and ecological impact, thus only tracking the distance travelled fails to give an all encompassing assessment of a product's ecological impact.[3]

Even once transportation methods are considered, however, transport-related emissions can be misleading since transportation makes up a relatively small proportion of a product's total emissions in comparison to the entire supply chain.[4] In many cases production-related emissions outweigh any gains from localizing production. Favorable weather and climate conditions are important factors in the emission intensities of production as refrigeration, storage and production of foods via greenhouse methods may entail much larger emissions than the transportation itself.

The relative effect of production methods relative to transportation-related emissions means that many goods that are sourced from developing countries and those from more favorable climates may have much lower embedded emissions than those sourced domestically or from developed northern countries.[5] Two recent studies provide clear examples of this. An analysis of the climatic impacts of food choices in the US and found that the percentage of emissions from the transportation for delivery of a product in regards to the total life cycle emissions ranged from 1% in the case of red meats to 11% for fruits and vegetables (Weber and H. S. Matthews, 2008). The less intensive the use of fossil fuels, nitrogen fertilizer and emission intensive inputs in the manufacture of the good, the higher the percentage of emissions from transportation. The differing amounts reflect the emission intensity in the entire life cycle of the food sources. The study concluded that the reductions in emissions from not consuming high-impact food (red meat and dairy) just one day a week in favor of lower-impact alternatives are equivalent to the gains from less transportation-related emissions from consuming only local products for an entire year.

A study of four agricultural products produced in the UK and in New Zealand and consumed in the UK concluded that even after considering transportation emissions, the NZ products contained lower embedded carbon than those of their UK counterparts in three of the four goods. The study took into account the entire life cycle analysis and emissions of the goods throughout the production chain (Saunders, Barber and Taylor, 2006).

2 The 100 mile diet is a social movement in which the goal is to source locally grown food in an attempt to minimize an individual's ecological foot print.

3 For example, air transportation has a larger emission footprint than sea-based alternatives.

4 (Saunders, Barber and Taylor, 2006; Saunders, Barber and Sorenson, 2009; Hogan and Thorpe, 2009; Chi, MacGregor and King, 2009; Williams, 2007; Wynen and Vanzetti, 2008).The emission intensity and degree of processing is of course a large factor. Even in the case of primary agricultural goods, transportation still contributes minimally to total overall emissions.

5 See Brenton et al. (2009), Hogan and Thorpe (2009), and Saunders et al. (2006; 2009) for a list of studies that look at carbon competitiveness of different goods sourced locally and those sourced from distant markets requiring transportation.

TABLE 1
COMPARISON OF EMISSION RATIOS FOR SELECTED PRODUCTS

	Energy Use (MJ/t)		Ratio	Carbon Emissions (KG CO_2/t)		Ratio
	United Kingdom	New Zealand	UK/NZ	United Kingdom	New Zealand	UK/NZ
Dairy	46 368	24 942	1.9	2 920.7	1 422.5	2.1
Apples	5 030	2 980	1.7	271.8	185	1.5
Onion	3 760	2 889	1.3	170	184.6	0.9
Lamb	45 859	10 618	4.3	2 849.1	688	4.1

Source: Wynen, E. and D. Vanzetti (2008).

III. National and international methodologies for tracking emissions

To date, there exists no internationally agreed-upon carbon labeling standard. The result has been a number of private labeling initiatives, highly susceptible to the influence of special interest groups (Cottier, Nartova and Bigdeli, 2009, pp. 132,134). As such, private labeling initiatives can potentially confuse consumers and also run the risk of undermining the credibility of future labeling standards. The proliferation of eco-labels, specifically of carbon footprint labels, by various retailers underlines the need for standards and guidelines (Weidema et al., 2008).

A number of accounting standards have been published, but many use conflicting methods of calculating and estimating carbon emissions. The differences in those methodologies can result in important differences in the final measure of the footprint of a given product. Because of this, efforts are underway to carefully define each methodology and to work toward an internationally accepted system that allows fair and transparent measurements and cross-product comparisons.

Some standards for estimating emissions use bottom-up methodologies and product specificity while others use top-down methods and more general approaches. Bottom-up approaches include mostly site-specific, first order inputs and can be limited in their scope. Top-down approaches are larger estimations that include higher order impacts and use environmental data from economy-wide emissions. They tend to be less time and labor intensive but are also less accurate at the individual product level (Bolwig and Gibbon, 2009). Other standards have emerged that use hybrid techniques of emission quantification.

However, one of the principal differences among the standards is that each has a different boundary, or scope, of what should or should not be included in the estimation of the products' footprint (S. Matthews, Hendrickson and Weber, 2008). The inclusion or exclusion of certain emissions greatly affects the overall accounting of embedded carbon within a product. Because of this, the choice of methodology is a key factor in any voluntary or mandatory carbon accounting system, border carbon adjustments or carbon duties on imported goods. A chosen accounting methodology will have implications for the competitiveness of products from different regions, including those from Latin America and the Caribbean, according to the methods used in during production. For example, products that have a low-carbon energy matrix will benefit while those that use a high degree of land and labor might be harmed.

A. ISO standards

The ISO 14000 series standards, which pertain to environmental management systems, use the Life Cycle Assessment (LCA) methodology to assess direct emissions during the production of a good, as well as a complete carbon accounting that includes the manufacturing process, distribution and disposal (Bolwig and Gibbon, 2009). The standards have undergone many revisions that have built on the methodology and improved accuracy. The ISO methodologies used to compute carbon emissions are accessible to governments, industries and the public for a fee. The upcoming release of the ISO 14067 standard will pertain specifically to the carbon footprint of products.

However, there are some problems surrounding the use of ISO standards. There is no agreement on which methodology to use when calculating a product's carbon footprint (PCF); there is no agreement on lifecycle boundaries; there is a lack of reliable data; and rarely do the resulting footprints contain the details of the methodology employed to determine the PCF (Bolwig and Gibbon, 2009).

Another concern with LCA applications that use ISO standards is that very few analysts have the ability to compare the input-output modeling of GHGs within the production method to encompass a product's life-cycle emissions. This is further complicated when considering the differences that exist among countries at varying levels of development. Wiedmann et al. (2007) make a compelling case that if embedded carbon accounting is to be done with any level of accuracy, a multi-region input-output model should be employed to cover all countries that trade with the domestic country. The data must be consistent and accurate in order to calculate the embedded carbon. This data may be difficult to obtain in developing countries and may be unreliable or intermittent. If the goal of carbon foot-printing is to publicize a product's true level of embedded carbon, or in the extreme case, to measure and compare the trade-related embedded carbon of a good,[6] then the model must entail a very difficult multi-region, input-output analysis of CO2. This will require significant human capital and institutional capacity.

ISO standards are voluntary and serve as international guidelines. After acceptance and subsequent use, they can become a requirement in certain markets when adopted as a norm across the entire industry. The PAS 2050, developed in the UK, is the only other standard that competes with the ISO standards. There are, however, a wide variety of standards and online carbon footprint calculators that are used by distinct segments of society.

B. PAS 2050 standard

The PAS 2050 standard is a Life Cycle Assessment (LCA) method and consists of a detailed and complex, bottom up quantification of direct and indirect emissions. According to the British Standards Institute, the PAS 2050 standard aims to bridge the gap between complex bottom up approaches that yield different results according to scope, boundaries and reliability of data and the more general top down approaches

6 If a tariff is to be levied on a good based on carbon content, it is important that the level of accuracy throughout the entire supply chain be as accurate as possible. The standard must therefore be truly universal and third-party verified.

that are too broad to yield any detail in regards to product specificity (British Standards Institute, 2010). The government-endorsed standard was developed jointly by the Carbon Trust and the British Standards Institute (BSI) and is based on previously released ISO standards. The standard includes a guide to calculate emissions for the entire lifecycle of a product including the change in land use (since 1990), transportation and other emissions within the boundaries of production (Bolwig and Gibbon, 2009).

The PAS 2050 standard does not include in its boundaries certain GHG emissions that may benefit, or provide an advantage to LAC exports, such as: [7]

- Human energy inputs (ie. picking fruit by hand rather than using machinery);
- Capital costs – buildings, machinery, other equipment;
- Transportation of workers to and from their workplace;
- Animals transport services (goods or workers).

Latin American and Caribbean production generally includes more labor intensive production and likely more workers using public transportation, biking or walking to work. The inclusion of these emission sources within the boundaries of PCF may provide a more accurate representation of total embedded carbon. As these boundaries are currently excluded under paragraph 6.5 of the PAS 2050, this may preferentially favor goods from industrialized countries over those from developing and least developed countries (Bolwig and Gibbon, 2009). In addition, LCA methods of accounting for carbon content can be very resource intensive to implement.

