



**Impact of Climate Change
Mitigation Policies in
OECD Countries on
Carbon Emissions
Intensive Export
Industries in Latin
America**

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Executive Summary

This paper focuses on carbon-intensive industries in Latin America in order to analyze how climate change mitigation policies in the developed nations of the Organization of Economic Cooperation and Development (OECD) influence trade patterns in developing countries. In particular, it examines Latin American's exposure to potential embodied carbon tariffs and the region's response and actions to avoid said tariffs. The carbon-intensive industries in Latin America were chosen as examples based on the list of industrial sectors identified as "exposed to a significant risk of carbon leakage" in the European Commission Decision at the end of 2009.

The comparison of import growth rates of carbon-intensive goods from Latin America to the European Union (EU), United States, and China showed a general trend of trade expansion between Latin America and China compared to stagnating trade growth between Latin America and the EU and the United States in recent years. Chinese imports of carbon-intensive goods have been found to be particularly strong from small economies in South America and Caribbean countries, which prosper from the increased Chinese demand for natural resources, but lack the finances and necessary experience to react to tightening climate change policies in OECD countries.

Besides the maintenance of market shares in OECD countries affected by mitigation policies, Latin American industries and companies should manage and disclose their carbon footprint for further reasons: 1) the so-called *first mover advantage*; 2) in order to overcome misrepresentation and overestimation of their carbon footprint; and 3) in light of the possible increase of stock prices as a result of these measures. In particular, small- and medium-sized enterprises (SMEs) need assistance. Hence, governments are encouraged to prioritize the promotion of carbon disclosure programs among SMEs.

Trade policy can facilitate the compliance of Latin American countries with current climate change policies of OECD countries –especially certain carbon accounting and energy standards –in a variety of ways: 1) establishing carbon accounting and disclosing schemes or compliance to existing ones; 2) giving access to existing clean technologies by eliminating obstacles such as tariffs and subsidies to the diffusion of technology; 3) giving access to financing for clean technology development and abatement efforts. In order to specify the above-mentioned policy recommendations, this paper recommends that further research on a joint trade-climate change framework be conducted.

1. Introduction

A number of OECD countries¹ committed themselves to the post-2012 increased reduction targets of carbon emissions during the recent Climate Change Conference in Doha, although no internationally binding climate change agreement along the lines of the Kyoto Protocol was reached. As a result, a spirited debate has emerged between environmentalists and free trade advocates regarding carbon embodied trade flows, determinants of carbon leakage, and industry competitiveness.

Current data shows that around 25 percent of all carbon dioxide emissions related to human activity is traded through the import and export of products. Carbon embodied in international trade flows of carbon-intensive commodities such as steel, cement, pulp and paper, and chemicals make up 50 percent, while the other half is embodied in semi-finished and finished products such as industrial machinery, clothing, and motor vehicles. In particular, developed countries are net importers of carbon-embodied products, while developing countries are net exporters (Davis and Caldeira 2010).

Though OECD countries like the United Kingdom and Germany reached their carbon reduction targets set out in the Kyoto protocol before their respective deadlines, they did not reduce their carbon consumption. In fact, they were among the top net importers of embodied emissions in 2004: Japan, the United Kingdom, and France show net imports of around 75 percent kg CO₂/\$ traded, Germany around 71 percent, Italy 68 percent and the United States 61 percent (Davis and Caldeira 2010)². As carbon-embodied imports are expected to increase in OECD countries with the expansion and further success of post 2012 climate change mitigation policies, policymakers may fear that climate change policies in OECD countries could be undermined by increasing energy-intensive production in non-participating countries and by the resulting leakage of carbon-intensive products into OECD countries. OECD countries, especially EU nations and the United States, are responding to these apprehensions with the consideration of protective regulations in two forms: first, the imposition of embodied carbon tariffs on the carbon content of imports entering their countries, and, second, the distribution of free emission allowances to affected industries. As a result, free trade advocates, especially in the developing world, fear that these tariffs may

¹ Countries are mentioned in the table A. in Annex I of the *Outcome of the work of the Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol* (UNFCCC, 2012)

² Graph 1) in the Annex illustrates the mean CO₂ intensity of imports and exports to and from the largest net importing/exporting countries (and Middle East region) taken from Davis and Caldeira (2010).

undercut exports from developing countries and, thus, hamper important industries and growth opportunities.

Nevertheless, the environmentalist and free trade communities are both dealing with a *public good* at a global level, and their policies are both only effective if they are implemented multilaterally. In fact, economic policies that fail to take into consideration climate change issues may be conducive to a global climate crisis, yet in reality these two sets of policies could be mutually beneficial when jointly implemented.

This paper analyses Latin America's exposure to potential embodied carbon tariffs and the region's response and actions to avoid said tariffs, using this case story as an example for developing regions affected by climate change policies. The paper is organized as follows: Section I provides a theoretical background on the current debate on carbon leakage. Section II discusses the exposure of Latin America's energy-intensive export sectors to climate policies in the European Union and in the United States. Finally, Section III gives some policy recommendations.

2. Theoretical Background – Impact of Climate Change Policies on Trade

2.1 Race to the Bottom and the Leakage Effect

Unilaterally implemented climate change policies can have self-destructive spillover effects in the form of a leakage of energy-intensive goods. The unilateral implementation of such policies can lead to relative increases in production costs in carbon constrained countries, where producers buy emissions certificates and pay carbon taxes, compared to producers in unconstrained countries. The relative price increase for carbon in constrained countries is expected to lead to a race to the bottom: due to the price pressure, output is relocated to countries in which environmental standards are low and production is cheaper. The relocation process of energy-intensive output can have two forms. On the one hand, firms in energy-intensive industries relocate their plants and investments to countries with lower environmental standards. On the other hand, imports of energy-intensive goods from unconstrained countries can increase while the production of the same goods in regulated markets decreases. Both relocation processes result in *carbon leakage*: an increase in exports of carbon embodied products from unconstrained countries to constrained countries (Frankel, 2009/ Bosetti & De Cian, 2012/ Böhringer et al., 2010, Low et al. 2011).

The World Trade Organization (WTO) does not expect a reduction in global emissions, but rather a considerable shift of trade, investment, and production to less constrained locations used as so-called *pollution havens* as a result of climate change policies

(Low et al, 2011). These pollution havens are characterized as relatively poor, capital-intensive or less densely populated countries by Levinson and Taylor (2004). Frankel (2009) goes beyond the WTO's argument by expecting leakage to lead to even higher emissions from non-participating countries than it would be the case without leakage.

Moreover, successful emissions mitigation policies are expected to result in a *decrease* of fossil fuel prices. All other factors being equal, the successful decline in the consumption of carbon in OECD countries can trigger a reduction in the world price of high-carbon fossil fuels, coal, and oil. Hence, non-constrained countries would be in a position to respond to depressed oil and coal prices with an increase in consumption (Frankel, 2009/ Bosetti & De Cian, 2012/ Böhringer et al., 2010). Additionally, Frankel (2009) argues that demand for renewable energies in energy-constrained countries would increase, while reliance on carbon imports from non-constrained countries would drop. As a response, non-constrained countries would increasingly trade among each other –for instance, developing countries in Latin America with developing countries in Asia. Consequently, a dual world of dirty and clean energy users and traders may emerge.

Yet successful emission mitigation policies may have further consequences. Bosetti and De Cian, (2012) and Messerlin (2010) mention a third impact: the so-called *free-rider effect*. The decrease of global emissions may encourage non-constrained countries to emit even more greenhouse gases than usual as the resulting damage is perceived less fatal. Furthermore, Bosetti and De Cian (2012) argue that there is a fourth impact – the so-called *technical change effect*. Increasing production prices set incentives for innovations to decrease costs. Due to international trade, migration, and corporate integration, new technologies are expected to be transferred throughout the world, while global emissions fall.

2.2 Protective Regulations and Vested Interests – the Leakage Argument

The center of the current policy discussion is the carbon leakage effect. The International Panel for Climate Change (2007) reports leakage rates in a range of 5 to 20 percent. Due to the possible increase of imports of cheaper carbon-intensive products from non-constrained countries, industries in carbon-constrained countries fear a loss of their competitiveness and start demanding protective regulations to counteract the leakage effect. The affected sectors usually account for the most powerful lobbies in the trade and environmental negotiations. On the one hand, lobbyists from these industries demand carbon allowances to counteract carbon limitation, and, on the other hand, they make use of the leakage argument to gain

more protection in the form of border carbon adjustments for their industry (Frankel, 2011/ Messerlin, 2010).

As a response, the EU published a Commission Decision at the end of 2009 – a specification to Directive 2003/87/EC, identifying six industrial sectors as “exposed to a significant risk of carbon leakage”. The EU’s list of sectors exposed to carbon leakage includes manufacturing companies from the aluminum, cement, chemicals, glass, pulp and paper, and the iron and steel sectors. Furthermore, the EU (2010) defines energy-intensive industries that are not able “to pass on the cost of required allowances in product prices without significant loss of market share to installations outside the Community (EU), which do not take comparable action to reduce their emissions”, as eligible for free allowances of carbon emission certificates. With a significantly high risk of carbon leakage, industries “could receive a higher amount of free allocation,” or an “effective carbon equalization system” would be implemented. Such a system would include border adjustment measures such as embodied carbon tariffs. The implementation of such tariffs would only be justified for industries facing higher leakage as a consequence of the EU Emissions Trading System³.

Given transatlantic policy developments, some economists fear that current climate change policies will be topped by the imposition of carbon-embodied tariffs on imports from countries not complying with OECD countries’ carbon emissions policies. For instance, in light of the Euro crisis and a depressed EU budget, the French minister for Industrial Renewal, Arnaud Montebourg, revived the discussion on the implementation of carbon tariffs under the so-called *carbon inclusion mechanism*. While a carbon embodied tariff scheme was broadly rejected by France’s fellow European governments as introducing “eco-imperialism” and initiating a trade war back in 2008-09, carbon-intensive industries such as the steel industry, represented by Eurofer, are now welcoming a carbon tariff scheme and pushing for its implementation (EurActive, 2012). For its part, the United States under the Obama administration pledged to reduce carbon emissions (based on 2005 levels) by 17 percent by 2020. Washington legislators responded to growing concerns about loss in competitiveness in energy-intensive industries with the Carbon Limits and Energy for America’s Renewal (CLEAR) Act, introduced in 2009 by Senators Maria Cantwell (Democrat from Washington) and Susan Collins (Republican from Maine). The bill, which failed to go beyond the committee phase, outlined border adjustment measures planned to go

³ The EU Emissions Trading System (EU ETS) comprises all 27 EU member states, as well as Iceland, Lichtenstein, Norway and Croatia. 45 percent of all greenhouse gas emissions in the EU are managed by the system. The EU ETS is based on the so-called “cap and trade” system. Under this system total greenhouse gas emissions are limited to a certain amount, called a cap. Over time, this cap is reduced. Companies receive emission allowances that can be traded. If emissions are not covered by an allowance, fines are imposed on the companies (European Commission, 2013).

into effect starting in 2013. Similar to the French proposal, importers would be required to pay fees for the share of carbon embodied in the imported goods from countries not imposing carbon limits on similar to those in the United States (Larsen & Bradbury, 2010).

Assessment studies of embodied carbon tariffs run multi-regional input-output models (MRIOs) in order to show carbon emissions embedded in trade flows, production, and consumption. These studies identify the developed world as net carbon importers and developing world as net carbon exporters. Advocates of embodied carbon tariffs use the huge carbon-embodied trade flows found in these studies to argue that border measures dampen the leakage effect (International Panel of Climate Change, 2007). Moreover, the price pressure on energy-intensive industries in non-participating countries is considered to motivate these countries to commit to climate change policies, thereby leading to a drop in global emissions. Hence, theoretically, embodied carbon tariffs are economically acceptable as a second best response to current unilaterally implemented climate change policies (Wagner, 2011). Nonetheless, critics such as Böhringer et al. (2011) and Winchester et al. (2010) regard embodied carbon tariffs as a shift of abatement costs from OECD countries to developing countries. They find considerable welfare losses in developing countries and propose compensation for non-participating countries equal to their tariff-induced welfare losses. Furthermore, critics have legal and feasibility concerns, as embodied carbon tariffs do not comply with the General Agreement on Tariffs and Trade (GATT) provisions of the WTO.