C. Bilan Carbone

The French Government spearheaded the introduction of a standard known as Bilan Carbone. This standard was created through the Agence de l'Environnement et de la Maîtrise de l'Energie (ADEME) and is being employed by a number of French companies. The French labeling initiative is said to be compatible with the ISO 14064 standard and includes methodologies for calculating the emissions of not only activities, but regions as well (ADEME, 2010).

The Bilan Carbone methodology and calculations may only be used by certified individuals who have attended ADEME's Bilan Carbone training sessions. This may ensure that individuals are correctly calculating the PCF of a good according to the methodology but the availability of such training sessions may also pose a barrier to the adoption of such standards.

D. New methodologies, initiatives and labeling schemes

As carbon accounting is still a relatively new concept, organizations involved in the creation of standards continue to release updated versions using slightly different methodologies for calculation and different boundaries within their scope. The World Resources Institute and World Business Council for Sustainable Development (WRI-WBCSD) under their "Greenhouse Gas Protocol Initiative" have created the Greenhouse Gas Protocol (GHG Protocol) that serves as the basis for many other emissions accounting methodologies. The protocol has been updated and is expected to be published in mid-2011 (Greenhouse Gas Protocol Initiative, 2011). The International Organization for Standardization is also expected to publish their revised ISO 14067, "Carbon Footprint of Products" standard in 2011 (Bolwig and Gibbon, 2009, p. 2).

Several governments are developing procedures and norms for the private sector to use in measuring the environmental impact of goods and services. In addition to product-specific accounting and certification, governments are also interested in promoting better corporate processes and efficiency.

[7] See (British Standards Institute, 2008).

The efforts by official agencies often occur in partnership with the private sector, and include developing label standards, adapting existing methodologies to their national context, creating guidelines and manuals for producers, distributing information to producers and consumers, and changing their own standards of procurement to encourage suppliers to reduce emissions in their supply chains.

In Taiwan, for example, the authorities are encouraging large retailers to require suppliers to supply carbon footprint labeled products. The government will also be required to extend its current "Green Mark" purchasing system and give preference to carbon labeled products. In response to global vendors who are starting to demand information on the level of emissions of goods, the Industrial Development Bureau will provide assistance to Taiwanese manufacturers to help them calculate the carbon footprint of their goods. The electrical, electronic and photo-voltaic industries have shown particular interest in this program and see it as a competitiveness issue (Ministry of Foreign Affairs & Trade and New Zealand Trade & Enterprise, 2010b, 2010a).

In Italy, the Ministry of the Environment has announced that it will implement a program to reduce GHG emissions in the agricultural sector. The program is still in its planning phases but authorities are considering projects that aim to reduce the environmental impact of production activities (e.g., livestock farming) and also target consumer behavior (e.g., sustainable diet). The Ministry of the Environment will also develop a system of carbon footprint analysis in line with the system that exists in the UK (Ministry of Foreign Affairs & Trade and New Zealand Trade & Enterprise, 2010b).

In France, a national initiative to promote environmental responsibility includes an environmental label, not necessarily related directly to carbon content. The French National Assembly has approved a new environmental responsibility law that makes significant changes to many areas, including corporate social responsibility, building codes, and others (French National Assembly, 2010). The new law, known as "Grenelle 2" mandates a 12-month trial period for an environmental labeling scheme to begin in July 2011. Depending on the results of this pilot program, the Assembly will decide whether and how to expand it to the entire French economy. It is still unclear which products and sectors will be part of the pilot program, how it will be measured, and how the new eco-label will be displayed.

Japan, the Republic of Korea, New Zealand and Thailand are also developing carbon or climate-related labels and standards. The government of Singapore recently announced the creation of the Singapore Carbon Label, intended to emphasize the country's transition to a low carbon economy, differentiate the country's exports and boost their export competitiveness (Singapore Government, 2010). The standard is based on the PAS 2050 and the draft ISO 14067 standards and will be a joint initiative between the Singapore Environment Council and the Singapore Institute of Manufacturing and Technology. The Singapore Carbon Label is said to include rigorous lifecycle analysis as well as emission reduction recommendations for business. Neither the government nor the institutes have yet revealed any details of the methodology and boundary limits of the new initiative (Singapore Government, 2010).

Regardless of the credibility of individual standards or labeling schemes, it is clear that these tools have attracted the attention of governments and the private sector. Should consumers be willing to pay a premium for lower carbon content and, more importantly, if companies expand the use these tools to identify inefficient processes, carbon accounting methodologies will become a useful tool in the effort to combat climate change. On the other hand, the potential effects of these methodologies and schemes on global trade patterns, particularly as they relate to developing nations, are a cause for concern. Carbon accounting methodologies and labeling schemes are emerging as new technical barriers to trade and a form of protectionism.

E. Other standards

Other standards exist not only for carbon labeling, but also for climate friendly practices throughout the world, including in Austria, France, Germany, Japan, New Zealand, Republic of Korea, Sweden, Switzerland, Thailand, United Kingdom, and the European Union.[8] Sweden's system is notable for being the first country-wide climate standard for labeling food products, though it is not mandatory. Rather than a Product Carbon Footprint (PCF) label, it certifies suppliers of domestic and imported products (producers, distributors and retailers) as having made "significant efforts" to reduce carbon emissions throughout the food production chain. It was developed and is managed in cooperation with private and public organizations, including various food suppliers and the Federation of Swedish Farmers.

Perhaps the oldest and most mature label belongs to the German Blue Angel seal. The label has been in use since 1978 and is awarded to the top 20% of products that "conserve water, protect the climate, conserve resources and protect health". Food products are not covered in the blue label but currently 11,500 products are covered in 80 different categories (Der Blaue Engel, 2010). Germany has also begun a PCF Pilot project with the involvement of 15 companies, initiated by the independent Berlin-based think-tank THEMA1 in partnership with the Institute of Applied Ecology and the Potsdam Institute for Climate Impact Research (THEMA1, 2010).

Private carbon labels have also been introduced in the US and Canada. The Washington D.C.-based Carbon Fund has established a 'Certified Carbon Free' label that uses Life Cycle Assessment (LCA) methodology and certified carbon off-setters to render a product carbon neutral. The Climate Conservancy, a California-based organization founded by scientists from Stanford University, uses LCA methodology to inform consumers on the GHG intensity per dollar of product. Within Canada, Carbon Counted has introduced a label and allows businesses to use Carbon Connect, an online calculator that establishes a carbon footprint using LCA. The business then undergoes a third party audit and is issued Carbon Counted labels displaying the products' PCF. Significant participation in voluntary climate labels have yet to be realized in the US and Canada although this may change when the governments of the region announce their long awaited climate change action plans.

TABLE 2
CARBON LABELING INITIATIVES BY COUNTRY

Country	Scheme name	Launched	Product coverage	No. certified products	Methodology
Australia	Planet Ark	2009	All Goods and Services	2800	
Austria	Hofer Carbon Labeling	2009	Food Products	74 (30 fourthcoming)	ISO 14040, 14044
Canada	Carbon Connect	2007		22	ISO 14064
Canada	CarbonLabels.org	2008	Food Products	1	PAS 2050
Chile	IIA Project	2009	Food Products	(13 assessed)	PAS 2050
China	Ministry of Environmental Protection	forthcoming		n/a	
France	Indice Carbone Casino	2008	Food Products	160	ISO 14064
France	J'économise ma Planète (Bilan CO2)	2008	Food Products	800 categories (380,000 products)	Bilan Carbone
Germany	Stop Climate Change	2007	All Goods and Services (Focus on Food)	11	ISO 14064
International	Carbon Disclosure Project	2007	Corporations	2456	Questionnaire

(continued)

[8] A complete list with additional information can be obtained on the PCF World Forum website (www.pcf-world-forum.org).