The two basic articles and principles in the General Agreement on Tariffs and Trade (GATT) that are essential to the debate are article II on most favored nation (MFN) status and article III on national treatment (NT). Article II states that imported products have to be equally taxed and it says that the importing country may only apply tariffs and taxes at the border. Article III says that “like products” of foreign and domestic origin have to be equally taxed (Low et al., 2011/ Messerlin, 2010, Charnowitz, 2007). These two articles have to be respected when deciding on the type of border adjustment measure. For instance, tariffs, in contrast to taxes, are only imposed on a selected group of foreign countries. Therefore, they discriminate between imports of different origins and between domestic and foreign products. Hence, carbon tariffs conflict with GATT provisions article II and III and the WTO agenda (Messerlin, 2010). Moreover, the GATT allows for taxes on specific exported products, but it prohibits direct taxes on export-exposed industries or firms. Nevertheless, emission-related subsidies and taxes are set at an industry or firm level (Low et al., 2011).

Likewise, the implementation of carbon-embodied tariffs requires product differentiation based on the product's carbon footprint, since perfectly similar products are different if the carbon emissions during the production process differ. Yet, not only does the non-discrimination rule of the GATT provisions prohibit the differentiation of traded products on the basis of their production processes, but the exact distinction and assessment of production processes for each product and country makes the implementation of carbon embodied tariffs a complex process (Messerlin, 2010 and Low et al., 2011). The European Commission identified 164 sectors as being highly exposed to carbon leakage. Therefore, Messerlin (2010) suggests a reduction of the number of products subject to carbon taxation and a clustering of production processes to simplify the classification of products according to their carbon footprint.

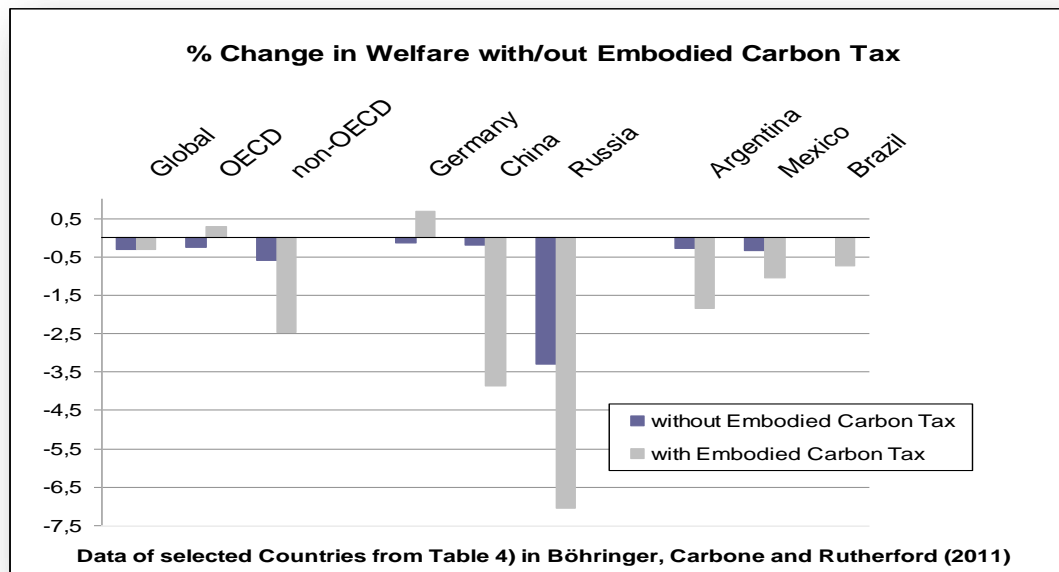
Finally, regarding the accumulated stock of emissions due to the past industrialization of developed countries, the justification of one global price for carbon emissions irrespective of the countries' historical carbon emissions will be perceived as discriminatory by developing countries. For instance, China lays this point out under "common but differentiated responsibilities" in its latest five-year plan. According to China, developed countries have the resources and technologies to mitigate carbon emissions. In contrast, developing countries have to focus on further economic development, the fight against poverty, and adaptation measures for climate change. Therefore, developed countries, it is argued, should take the lead in carbon emissions reductions, while they should financially support developing countries and facilitate transfer of low-carbon technologies (Chinese Government, 2012).

2.3 Conclusion

In sum, due to large discrepancies between world economies, the global climate change regime appears to be in conflict with trade liberalization trends in developing countries. Whether or not border taxation and related policies are justified on the grounds of a possible leakage effect, border carbon taxes are expected to impact the terms of international trade patterns and may shift abatement costs to non-constrained countries, as found by Böhringer et al. (2011) and Winchester et al. (2010). Both studies find that border carbon adjustments, when implemented jointly by OECD countries, reduce the leakage effect by around two-thirds, but cut carbon emissions only slightly and decrease global welfare significantly. Graph 1 below is derived from Böhringer et al. (2011) and shows the percentage change of welfare in the absence and in the presence of embodied carbon taxes on imported goods

provided that OECD countries jointly reduce their business-as-usual carbon emissions by 20 percent. Developed countries, as net importers of carbon-embodied products, experience a welfare surplus, while net exporters such as China and Russia experience welfare losses. Latin American countries such as Argentina, Mexico, and Brazil – all net exporters of embodied carbon products – show welfare losses of around 0.75 to 2 percent of their GDP.