Table 2 (concluded)

Country	Scheme name	Launched	Product coverage	No. certified products	Methodology
Italy	Ministry of the Environment	forthcoming	Agricultural	n/a	
Japan	Carbon Label (Japan)	2009	All Goods and Services	41	ISO 14040
Netherlands	Nature & More Trace and Tell System	2004	Food Products	n/a	
New Zealand	CarboNZero	2008	All Goods and Services	100	PAS 2050
South Korea	Carbon Footprint Label	2009	All Goods and Services	189	PAS 2050
Singapore	Singapore Carbon Label	2010	All Goods and Services	n/a	PAS 2050, ISO 14067
Spain	EPEA	2010	Agricultural	(3 assessed)	EPEA2010, PAS 2050
Sweden	Verified Sustainable Ethanol Initiative	2008	Ethanol	1	LCA
Sweden	Climate Declarations	2007	All Goods and Services	66	
Sweden	Climate Label	2007	Food Products	n/a	ISO 14040
Switzerland	Approved by Climatop	2008	All Goods and Services	10 (70 assessed)	LCA
Taiwan	Green Mark	1992		5704	ISO 14021
Taiwan	Taiwan Carbon Label	2010		7	PAS 2050, ISO 14067
Taiwan	Taiwan Electrical and Electronic Manufacturers' Association (TEEMA)	2009	Electronic Sector	5 companies	LCA
Thailand	Carbon Reduction Label	2008	All Goods and Services	40	UNFCCC/CDM
Thailand	Carbon Footprint Label	2009	All Goods and Services	10	UNFCCC/CDM
United Kingdom	AB Agra GHG Modeling	2008	Dairy	1	PAS 2050
United Kingdom	Carbon Reduction Label	2008	All Goods and Services	2800	PAS 2050
United States	Certified Carbon Free	2007	All Goods and Services	44	LCA
United States	Climate Conscious Carbon Label	2007	All Goods and Services	3	LCA
United States	Footprint Chronicles	2007	Clothing and Footwear	14	LCA
United States	Green Index Rating	2007	Footwear	8 Models	LCA

Source: Author's own research and Bolwig, Simon and Peter Gibbon (2009).

F. Harmonizing methodologies and standards

There are significant challenges to harmonizing the methodologies developed to measure carbon content in products and services, and in creating a universally accepted set of practices and standards for the carbon accounting certification companies. Some of the methodologies described above are incompatible with each other because of their specified boundaries. Also, companies need to be able to apply a methodology that is relevant to their specific product, region and consumer market, all of which have particular requirements. Private and government-supported initiatives lack a governing standard and methodology, making it difficult for customers to compare products and increasing the cost to producers of certifying products. Though many base themselves on either the ISO or the PAS methodologies, they are usually adapted to the individual country's realities.

There is also a need to establish a standard of practices and certification for the certifying agencies themselves who are the ones to implement the established methodologies. These agencies should also be part of a data collection effort to identify problems in the measurement and certification of carbon content across products and countries. All of this would go a long way towards improving transparency for consumers and, more importantly, to the companies that rely on these methodologies and practices to identify areas for improvement in their production processes.

Organizations and governments recognize the need for a harmonized system of carbon accounting that avoids the pitfalls of the currently fragmented system. The European Commission, France and the UK are all actively developing methodologies and the regulatory framework required for national and regional carbon accounting mechanisms. The goals are to harmonize the processes to allow for comparability across similar products and to provide producers with useful information about the environmental impact of their inputs. The efforts in the UK (see PAS 2050 Standard), for example, are being designed to inform policy. These are not expected to be used in a consumer-labeling mandate in the near-term. This approach avoids the daunting task of regulating the accounting and labeling of individual products, opting instead to focus on the production chain as a way to achieve universal labeling.

The European Community has funded a study to review various standards and methodologies for carbon labeling. The goal is to harmonize the various standards inside the European Union as well as around the world (Le Goff, 2010). The Community have released a report that identifies, analyses and compares the existing major methodologies and initiatives in the field of product carbon footprinting (Ernst & Young and Quantis, 2010).

G. Carbon accounting in agricultural goods

Methodologies to measure emissions throughout the production supply chain of agricultural goods vary greatly. The bulk of private labeling has focused on foodstuffs as the availability of studies on industrial products is rather limited due to the complexity of their supply chains (Paul Brenton, Gareth Edwards-Jones and M. F. Jensen, 2009, p. 249). As such, the majority of the literature and labeling initiatives thus far have focused on agricultural goods.

The objective of carbon accounting and labeling is to encourage the purchase of the least detrimental form of on-farm food production and to limit the emissions resulting from the entire supply chain. Emission intensities can vary at neighboring farms that use different agronomical practices to supply nearly identical products. Emission intensities also vary throughout the supply chain depending on numerous factors such as a product's value added, packaging, or mode of transport.

With regard to the physical point of production, the embodied carbon of a product can vary greatly. For instance, fertilizer imported from a country whose electricity generation is largely derived from renewable energy would contain less embodied carbon than a country that derives the bulk of their electricity from coal (Paul Brenton, Gareth Edwards-Jones and M. F. Jensen, 2008, p. 22).

Other problematic issues include the level of de-nitrification that occurs in fertilizer timing and placement through biological activity; the amount of fertilizer that is converted from a plant usable form to NOX gases (which have large GHG warming potentials) through anaerobic respiration[9] (Mosier, 1994). This phenomenon is nearly impossible to quantify at the individual field level and is one of the larger agricultural GHG emissions. In the production of meat, dairy and poultry, the type of feed (grass vs. grain) and the origination of the feed source itself (for instance imported versus domestic) will have a large effect on the embodied carbon of the final product.

The choice of methodology used to compute the carbon footprint of a product can have a significant impact on the competitiveness of the region's exports. For example, using boundaries that exclude capital goods in carbon labeling (such as tractors and other equipment) and the resulting emissions from their production may have negative implications for low-income countries. Low-income countries tend to be less fertilizer-, agrochemical-, and capital equipment-intensive and in some instances, still employ livestock for agricultural tasks (Paul Brenton, Gareth Edwards-Jones and M. F. Jensen, 2008, p. 26).

Minor details such as workers' mode of transport to and from work if included in the calculation methodologies can have implications for export competitiveness. The involvement of LAC countries in the standard setting and methodology is urgent in order to assure these important details are accounted for.

If an industry average approach is to be used in carbon foot-printing methodologies, the onus of differentiation will fall on the environmentally conscious producer who decides to adopt new technology and environmentally friendly practices. The lower carbon label would need to be measured at the farm level, a virtually impossible task without reliable data, technical know-how and scientific accuracy. The accounting task for a producer to separate him/herself from other methods of production in order to achieve the premium that may coincide with a lower carbon footprint may be overwhelming. The costs of monitoring and verification may likely surpass the obtained premium and thus, the likelihood of a producer adopting an environmentally friendlier practice may decrease with the increased costs of carbon accounting.

Emission accounting began with a focus on agricultural goods but has evolved to estimate and calculate emissions from manufactured goods with increasing levels of processing. The following standards address not only agricultural goods but also manufactured products.

9 Anaerobic respiration occurs when micro-organisms within soils are devoid of oxygen due to flooding or periods of soil waterlog and use nitrogen fertilizers in the final stage of respiration (or respiratory cycle), converting them to NOX gases.

IV. Conflicts and challenges

A. Trade diversion

Greater information on the emissions associated with production of goods aims to change production and consumption patterns around the world. Much of the drive for greater carbon emissions accounting comes from the fear of "carbon leakage", or the increase of carbon emissions in developing economies due to outsourcing or relocation of production from industrialized economies. This would also result in changes to trade patterns as more efficient competitors would gain at the expense of inefficient producers.

This diversion of trade could result in significant harm to producers in the poorest of countries and whose inefficiency is merely a result of national conditions. A "dirty" national energy matrix would be a form of "original sin" to a country's exporters, and a national economy dependent on natural resources, as is the case for many developing economies, would be penalized for its impact on soil and water resources. Export-oriented producers would also need to implement expensive Lifecycle Analysis (LCA) methods that are expensive and an additional burden (MacGregor, 2010).

B. Bias in PCF methodologies

Product Carbon Footprint methodologies must specify its boundaries and other parameters which necessarily introduces some bias. For the reason that carbon labels have thus far largely focused on agricultural goods, countries and regions whose exports depend more heavily on agricultura —such as in the Latin America and the Caribbean (LAC) region— are at a disadvantage compared to domestic producers.[10] The difference in the complexities of supply chains for manufactured goods compared to agricultural goods may have biased the initial introduction of carbon labels, which initially focused on the products in which the conducting of LCAs and PCFs was relatively simple (Zaino, 2008). This bias may have already affected LAC exports, given that some of the world's largest retailers are currently requiring carbon labels for agricultural products.

The inclusion of land use change within PCF methodologies (such as PAS 2050 and others) may also introduce a bias in favor of developed countries that have converted historical natural vegetation to cropland in the past. In the case of countries within the tropics, the land use change has a substantial impact on the PCF. The carbon content of changing forests also has a large potential for error, for example deciduous forests and tropical forests differ greatly in carbon content. Currently, the Intergovernmental Panel on Climate Change guidelines for land use change include worst case scenarios and may lead to overestimation of emissions (Plassmann et al., 2010).

Another bias that may negatively affect LAC exports includes the exclusion of the carbon sequestration potential of perennial agroforestry crops such as coffee and cocoa, two prominent crops within the LAC region (Plassmann et al., 2010). Sequestration refers to the ability of plants to absorb and store carbon through biological processes and in some countries, carbon sinks are allowed in offset and abatement schemes. Should sequestration be included in future PCF standards, the embedded carbon of LAC exports may be favorably reduced in these important sectors.

A significant issue for the Latin America and the Caribbean region is that it is not participating in the design and harmonization of all these standards, and their use and requirement by importers will be negotiated solely on the private sector, where large buyers may be able to dictate the methodology used. This is, of course, a goal of the system: encourage companies to be better informed of the carbon content of their production chain and thus force their requirements onto production standards. However, the lack of voice from developing countries, and Latin America and the Caribbean in particular, regarding technical methodological issues is of great concern to its exporters. Latin American and Caribbean policy makers and industry representatives must be prepared for this issue as the implications for exports, technical capacity for monitoring, verification and implementation may become insurmountable.

C. The WTO and private labeling schemes

Whatever multilateral framework emerges for dealing with Climate Change, it must respect the basic principles established under the WTO and other international agreements. [11] For example, with respect to national rules on product characteristics —such as requirements relating to energy efficiency, GHG emissions or labeling rules— it is not yet clear whether WTO allows distinctions to be made on the basis of the production process, rather than the specifications of the product itself. Production process and emission boundaries set out within PCF standards will be a new frontier that may soon be tested at the WTO.[12]

A distinction must be made, however, by government labeling requirements and private initiatives. Increasingly labeling and carbon accounting is being used by the private sector to identify inefficiencies and gain a better environmental image. The action of governments seems to be limited to developing standards and methodologies, providing information and capacity building to producers. This market-led push is not likely to be actionable under existing agreements.

The voluntary and private nature of the labeling requirements creates a challenge since governments are actively encouraging companies to reduce emissions in their activities, which will inevitably affect international suppliers. However, since these are not mandatory practices, it is difficult

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10 While it is true that if the requirements are applied universally, agricultural exports will universally suffer and the competition effects within this sector will be negated, countries that depend on agriculture for a significant portion of their income will suffer in an absolute sense as profitability and thus wages and employment decline. In addition, under certain conditions the exports from developing economies may be less intensive in carbon emissions than agricultural products from industrialized economies, as shown above.

11 A more detailed analysis of the interaction between WTO rules and climate change measures can be found in (ECLAC, 2009, p. 41).

12 See Low, Marceau and Reinaud (2011) for a discussion of the interaction between WTO rules and national environmental policies.

to resolve the issue of whether governments that encourage domestic firms to adopt them are in conflict with the WTO agreement on Technical Barriers to Trade (TBT) (Blandford and Josling, 2009, p. 11). The WTO Agreement on Technical Barriers to Trade requires that mandatory technical regulations imposed by central governments (including labeling schemes) not be more trade-restrictive than necessary to fulfill a legitimate objective, such as protection of the environment. However, in the case of voluntary private standards (such as the carbon labeling schemes used by a growing number of firms in developed countries), this obligation is not binding. Governments are required instead to "take such reasonable measures as may be available" to ensure that private standardizing bodies act consistently with the provisions of the TBT Agreement, including on non-discrimination. Thus while the WTO dispute settlement mechanism can be used to enforce the provisions of the TBT Agreement in the case of mandatory technical regulations, this possibility does not exist for voluntary private standards and it is not clear how a dispute on this basis would be brought. In addition, government actions to require use/compliance with such labels in domestic or imported products may be challenged (Cottier, Nartova and Bigdeli, 2009, p. 151; Blandford and Josling, 2009).

An additional complicating factor is the dividing line between process or product methods (PPMs) that have a physical impact on the product itself ("product related") and those that have no physical impact on the product itself ("non-product-related"). WTO members have argued that non-product-related PPM regulations are not subject to the TBT provisions and thus exclude them from the requirements of notification, harmonization and mutual recognition that exist in the TBT agreement:

> It would seem inefficient if product-related PPM technical regulations were subject to the more stringent requirements of the TBT Agreement, while the less transparent non-product-related PPM technical regulations —possibly justifiable under Article XX of GATT— were not. Whether non-product-related PPM regulations generally are included in the definition of technical regulations depends on how one reads "characteristics" of the products and "their related process and production methods". The competitive nature and capacity of products surely constitute characteristics of the same products. On the other hand, the Tokyo Round Standards Code made an explicit distinction in Article 14.25 in allowing challenges against 'drafting requirements in terms of processes and production rather than in terms of characteristics of products' (Low, Marceau and Reinaud, 2011, p. 24).

Given the growing importance of private standards, the region's governments should promote compliance by all WTO members with the TBT Agreement's Code of Good Practice for the Preparation, Adoption and Application of Standards, including by increasing transparency about new initiatives. It is clear that the attractiveness of voluntary labels is that they can be tailored to the needs of a subset of consumers and producers, in lieu of more intrusive government policies. However, a legal structure is needed to ensure that such labeling use does not result in barriers to trade.

Efforts are underway to harmonize the main carbon footprint calculation methodologies and reach an agreement on a standard which is fair, efficient and transparent. For Latin America and the Caribbean, the outcome of those efforts is very important. Depending on the methodology that is eventually favored, the region's exports may win or lose competitiveness vis-à-vis those from other regions.

V. Implications for Latin America and the Caribbean

The main destination markets for exports from Latin America and the Caribbean (over 50%) are also those countries that are most interested in measuring the embedded carbon content in products and services (the United States and the European Union.) As multilateral negotiations on climate change become more complicated, the unilateral actions of developed nations have the potential to decrease the competitiveness of exports from those countries that fail to mitigate their emissions. In the future, carbon labeling, whether through private initiatives or legislated by national governments will almost certainly increase the cost of exports from the region. The effect will also depend on the type of carbon accounting and estimations employed by foreign governments during this process.

If private labeling initiatives extend to LAC exports, accounting for the carbon content will become a challenge because of the steep learning curve and the high costs associated with collecting the necessary data (Paul Brenton, Gareth Edwards-Jones and M. F. Jensen, 2009, p. 229). A survey of three PCF scheme operators by Bolwig and Gibbon found the LCA of a single agricultural product to range from €2,500 to €6,000 at one operator, to a high of US$15,000 at the second operator. The costs ranged as high as US$70,000 for some food and manufactured products from the third scheme operator. The costs differ depending on the complexity of the supply chain and the economies of scale (Bolwig and Gibbon, 2009). The certification and PCF accounting costs require further research but certainly threaten a spike in costs for small LAC producers.

It is very difficult to estimate with precision the amount of total LAC trade at risk due to carbon-related requirements in export markets. This is a consequence of the large and growing number of such requirements, of their diversity in terms of coverage and methodology, and of the fact that information about them is very disperse and therefore difficult to collect. Unless and until there is some form of multilateral agreement that specifies how the carbon footprint of tradable goods must be calculated, any estimate of the potential cost of carbon-related requirements will necessarily have to be based on general assumptions.

Also, this fragmentation will mean significant additional costs for the region. Latin American and Caribbean firms exporting to multiple countries would have to meet different carbon footprint-related requirements, thus increasing their transaction costs. Increased labeling requirements result in a growing demand for methodologies to guide and ensure the comparability of data. Producers in Latin America and the Caribbean must navigate a fragmented system of requirements and methodologies in trying to export to industrialized countries. Without a uniform standard, producers will be required to measure carbon emissions in different ways depending on the country, the buyer and the product.

This places a large burden on exporters, especially those without economies of scale (Bolwig and Gibbon, 2009) who will be less able to absorb the cost and thus will become less competitive. This possibility reinforces the need for LAC to call for a single international standard in order to reduce the costs for exporters.