Graph 1. % Change in Welfare with/out Embodied Carbon Tax



3. Impact of Climate Change on Regional Trade and Environmental Policies – Evidence from Latin America

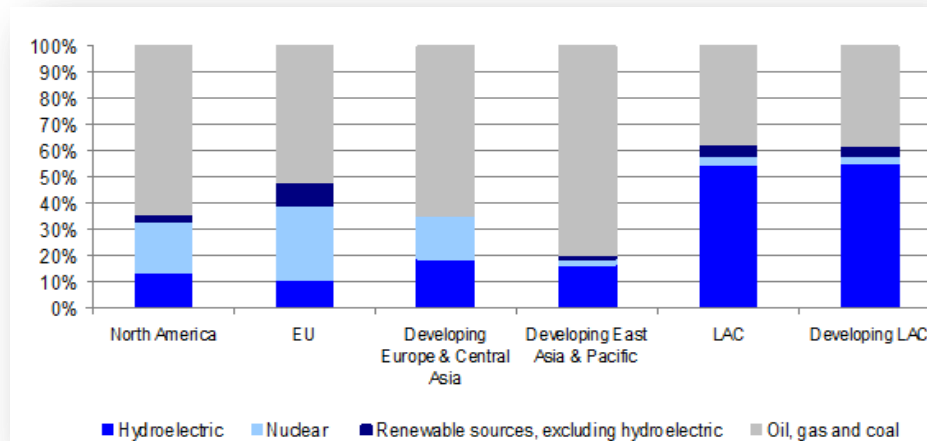
The findings of Böhringer et al. (2011) and Winchester et al. (2010) lead to the question of which developing country industries are likely to leak carbon, and how will and can affected industries and countries anticipate potential implementation of border carbon adjustments and associated welfare losses. This section will discuss Latin American public and private sector responses in affected energy-intensive sectors after analyzing Latin America’s export exposure to protective regulations, primarily in the EU and United States. The following sectors will be covered: metal ore, iron and steel, copper, as an example ferrous metals, aluminum, cement, glass and glassware and pulp and paper. Finally, policy recommendations for the Latin American region will be provided.

3.1 Introduction: Green Growth of Latin America – Challenges and Opportunities

While Latin America is on average one of the lowest carbon emitters worldwide with around 4 percent of global carbon emissions, the United Nations Industrial Development Organization (UNIDO, 2011) identifies it as the only region that experienced an increase in its industrial energy intensity from 1995-2008 due to technological change induced by the expansion of energy-intensive sectors, especially in Argentina, Brazil, Chile, and Colombia. Furthermore, Latin America is the second largest manufacturing region in terms of value added with USD 423 billion in 2010, after the East Asian and Pacific region with USD 1,540 billion, and at 5.7 percent it has the second highest growth rate of manufacturing value added in 2010. While the export growth in medium and high-technology products stagnated in recent years, exports of resource-based and low technology goods increased yearly by 2 percent (UNIDO, 2011).

As can be seen in graph 2, 30 percent of Latin America's primary energy is supplied by renewable energy sources, while around 68 percent of total electricity is extracted from hydropower (World Bank World Development Indicators, 2012). Consequently, Latin America has the lowest share of oil, gas and coal, as well as nuclear electricity production sources worldwide, without any difference between individual developing countries in Latin America and between countries and the region as a whole. Brazil is the world's leader in the production of biofuels due to its immense ethanol resources. Industrial energy intensity in Latin America is on average the lowest worldwide and around four times lower than that of European developing countries, which host the most energy intensive industries worldwide (UNIDO, 2011). Moreover, Latin America is of major environmental importance – it inhabits 22 percent of the global forest area, including the Amazon Basin, which is the largest tropical moist forest worldwide (Hufbauer and Kim, 2010).

Graph 2. Electricity Production Sources (in % of total)



Source: World Bank World Development Indicators, 2011

Most Latin American countries have signed the KYOTO Protocol to the United Nations Framework Convention on Climate Change (UNFCCC) and outlined national strategies to combat climate change. In accordance with the Copenhagen Accord from 2009 Chile⁴ and Mexico⁵, as the only two OECD countries in the region, voluntarily follow targets of 20 percent (based on 2007 levels) and 30 percent (based on business-as-usual scenario estimations) emission reduction, respectively, by 2020. Brazil⁶ announced an 80 percent reduction in deforestation rates and a voluntary 38 percent reduction of carbon emissions by 2020 (based on 2005 levels). Costa Rica⁷ committed itself to reaching complete carbon neutrality by 2021.

Despite the progress of the implementation of carbon mitigation policies in Latin America in recent years, further progress on climate actions is essential for the region's economic future. Regions with high exports shares in energy-intensive products, such as Latin America, fear their exports may decline as OECD countries implement tighter climate change policies. Hence, it is important to explore how dependent Latin American exports of carbon-intensive products are on developed country markets like the EU and the United States.

⁴ Chile's pledge in Copenhagen Accord (UNFCCC, 2010(a))

⁵ Mexico's pledge in Copenhagen Accord (UNFCCC, 2010(b))

⁶ Brazil's pledge in Copenhagen Accord (UNFCCC, 2010(c))

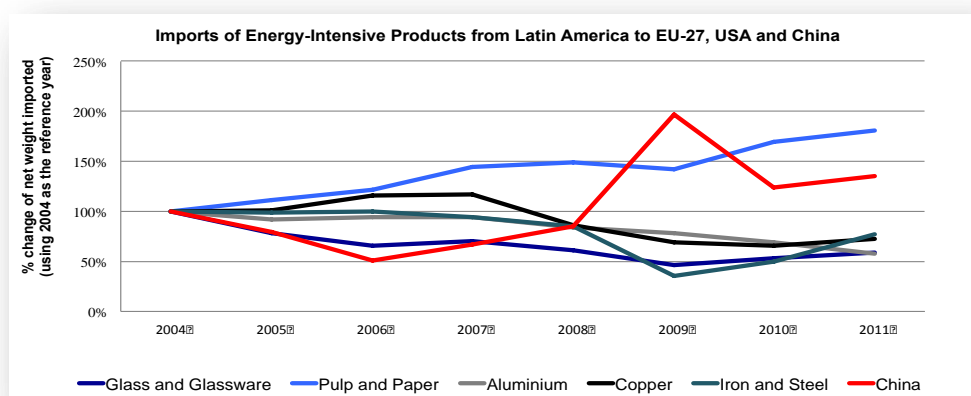
⁷ Costa Rica's pledge in Copenhagen Accord (UNFCCC, 2010(d))

3.2 Data Analysis - Latin America's Energy-Intensive Exports to EU-27, United States and China

For the following analysis of the importance of the EU and American markets as export destination for energy-intensive sectors, the paper uses EU, U.S. and Chinese import data for selected sectors from the UN Comtrade database. These energy-intensive sectors were selected based on the list of energy-intensive sectors outlined in the 2009 EU Commission Decision (EU, 2010): aluminum (HS 76), glass and glassware (HS 70), pulp and paper (HS 47), steel and iron (HS 72) and copper (HS 74). Imports were identified based on their two-digit HS 2002 product code in the UN Comtrade database. Only export flows of sectors with an equal or higher trade value than USD 1 million were included in the dataset. As only import flows of a trade value greater than USD 1 million were considered, estimated changes in the growth rates in the following graphs are more pronounced than in reality. The data presented is limited to the accuracy of the reporting nations. Given the above stated limitations, the presented data only gives an approximation of the growth rates of the respective energy-intensive export sectors in Latin America. Furthermore, as the graphed data is of pure descriptive nature, the presented tendencies can be used as an anchor for further statistical research.