In addition to the problem of having to adhere to various methodologies, is the problem of methodological concepts. One particular problem concerns the boundaries of a product's life cycle. In particular, the region may suffer significant loss of competitiveness if methodologies continue to exclude the carbon emission content of capital goods used in the production of agricultural products. Without the inclusion of these emissions, labor intensive production that occurs within LAC may suffer an artificial disadvantage to more capital intensive production systems. [13]

LAC will also pay a higher price for the transportation component of carbon emissions in its exports due to its geographical distance to industrialized markets. Some of the region's exports consist of perishable agricultural goods that require airfreight to reach their destination markets in a timely manner. In a highly competitive market, the additional carbon footprint of transporting a product by air over a greater distance may determine winners and losers in selected markets. However, if the option to transport via ocean freight exists, the emission intensity is greatly reduced and results in much lower embedded carbon content. Also, some carbon labels and carbon-related procurement practices of several important retailers in OECD countries place great emphasis on one particular aspect of the carbon footprint: the distance travelled by a product to reach the consumer. This is despite the fact that several studies show that transport is not necessarily the most important component of the carbon footprint of a product.[14]

If the effect of new labelling requirements is the reduce demand for imports (particularly in agriculture) from developing countries, the burden of reducing emissions will be placed onto those least responsible for the current problem. Such an outcome goes against the UN climate change convention's recognition of global inequity in responsibility for dealing with climate change and would harm development goals. As development efforts promoted greater non-subsistance agricultural trade to increase investment, education and income levels, measures to limit access to international markets would directly undermine these efforts. This justifies the need for differentiated responsibilities for developed and developing nations (MacGregor, 2010).

A. Trade in green goods and services: Is there a "carbon divide"?

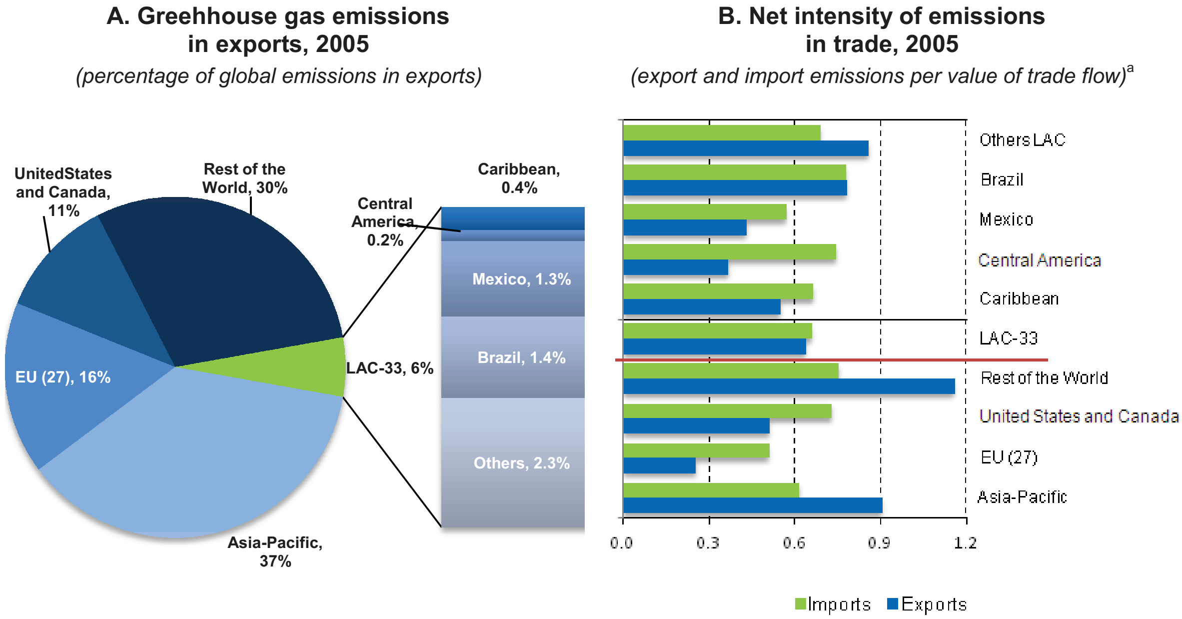
International trade accounts for nearly a quarter of total global emissions of greenhouse gases (GHGs), making it hard to ignore the role of cross-border commercial transactions in the environmental agenda. Nonetheless, Latin America and the Caribbean contributes only about 6% of total export-related

[13] See (Bolwig and Gibbon, 2009) for more details.

[14] See (Saunders, Barber and Taylor, 2006; Saunders, Barber and Sorenson, 2009; Hogan and Thorpe, 2009; Chi, MacGregor and King, 2009; Williams, 2007; Wynen and Vanzetti, 2008).

emissions, a smaller share than other regions (Figure 1 A.)[15] Brazil and Mexico have the highest amounts of total GHGs emissions embedded in exports in the region. In the case of Brazil, the exported emissions are balanced by a high amount of emissions embedded in imports. Brazil also leads the region in export emissions intensity (emissions relative to the value of exports). In terms of net emissions intensity, the region is a slight net importer of GHG emissions, with significant heterogeneity across the subregions (Figure 1 B).

FIGURE 1
EMISSIONS OF GREENHOUSE GASES EMBODIED IN TRADED PRODUCTS



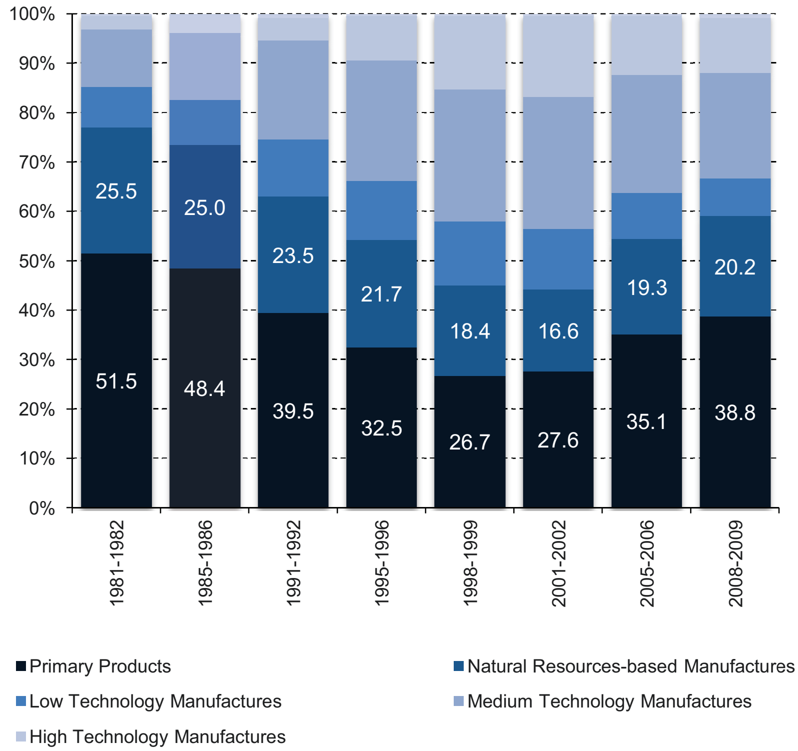
Source: ECLAC, based on World Resources Institute, Climate Analysis Indicators Tool (CAIT v.7).

[a] Kilotons of CO2 emissions in exports per million of US$ in exports and kilotons of CO2 emissions in imports per million of US$ in imports.

The overall emissions and emission intensity of Latin American and Caribbean countries is primarily a reflection of the region's export and import specialization. The region has seen a resurgence of primary products in its export basket, due in great part to the growth of global demand for commodities and the ensuing rise in prices (Figure 2).

[15] Export-related emissions are used to provide a comparison of emissions in production, as opposed to a consumption-based perspective.