Graph 3 shows the 2004-2011 growth rates in imports in the EU, United States, and China, distinguished by selected sectors. The year 2004 is used as the reference year. To control for price fluctuations of the imported commodities, their net weight⁸ was used for the analysis.

Graph 3. Imports of Energy-Intensive Products from Latin America to EU-27, USA and China



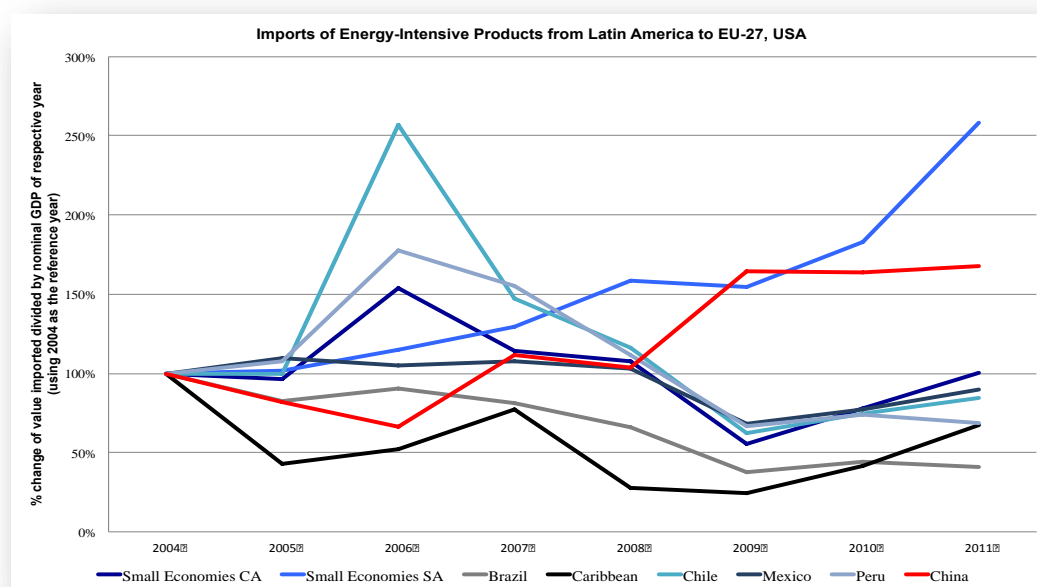
Source: UN Comtrade Database, 2012

⁸ The net weight of imports is given in the UN Comtrade data base for the four-digit HS 2002 code of each product group

Each line depicting a certain sector shows the average growth rate of the summed up imports of the EU and United States. The line depicting China shows the average growth rate of imports of the selected sectors. All EU and U.S. imports, except for those from the pulp and paper sector, decreased on average since 2004. In contrast, Chinese imports increased by around 35 percent in 2011 vis-à-vis 2004. Moreover, Chinese imports increased during the global financial crisis in 2009.

Graph 4 compares the 2004-2011 growth rates of EU, U.S. and Chinese imports, denoting country or region of origin. Again, the year 2004 was used as the reference year. The values of imports per country of origin were divided by the countries' nominal GDP⁹ (in USD) of the respective year.

Graph 4. Imports of Energy-Intensive Products from Latin America EU-27, USA



Source: UN Comtrade Database, 2012 and World Bank World Development Indicators, 2011

The graph shows the average growth of total EU and U.S. imports and the average growth of Chinese imports from the selected sectors in Latin America. All EU and U.S. imports, except for those from Small Economies in South America¹⁰ (SA) and Small Economies in Central America¹¹ (CA), decreased between 2004 and 2011. The reason for the sharp increase in

⁹ The GDP data was taken from the World Development Indicators from the World Bank

¹⁰ Small Economies in South America comprise of: Bolivia, Ecuador, Paraguay and Uruguay. Guyana and Suriname had to be excluded due to missing data

¹¹ Small Economies in Central America comprise of: Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama.

imports from Small Economies in SA was the tremendous expansion of Uruguay's pulp and paper sector from 2008 onwards.

Chinese imports of Latin American energy-intensive goods, except for those from Brazil and Small Economies in CA, increased. Growth rates for Chinese imports from Small Economies in SA and the Caribbean¹² were remarkably high. Again, the sharp increase of imports from Small Economies in SA can be explained by the expansion of Uruguay's pulp and paper sector. Increasing imports from the Dominican Republic's iron and steel sector caused the higher number of imports from the Caribbean.

The decreasing EU and U.S. imports, on the one hand, and the high growth rates of Chinese energy-intensive imports, on the other, highlight the need for coordinated region-wide actions to decrease, account for, and manage carbon emissions in order to avoid a two-world scenario as predicted by Frankel (2009). As stated above, Chinese imports have been particularly strong from Small Economies in SA and Caribbean countries, which lack the finances and necessary experience to react to tightening climate change policies. The following section offers policy recommendations on ways for cooperation between the trade and climate change frameworks.

4. Policy Recommendations – Cooperation between Trade and Climate Change Regimes

UNIDO (2011) asserts that investments in industrial energy efficiency are paying off in three ways: environmentally, economically and socially. Environmentally, enhanced industrial energy efficiency could help decrease the industries' current share of one fourth in global carbon emissions, water usage and resource depletion. Economically, energy-intensive industries can experience substantial cost-savings from enhanced energy efficiency, given the absence of heavy subsidies on fossil fuels. Socially, cost savings can free up resources for investments in the modernization of production processes, thereby improving competitiveness, productivity, and wages. Moreover, the expansion of the renewable energy sector can create employment opportunities. All three dimensions are equally important for the Latin American region, as it is expected to increase its industrial energy intensity in the coming years.