FIGURE 2
LATIN AMERICA AND THE CARIBBEAN: TOTAL EXPORTS ACCORDING TO TECNOLOGICAL INTENSITY

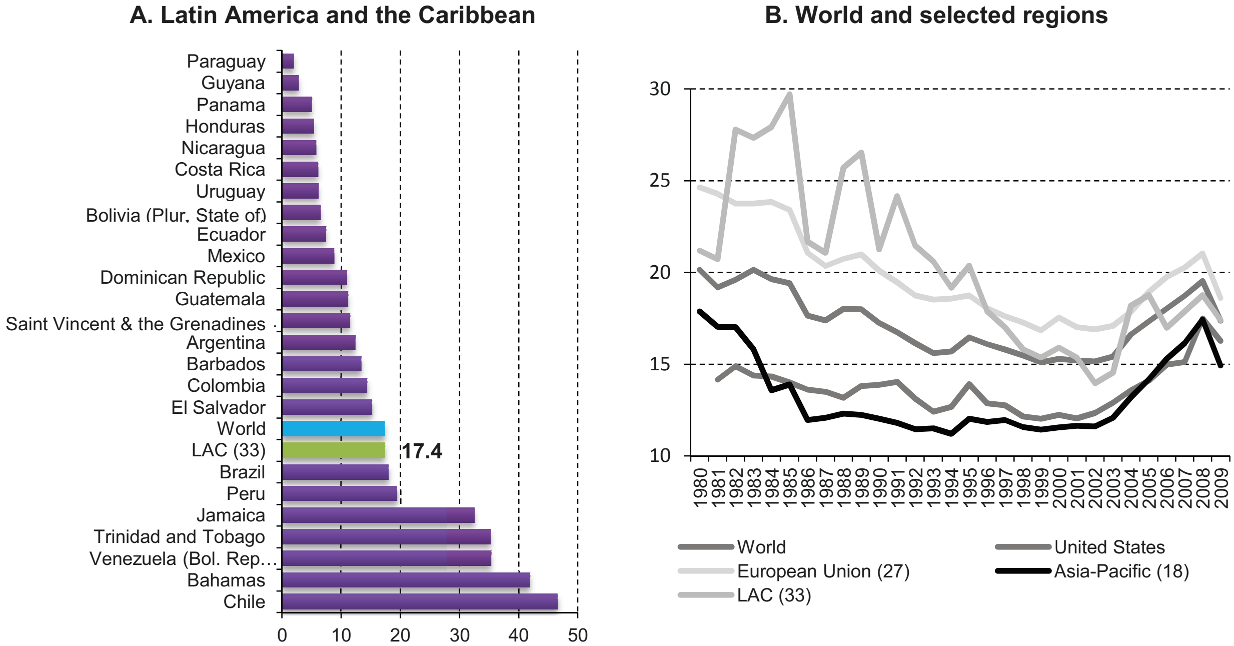


Source: ECLAC, based on UN COMTRADE data.

In addition, the export basket of the countries in Latin America and the Caribbean includes an important share of "Environmentally Dirty Industries" (EDI), which are largely manufactures based on natural resources and primary products.[16] EDIs are defined as those with the highest levels of pollution abatement and control expenditures. 17% of the entire region's exports in 2009 were of these "dirty" products (Figure 3 A), with a large variation across countries. This share is also growing over time. Since EDIs correlate closely with primary products and natural resource-based manufactures, the resurgence of primary products shown above also means that the region is exporting more products from EDIs. Figure 3 B shows the annual exports of EDIs as a share of total exports in selected regions. The data shows that, since 2002, the region's export share of EDIs has been increasing, in line with the experience of the rest of the world and closely related to the price effect that also explains the "reprimarization" shown above.

[16] Environmentally Dirty Industries (EDI) were chosen based on pollution abatement and control expenditures in the United States, using 1988 data. They include 40 industries at the three-digit level of the SITC. Also included are those industries that incurred pollution abatement and control expenditures of 1 percent or more of the value of total sales (Murillo, 2007, pp. 27-28; Low and Yeats, 1992).

FIGURE 3
EXPORTS OF ENVIRONMENTALLLY SENSITIVE PRODUCTS, 1980-2009
(Percentage of each region's total exports)



Source: ECLAC, based on United Nations COMTRADE database online.

Figure 3B also shows that the region's reliance on exports of EDIs has converged with that of other regions in the world. At its highest level, nearly 30% of LAC's exports were of "dirty" products, compared to a world total of 20%. In 2002, Latin America and the Caribbean's export share of EDIs was lower than the world as a whole, and has since remained at levels similar to the world total. The differences between the regions studied has decreased significantly in the last 30 years, from an average of 12 percentage points in the 1980s to 8 percentage points in the 1990s, and less than 5 percentage points in the 2000s.

Given the differences in the environmental impact of selected products and industries, there exists the opportunity for changes in export patterns to have an effect on global GHG emissions. In addition to the obvious need to discourage trade of polluting goods, greater trade of goods and services that are in themselves more climate friendly, or that are used in the production of climate friendly products, can help accelerate the adoption of greener technologies and processes around the world. This would serve to promote less harmful trade by reducing the relative costs of more green technologies. Finding the proper way to accomplish broad trade liberalization and an appropriate mix of incentives to promote less harmful trade —all the while satisfying the priorities of individual nations— has been at the centre of recent discussions in the WTO.

According to the WTO's Director General, Pascal Lamy, liberalizing trade in Environmental Goods and Services (EGS) in the context of the ongoing Doha Round is an immediate contribution that the WTO can make to mitigate climate change (Lamy, 2008). Moreover, liberalizing EGS could give some countries in Latin America and the Caribbean the opportunity to capitalize on existing competitive advantages by opening new markets. Reducing tariffs for these products would also result in lower input costs for climate friendly technologies and improve the ability of the region to use these technologies in its production process.

Negotiations on how to best achieve these goals have coalesced around two main issues: 1) should tariffs be reduced based on a positive list of environmental goods that have certain characteristics, based on environmental projects identified by each country (such as the building of solar energy farms), or based on a request-offer bilateral negotiation that is extended on a MFN basis; 2) how to define the products or projects that would be eligible in such a way as to make the process effective and efficient.

Until negotiations reach a consensus on the definition of "green" goods and services, an analysis of trade patterns must include the caveat that it is based on a set of products that are likely to be changed. With this in mind, there is some value in analyzing levels and trends of environmental products according to a particular definition, especially since many of the existing proposals have large overlaps.

In 2009, total Environmental Goods (EG) exports for the 153 products in the WTO's "Friends of Environmental Goods" list[17] amounted to US$ 728 billion, or 6.0% of the world's total trade in that same year. EG exports represented 8.9% of the US$ 8.2 trillion manufactured products traded in 2009 (Table 3). The reference universe of environmental goods of interest across all proposals and submissions ("WTO-all" in Table 3 below) represents 33% of world trade in manufactures in 2009 (WTO, 2011). Latin America and the Caribbean's exports of these products amounted to US$ 135 billion, 20% of the region's total exports and nearly half of its total exports of manufactures.

TABLE 3
EXPORTS OF ENVIRONMENTAL GOODS: COMPARISON OF SELECTED PROPOSALS, 2009
(US$ billions and percentages)

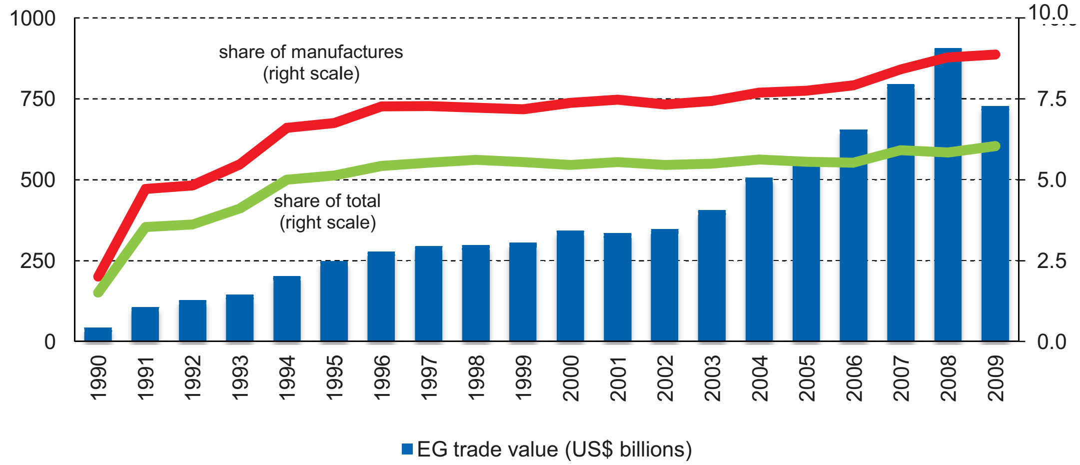
Region and list	Trade value (US$ billions)	Share of total trade	Share of manufactured products' trade [a]
WORLD exports			
Friends-153	728.3	6.04	8.87
APEC	435.0	3.61	5.30
OECD	491.6	4.08	5.99
WB43	181.8	1.51	2.21
WTO-All [b]	2 719.8	22.56	33.12
LAC (33) exports			
Friends-153	23.6	3.49	8.24
APEC	13.2	1.95	4.60
OECD	19.0	2.81	6.64
WB43	6.4	0.95	2.23
WTO-All [b]	135.0	19.94	47.06

Source: ECLAC, based on United Nations COMTRADE database online.
[a] SITC revision 3, codes 5+6+7+8-667-68.
[b] "WTO-All" refers to the sum of all the proposals currently being discussed in the WTO. List available in (WTO, 2011).

Over time, total world trade in environmental goods (EGs) —defined as those in the "Friends-153" list— has increased significantly, from 1.5% of total exports in 1990 to over 6% in 2009. Relative to manufactured trade, EGs have also gained significant ground, from just 2% in 1990 to nearly 9% in 2009 (Figure 4). EG exports declined in 2009 due to the widespread economic crisis, falling to US$ 728 billion after an all time high of US$ 908 billion in the previous year.