Nevertheless, developing countries, such as those in Latin America, are reluctant to implement climate change policies on several grounds. For instance, Bosetti and De Cian

¹² The Caribbean countries included in the data comprise of Antigua and Barbuda, the Bahamas, Dominica, Dominican Republic, Jamaica, St. Vincent and the Grenadines and Trinidad and Tobago. Cuba had to be excluded due to missing data

(2012) identify climate change damages, price changes of fossil fuels, and effective transfer of technology as the driving forces forming the climate change response of developing countries.

Yet, Bosetti and Victor (2011) argue that governments of developing countries can gain substantial credibility by pre-committing to international climate change regulations, thus anticipating border carbon adjustments and speeding up investments in low-carbon technologies. Those Latin American countries investing early in low-carbon technologies may enjoy a first mover advantage within the region, and in addition these countries may be eligible for international financial support for climate change adaptation and emissions mitigation (De La Torre et al., 2009).

Against this background, this paper posits that trade policy can facilitate the compliance of Latin American countries with OECD climate change policies, especially certain carbon accounting and energy standards. To this end, country officials could adopt the following measures:

1. Establishment of carbon accounting and disclosing schemes, or compliance with existing ones.
2. Greater access to clean technologies through the elimination of obstacles such as tariffs and subsidies to the diffusion of technology.
3. Elimination and decrease of subsidies for energy-intensive industries Access to financing for clean technology development and abatement efforts.

4.1 Carbon Disclosure

Energy-intensive industries could be differently affected by potential embodied carbon tariffs depending on their energy mix, as well as the energy mix used for the same production processes in the export destination country. The industrial use of energy depends on various factors: technology used, availability of financial resources, type of production processes, and state of machinery. As many recent industrializing countries are using state of the art technology in their production processes, they might be more energy-efficient than developed countries (Motaal, 2009). Hence, managing carbon emissions, reducing them, and communicate this process to consumers is regarded as an opportunity to increase sales, by maintaining and increasing market share on a domestic and international levels, as well as to save production costs.

A trend towards carbon disclosure is slowly gaining traction. For example, British Deputy Prime Minister Clegg put forth a requirement for around 1,600 large companies listed

at the London Stock Exchange to disclose their carbon emissions along with their financial statements since June 2012 (The Guardian, 2012). Likewise, in 2010, the U.S. Securities and Exchange Commission required publicly traded companies to include corporate, physical, and regulatory risks caused by climate change in their financial reports (U.S. Securities and Exchange Commission, 2010).

At the same time, investors are increasingly requiring businesses to disclose their carbon emissions, and to manage and reduce them. As a result, there is a significant growth in the number of socially responsible investment funds (SRI), also called *green funds*, and in the number of investors since their foundation. For instance, the Coalition for Environmentally Responsible Economies (Ceres) with its Investors Network on Climate Risk (INCR) started in 2003 in the United States with 10 investors with USD 600 million in assets. By 2012, the INCR had 100 investors with almost USD 11 trillion in assets (Ceres, 2013). The Institutional Investors Group on Climate Change (IIGCC) has 75 European investors with around USD 10 trillion (€7.5trillion) in assets (Institutional Investors Group on Climate Change, 2013). The UN Principles for Responsible Investment (PRI) is a network of investors adhering to certain environmental, social and corporate governance principles. The network counts of 1144 signatories managing more than USD 32 trillion in assets, and it increased by USD 28 trillion since its foundation in 2006 (Principles for Responsible Investment, 2013). Finally, the Carbon Disclosure Project (CDP) Investors Initiative boasts 722 institutional investors with USD 87 trillion in assets by 2013 (Carbon Disclosure Project, 2013).

As a result of the increasing incorporation of climate change risks into investment decisions, Griffin and Sun (2012) found that voluntary carbon disclosure could increase stock prices. Against the general perception that carbon disclosure may only be benefiting large companies, Griffin and Sun (2012) show that small firms in particular tend to see a stock increase of up 2.32 percent vis-à-vis 0.5 percent on average for large firms two days before and after the carbon disclosure took place.

Nonetheless, as carbon accountants are mainly based in developed countries, there are doubts about the accuracy placed on accounting for carbon footprints in developing countries. To overcome the threat of misrepresentation of carbon emissions production processes in developing countries, regions like Latin America are encouraged to implement their own carbon accounting schemes (Brenton et al. 2010). Particularly, developing countries with an international competitive advantage of energy efficiency in certain industries should set

energy standards and help their private sector to comply with these standards in order to avoid any kind of misrepresentation.

Complementing this disclosure trends, in recent years a number of initiatives and programs have emerged to account for and disclose the carbon footprint of supply chains worldwide. The Carbon Disclosure Project, Carbon Trust, and Greenhouse Gas Protocol, among others, are currently the best-established carbon accounting and disclosing programs and initiatives on a global level. In Latin America, particularly Brazilian and Mexican companies with great exposure to the EU markets take part in carbon accounting and disclosing programs. In addition, countries like Argentina, Colombia, and Costa Rica have implemented energy labeling and minimum energy performance standards. Some of the main products covered under the labeling schemes are air conditioners, refrigerators, freezers and combinations of them, lamps, motors and water heaters. Most of the programs are mandatory and managed by governmental agencies. Energy labeling is on its way in other countries such as Chile and Peru.

Despite developing countries' recent efforts to follow the carbon-labeling trend, they have to focus on further economic development and poverty reduction, while lacking financial resources and necessary technologies. Brenton et al. (2010) list three specific challenges that make developing countries susceptible to the introduction of carbon accounting:

- 1) Transportation costs: Most Latin American countries are geographically distant from their export destinations; hence, transportation costs for products transported by air are especially high for the region.
- 2) Lack of Information: Due to limited data on carbon emissions of supply chains in developing countries.
- 3) Lack of Innovation: Innovative technologies are mostly imported from developed countries; consequently, costs for new technologies are high.

Additionally, developing nations may fear that their firms, especially SMEs, may lack the necessary technical expertise and financial resources to comply with carbon accounting. SMEs already face obstacles related to compliance with technical trade standards in OECD countries, which effectively limits their penetration in developed country markets. These fears appear to be well grounded, as existing research and literature on environmental management and green innovation reveal that a majority of SMEs have traditionally adopted environment-related improvements only slowly. Yet, given that SMEs account for around 90

percent of global businesses and some 50 percent of global GDP, it is pivotal that SMEs receive special attention if governments are to meet their environmental goals (ACCA, 2013).

A further challenge for the effectiveness of carbon disclosure and communication is assessing consumer awareness. The consumer group “Which?” found in its survey “*Making sustainable food choices easier*,” conducted in 2010, that only every 5th consumer in the United Kingdom recognizes the carbon footprint label compared to 82, 54, and 33 percent that recognize fair trade labels, organic labels, and the label of the rainforest alliance, respectively. The reason for such limited awareness of carbon footprint labels might stem from their recent implementation, but also from consumers’ difficulty to interpret the carbon footprint on these labels (Which?, 2010). Furthermore, Euromonitor International (2011) found in its 2011 survey on green buying patterns that more than one third of consumers said they would be willing to pay a price premium for carbon-neutral products.

All in all, Latin American industries and companies should manage and disclose their carbon footprint for a variety of reasons. Besides the possibility of maintaining market shares in OECD countries affected by mitigation policies, Latin American may, first, enjoy a first mover advantage; second, overcome the misrepresentation and overestimation of their carbon footprint; and, third, experience a possible increase of stock prices. Yet, it is important to bear in mind that SMEs may need special assistance, so governments are encouraged to place special emphasis on them when promoting carbon disclosure programs among them with special emphasis. Nevertheless, there is a timing risk. As much as early action can be rewarded, late action can be punished in the form of a loss of market share and increasing production costs.

4.2 Removal of obstacles to the diffusion of clean technologies and low-carbon products

Yet in order to enjoy the returns of investments in energy efficiency, the costs for technologies have to be substantially driven down. Costs cannot only be driven down by further innovations in the respective technologies, but also through the removal of trade barriers for existing technologies, as well as the elimination of subsidies supporting energy-intensive industries. The removal of tariffs and nontariff barriers is not only essential for the success of climate change mitigation, but also for the liberalization of international trade. The liberalization of trade in goods and technologies is expected to reduce the costs of emissions mitigation policies. In particular, net importers of these technologies, mostly developing countries, benefit from duty-free access, as these countries are especially price-sensitive. For

instance, the World Bank (2008) finds that the removal of tariffs for wind, solar, clean coal and efficient lighting in 18 developing countries with a high share of carbon emissions will result in 13 percent of trade gains and have a substantial effect on emission reductions. A step forward marked the elimination of tariffs on Brazilian ethanol by the United States at the end of 2011.

BOX 1: Brazilian Ethanol

In December 2011, the United States, the world's number one producer of ethanol, eliminated its import barriers, in the form of tariffs and tax credits, for Brazilian ethanol, the world's number two producer. Brazil has a comparative advantage in producing ethanol, since ethanol from tropical sugarcane requires less arable land, and since less fossil fuel is required for its production vis-à-vis the corn ethanol produced in the United States. Consequently, Brazilian ethanol has a lower price and can compete with hydrocarbons, and at the same time it is environmentally friendlier than fossil fuels. The newly gained market access to the United States opens up a new set of investment opportunities, as U.S. and domestic Brazilian demand are expected to increase in the next years. Under the U.S. Energy Independence Act from 2007, biofuel is required to increase from the 18 billion liters in 2007 to 140 billion liters by 2022, from which 79 billion liters have to be derived from sources other than conventional biofuel from cornstarch.

As a response to the growing demand abroad and domestically, the Brazilian government set a production goal of 60 billion liters of ethanol by 2021. To reach this target, every year 15 new ethanol distilleries, new plantations, and sugar-mills will have to be built. Furthermore, price subsidies and tax reductions for fossil fuels should be lowered to lower the current price cap on ethanol. Additionally, the recently lowered mandatory amount of ethanol in standard motoring fuel should be increased again.

Other obstacles to the free trade of renewable energy technologies are heavy government subsidies to energy-intensive industries. The redirection of governmental spending away from fossil fuel generation and toward renewable energy generation is essential for the mitigation of carbon emissions. Hence, reforming the structure of energy subsidies is of great importance in order to develop of clean technologies further and to drive down carbon consumption in production.

4.3 Cooperation between governments and international organizations

Existing trade facilitation mechanisms and new financing sources related to climate change mitigation should work together in order to support developing countries to comply with climate change policies. One way of cooperation would be to provide energy certificates or subsidies for clean energy projects of export-exposed companies with limited financial resources in developing countries. Moreover, trade policy should further promote the

tradability of carbon allowances, as well as existing mechanisms for clean technology such as the Clean Development Mechanism (CDM) introduced by the Kyoto Protocol. Furthermore, international organizations could lead and ensure a multilateral framework of carbon-related border measures through talks with both UNFCCC and the WTO in order to set out guidelines for border measures on carbon-intensive imports.

5. Conclusion

Currently, in energy-intensive industries in the EU and the United States there is growing apprehension that climate change policies disadvantage them, and that their international competitiveness decreases due to carbon leakage from non-complying countries. Thus, it is expected that in the post 2012 climate change regime climate change policies in OECD countries will be supplemented by protective market regulations. Research suggests that embodied carbon tariffs are not a feasible solution to carbon leakage, as they do not comply with the GATT provisions, are costly to implement, and are found to simply transfer abatement costs from OECD countries to developing countries. Yet, comparable measures such as the internationalization of the EU ETS (European Commission, 2013) of carbon certificates or an “effective carbon equalization system” (EU, 2010) are under discussion.

As the data showed, there is a general trend of trade expansion between Latin America and China compared to stagnating trade growth between Latin America and the EU and the United States in recent years. Against the background of tightening climate change policies in OECD nations, if Latin American countries – in particular, small economies that lack the funds and know-how to implement these policies – are to maintain market shares in the EU and the United States, they will have to receive assistance.