[17] This list was first specified in a WTO non-paper (WTO, 2007) by a group of countries referred to as "Friends of Environmental Goods" as part of the ongoing negotiations under paragraph 31 (III) of the Doha Ministerial Declaration (which calls for "the reduction or, as appropriate, elimination of tariff and non-tariff barriers to environmental goods and services"). The countries are: Canada, Japan, Korea, New Zealand, Norway, Switzerland, Chinese Taipei, Taiwan, the United States, and the members of the European Union.

FIGURE 4
WORLD EXPORTS OF ENVIRONMENTAL GOODS, “FRIENDS” LIST, 1990-2009
(US$ billions and percentages)

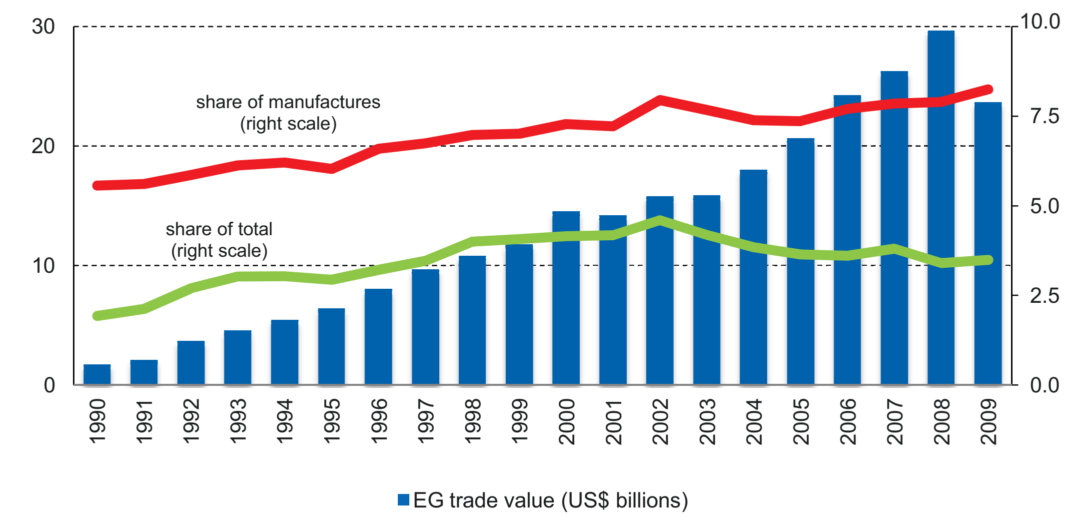


Source: ECLAC, based on United Nations COMTRADE database online.

Note: The total value of the “Friends 153” list for each year is the sum of the values reported by each country in any of three versions of the Harmonized System (HS): 1992, 1996 and 2002, opting to the latest version where possible.

Latin America and the Caribbean exports of EGs have followed the same pattern, growing steadily in value since 1990 before suffering from the global crisis in 2009. As a share of total exports, however, the resurgence of primary products’ exports shown above has resulted in a decrease in the share of EGs in the export basket, from a high of 4.6% in 2002 to 3.5% in 2009. However, as share of manufactured exports, environmental goods continue to expand, from 5.6% in 1990 to 8.2% in 2009 (Figure 5).

FIGURE 5
LATIN AMERICA AND THE CARIBBEAN EXPORTS OF ENVIRONMENTAL GOODS, “FRIENDS” LIST, 1990-2009
(US$ billions and percentages)



Source: ECLAC, based on United Nations COMTRADE database online.

Note: The total value of the “Friends 153” list for each year is the sum of the values reported by each country in any of three versions of the Harmonized System (HS): 1992, 1996 and 2002, opting to the latest version where possible.

Trade in Environmental Goods is highly concentrated, with the 20 largest exporters accounting for 85% of the total. Given the high technological content of the products in the EG lists, it is not surprising that the top exporters are the world's largest industrialized economies. Latin America and the Caribbean lags behind other regions in the world, partly as a result of its comparative advantages on natural resource exports. In the region, only Mexico is a significant exporter of EG (Table 4). The country is the 10th largest exporter of EG in the world. The US is the single largest buyer of environmental goods, absorbing 12% of the world's total EG trade and over 88% of Mexico's total exports of EG products.

TABLE 4
EXPORTS OF ENVIRONMENTAL GOODS: TOP EXPORTERS AND IMPORTERS, 2009
("Friend's" 153 list, US$ billions and percentages)

Region/Country	Exports USD billions	Share of Total Percent	Region/Country	Imports USD billions	Share of Total Percent
United States	85.7	11.8	United States	85.4	12.1
Canada	13.6	1.9	Canada	21.4	3.0
EU-27	339.3	46.6	EU-27	249.9	35.4
Germany	117.8	16.2	Germany	58.6	8.3
Italy	46.4	6.4	France	28.6	4.0
France	29.2	4.0	United Kingdom	23.1	3.3
United Kingdom	24.0	3.3	Italy	21.2	3.0
Netherlands	18.1	2.5	Spain	16.0	2.3
Asia Pacific (16)	217.6	29.9	Asia Pacific (16)	190.2	26.9
China	77.1	10.6	China	70.7	10.0
Japan	65.0	8.9	Rep. of Korea	28.5	4.0
Rep. of Korea	19.7	2.7	Japan	22.5	3.2
Singapore	13.3	1.8	Singapore	14.6	2.1
Hong Kong	13.0	1.8	Taiwan	14.6	2.1
LAC 33	23.6	3.2	LAC 33	47.5	6.7
Mexico	16.2	2.2	Mexico	19.7	2.8
Brazil	5.1	0.7	Brazil	9.7	1.4
Argentina	1.1	0.2	Venezuela	3.1	0.4
Colombia	0.2	0.0	Argentina	3.0	0.4
Chile	0.2	0.0	Chile	3.0	0.4
Rest of the World	48.5	6.7	Rest of the World	111.8	15.8
Grand Total	728.3	100.0	Grand Total	706.3	100.0

Source: ECLAC, based on United Nations COMTRADE database online.

B. Opportunities in a new era of carbon accounting

Developing countries are well positioned to gain from liberalization of EGs. "Liberalisation could allow some developing countries to significantly expand their production and export of such dynamic environmental goods and thus promote increased industrial diversification of their economies. For many others, trade liberalisation of environmentally preferable industrial and consumer goods may provide immediate gains needed to support rural economies and facilitate the integration of their small and medium sized enterprises into global supply chains" (Hamwey, 2005). In fact, a recent analysis of the "Friends 153" list points to the relative importance of some developing countries in the global trade of many EG categories (Jha, 2008; UNCTAD, 2010, p. 180).

Given the export structure in the region, it is clear that the agricultural sector must lead the effort to adapt to new rules and requirements in export markets. A few countries in Latin America and the Caribbean are working to calculate the carbon footprint of selected industries, and are using this process to develop methods and the technical capacity to expand to other segments of their economies. A prime example is Chile's agricultural sector, where the government and industry leaders have calculated the carbon footprint of the country's wine industry, using the British PAS 2050 methodology. The industry is using this information to identify and remedy inefficiencies in the production chain. Some wine makers have adopted measures that have resulted in a 50% reduction in the carbon footprint of their operations. The authorities claim that their goal is to calculate the emissions of the entire agricultural sector and work toward making all agricultural production carbon neutral (Donoso, 2010). To support this goal, the Agricultural Research Institute commissioned and completed in January 2010 a study of the carbon footprint of the country's agricultural exports (INIA and DEUMAN, 2010). As a result, the Ministry of Agriculture now has a number of carbon footprint calculators available to the agricultural sector, including vegetable products (with and without land use change factors), animal products and bottled wine.

At the same time, and with cooperation from its Chilean counterparts as well as experts in New Zealand, academics and other technical partners, Uruguay is developing its own technical capacity at the institutional level. The country is well aware of the potential for new requirements to impact the export sector's competitiveness. The agricultural and livestock industry is especially interested in developing the capacity to measure and react to new carbon accounting requirements in light of the ongoing efforts around the world to measure and mitigate emissions of these products (Oyhantcabal, 2010). Uruguay is actively looking to design commercial, marketing and diplomatic strategies to improve the image and acceptability of its products in light of these trends. Authorities have organized working groups at the institutional and technical levels. Companies are brought together depending on their place in the value chain of affected products, while technical experts are tapped from academic, institutional and governmental bodies. Uruguay hopes to conclude studies and formulate strategies for meat products (cattle and sheep), dairy, rice, grains, forestry, and fruit products.

Generally, changes in the competitiveness of products and services will result in changes in comparative advantage profiles, favoring non-traditional export sectors that have lower relative carbon footprints. The carbon footprint also allows for exporters to differentiate their products based on origin. This is a new opportunity to attract investment, including FDI, in service and high technology sectors. Engineering and consulting services that currently exist could be leveraged in new sectors, helping some economies migrate to a more service-oriented profile. The region could also benefit from its relatively favorable climate and, in some cases, better energy matrix.

1. Climate aid for emerging economies

A number of multilateral and bilateral climate change financing mechanisms have been established in recent years to assist developing countries in their mitigation and adaptation efforts to adjust to a new low-carbon development path.[18] The objectives of these funds overlap with some of the activities of Official Development Assistance (ODA), which aims to help countries grow and develop, implying a need for coordination of both donors and recipients' strategies and agendas.

Of particular concern is how new commitments for climate adaptation and mitigation finance will complement or disrupt existing ODA financing. A recent analysis of how ODA and climate financing mechanisms interact and overlap shows a risk that diverting ODA funds towards adaptation and

[18] The Global Environment Facility and World Bank Climate Funds are the main multilateral funds currently in existence, though new bilateral mechanisms could have a fundamental impact on the present architecture for global environment finance (Ancharaz and Sultan, 2010). For a complete list and an analysis of the existing multilateral and bilateral funds, see (Porter et al., 2008).

mitigation projects would decrease the amount of aid available for some regions and for some sectors. In particular, the study found that while LAC would receive more funds (at the expense of other regions), global Aid for Trade flows would decrease (Brown, Cantore and te Velde, 2010).

Individually, the reduction in Aid for Trade financing would have a significant impact on vulnerable open economies in the region. LAC is already a proportionally small recipient of global Aid for Trade financing, accounting for only 4.5% of total funds in 2008. A further reduction of funds would affect investment in economic infrastructure and production capacity building, the two main areas of Aid for Trade projects in the region.

To offset this, greater coordination between climate adaptation and mitigation projects and Aid for Trade priorities is needed. In the same way that climate change efforts must incorporate international trade in their agenda, Aid for Trade, as a development instrument, should consider the issue of sustainable growth and climate change. The challenge lies in achieving greater synergy between these two financing mechanisms so as to achieve the goals of each: to harness trade as an engine of growth for developing countries in line with their development objectives and to facilitate more sustainable economic activity.

Climate change financing mechanisms do not provide for trade promotion, which is financed through the Aid for Trade initiative. Nonetheless, climate change affects and is affected by trade, and climate change and Aid for Trade financing mechanisms are thus complementary. To achieve this coordination and complementarity, it is important to identify common priority areas of Aid for Trade and climate change financing mechanisms. A suggested mapping of such priority areas can be found in (Ancharaz and Sultan, 2010). According to the methodology used in the study, there are two specific Aid for Trade categories that more easily map to climate change projects: economic infrastructure and building productive capacity.

TABLE 5
COMMON PRIORITIES OF AID FOR TRADE AND CLIMATE CHANGE FINANCING MECHANISMS

Climate change related project	Aid for Trade sub-category	Aid for Trade category
Market access for new products	Trade Policy/ Multilateral trade negotiations	Trade Policy and Regulation and Trade-related Adjustment
Investments in dams, hydraulics, modern water distribution systems	Transport and Storage	Economic infrastructure
Rehabilitation of weather-battered infrastructure		
Protection of coastal zones from sea-level rise		
Energy-related projects (hydropower, renewable energies)	Energy supply and generation	
Soil rehabilitation, land terracing, fertilization	Agriculture	Building productive capacity
Diversifying into climate change resistant crops		
Changes in crop mix, changes in mix of livestock breed and fish species		
Diversifying away from sectors vulnerable to climate change (agriculture)	Industry	

Source: Ancharaz, Vinaye Dey and Riad A. Sultan (2010) "Aid for Trade and Climate Change Financing Mechanisms: Best Practices and Lessons Learned for LDCs and SVEs in Africa," ICTSD Programme on Competitiveness and Sustainable Development, N°10, Geneva, Switzerland, International Centre for Trade and Sustainable Development, January.

As private and government-endorsed labeling standards multiply, many LAC countries will lack the institutional, technical and budgetary capacity to meet the new requirements. At the Copenhagen summit in 2009, the US$30 billion Copenhagen Green Climate Fund was announced to fund capacity building, technology development and transfer as well as adaptation measures.[19] The fund is expected to assist developing countries in climate change mitigation and adaptation between 2010 and 2012. It is not clear, however, how much of this will be directed to LAC. In order to maximize access to both climate change and Aid for Trade financing, it is important that the region's governments develop national plans and projects that address their particular needs and long term objectives.

[19] In December 2009, the delegates of the United Nations Climate Change Conference agreed to the "Copenhagen Accord", which includes US$ 30 billion in new and additional resources to be spent in adaptation and mitigation efforts between 2010 and 2012 (UNFCCC, 2009).

VI. Conclusions and recommendations

Private sector requirements to account for the carbon footprint of individual products will continue to multiply in industrialized countries. A number of official institutions are developing new methodologies and perfecting existing methodologies to measure carbon emissions during the lifecycle of a product, and there are ongoing efforts to harmonize many of these. The importance of LAC involvement in the standards creation process cannot be over-emphasized. Should the region's industries, exporters and governments fail to involve themselves in the standards creation process, important boundaries within PCF may be overlooked, leading to standards that do not reflect the true PCF of the region's exports.

Latin American and Caribbean policy makers and industry representatives must be prepared for this issue as the implications for exports, technical capacity for monitoring, verification and implementation may become insurmountable. The region must be ready for changes that penalize "dirty" products. Efficient producers and countries with established comparative advantages in providing more environmentally friendly products and services will benefit from climate-related border measures. At the same time, industries that are not "green-competitive" will face higher costs and new competition.

LAC may be facing the realities of carbon labeling sooner than expected. If the region is to remain competitive in the trade of carbon-labeled goods, policy makers and private agents must work together to ensure that the institutional capacity and appropriate measurement mechanisms are in place to facilitate the PCF process and to meet new requirements in export markets. They must also encourage greater scientific dialogue and knowledge of the scientific base for carbon labeling methodologies and practices.

Governments of the region can take action to ensure that the region's exports remain competitive, aggressively investing in renewable energy sources, encouraging enterprises that require less energy, and developing supply chains that minimize transport emissions. The region should also apply PCF methodologies to supply chains to identify ways to reduce the carbon footprint of final goods and exports. Another contribution that governments can make is to create and maintain good data from national sources to inform the private sector. This would help producers calculate emissions in their products and identify inefficiencies in their production chains.

Whether or not the European Commission, the United States or other countries pass legislation including carbon border measures and carbon labeling schemes, countries in Latin America and the Caribbean must be prepared and informed as to what these implications may entail. Although it is unlikely that border mechanisms and labeling schemes will be implemented in the near term, it is in the region's best interest to move forward in implementing low emission technologies and energy efficient production systems.

Early action for building a low carbon economy can result in gains in export competitiveness. Although a global climate change action plan has not yet been agreed upon, the growing scarcity of fossil fuels and non-renewable resources cannot be denied. The region must move forward in addressing not only the climate change issue, but the future shortage of conventional energy sources. Doing so will lead to a more sustainable development path and will likely increase the competitiveness of the region's exports in the long term.

It is clear that the region needs to attract more foreign direct investment and technological partnerships to stimulate innovation and reduce the carbon-intensive nature of production while maintaining competitiveness. This is important to help the region move towards an export structure that is less energy-intensive and with lower emissions of greenhouse gasses. Many countries in the region have competitive advantages in producing environmentally friendly products, and investment and innovation can expand these advantages and help establish key industries as world leaders.

Governments in the regions should also promote and encourage compliance with the TBT Agreement's Code of Good Practice for the Preparation, Adoption and Application of Standards, including by increasing transparency about new initiatives. A legal structure is needed to ensure that such voluntary private labels do not result in unwarranted barriers to trade.

Beyond reacting to new requirements in export markets, the region must encourage a multilateral agreement that ensures a level playing field for the region's producers. Ongoing negotiations are complex, in part because of the need to link new requirements and incentives with financial assistance and technological transfer. In terms of domestic policies, countries in Latin America and the Caribbean must incorporate the issue of climate change and environmental sustainability in national and regional development strategies.

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