Trade policy can facilitate the compliance of Latin American countries with current OECD countries’ climate change policies, especially certain carbon accounting and energy standards, in a variety of ways: 1) by establishing carbon accounting and disclosing schemes or compliance with existing ones; 2) by giving access to existing clean technologies through the elimination of obstacles such as tariffs and subsidies to the diffusion of technology; and 3) by giving access to financing for clean technology development and abatement efforts. To specify the above-mentioned policy recommendations, further research on a joint trade-climate change framework has to be conducted.

References

- The Association of Chartered Certified Accountants (ACCA), 2012. Embedding Sustainability in SMEs. <http://www.accaglobal.com/en/research-insights/small-business/sme-sustainability.html>.
- Bosetti, V. and De Cian, E. 2012. *A Good Opening: The Key to Make the Most of Unilateral Climate Action. Discussion Paper 2012-49, Cambridge, Mass.: Harvard Project on Climate Agreements.*
- Bosetti, V. and Victor, D. 2011. Politics and Economics of Second-Best Regulation of Greenhouse Gases: The Importance of Regulatory Credibility. *The Energy Journal*. International Association for Energy Economics.
- Böhringer, C., Lange, A., Rutherford, T. 2010. Optimal Emission Pricing in the Presence of International Spillovers: Decomposing Leakage and Terms-of-Trade Motives, NBER Working Paper 15899
- Böhringer, C., Carbone, J., Rutherford, T. 2011. Embodied Carbon Tariffs. NBER Working Paper No. 17376
- Brenton, P. Edwards-Jones, G., Jensen, M. 2010. Carbon Footprints and Food Systems. Do Current Accounting Methodologies Disadvantage Developing Countries? A World Bank Study
- Carbon Disclosure Project. 2013. CDP Investors Initiatives. <https://www.cdproject.net/en-US/WhatWeDo/Pages/investors.aspx>
- Carbon Trust. 2010. International Carbon Flows. <http://www.carbontrust.com/our-clients/i/international-carbon-flows>
- Ceres. 2013. About INCR. <http://www.ceres.org/incr/about>
- Charnowitz, S. 2007. Trade and the Environment in the WTO. *Journal of International Economic Law*. Vol. 10. GWU Legal Studies Research Paper No. 338.
- Chinese Government. 2012. China's Policies and Actions for Addressing Climate Change. http://www.gov.cn/english/official/2011-11/22/content_2000272.htm
- Davis, S. and Caldeira, K. 2010. Consumption-Based Accounting of CO₂ Emissions. *Proceedings of the National Academy of Science of the United States of America*. Issue March 23, 2010 vol. 107 no. 12
- De La Torre, A., Faijnzyber, P., Nash, J. 2009. Low-Carbon Development: Latin American Responses to Climate Change. World Bank

- EurActive. 2012. French to revive Sarkozy's EU carbon tariff idea. <http://www.euractiv.com/climate-environment/french-unearth-sarkozys-eu-carbo-news-512790>
- Euromonitor International. 2011. Green Buying Behaviour: Global Online Survey. <http://blog.euromonitor.com/2012/03/green-buying-behaviour-global-online-survey.html>
- European Union (EU). 2010. Commission Decision of 24 December 2009 Determining, Pursuant to the Directive 2003/87/EC of the European Parliament and of the Council. A List of Sectors and Subsectors which are Deemed to be Exposed to a Significant Risk of Carbon Leakage.
- European Commission. 2013. The EU Emissions Trading Scheme. http://ec.europa.eu/clima/policies/ets/index_en.htm
- Frankel, J. A. 2009. Global Environment and Trade Policy. Proofs, in Post-Kyoto International Climate Policy. Cambridge University Press, 2009, pp. 493-529
- Frankel, J. A. 2011. Trade, Growth and the Environment. Guest Lecture: Rob Stavins Class in Environmental & Resource Economics and Policy
- Griffin, P., Sun, Y. 2012. Going Green: Market Reaction to CSR Newswire Releases.
- Hufbauer, G. C., Kim, J. 2010, Controlling Climate Change: Challenges for Latin America and the Caribbean. Institute for the Integration of Latin America and the Caribbean. Inter-American Development Bank.
- Institutional Investors Group on Climate Change. 2013. The Institutional Investors Group on Climate Change (IIGCC) is a forum for collaboration on climate change for European investors. <http://www.iigcc.org/>
- International Panel of Climate Change. 2007. Climate Change 2007. Working Group III: Mitigation of Climate Change.
- Larsen, J., Bradbury, J. 2010. World Resources Institute Summary of the Carbon Limits and Energy America's Renewal Act. World Resource Institute. <http://www.wri.org/stories/2010/02/wri-summary-carbon-limits-and-energy-americas-renewal-act>
- Levinson, A. Taylor, M. 2004. Unmasking the Pollution Haven Hypothesis. Working Paper. Georgetown University. Department of Economics
- Low, P., Marceau, G., Reinaud, J. 2011. The Interface Between the Trade and Climate Change Regimes: Scoping the Issues. World Trade Organization Staff Working Paper ERSD-2011-1

- Messerlin, P. 2010. Climate Change and Trade Policy: From mutual destruction to mutual support. Policy Research Working Paper 5378. The World Bank.
- Motaal, D. 2009. OECD Global Forum on Trade and Climate Change. Keynote Speech.
- Principles for Responsible Investment. 2013. PRI Fact Sheet. <http://www.unpri.org/news/pri-fact-sheet/>
- The Guardian. 2012. New emissions policy will force biggest UK firms to reveal CO2 figures. 19/6/2012. <http://www.guardian.co.uk/environment/2012/jun/19/emissions-policy-firms-reveal-co2>
- UNFCCC. 2012. Outcome of the work of the Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol. Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol. Eighth session. Doha, 26 November to 7 December 2012.
- UNFCCC. 2010(a). Chile's Pledge in Copenhagen Accord http://unfccc.int/files/meetings/cop_15/copenhagen_accord/application/pdf/chilecphaccord_app2.pdf
- UNFCCC. 2010(b). Mexico's Pledge in Copenhagen Accord. http://unfccc.int/files/meetings/cop_15/copenhagen_accord/application/pdf/mexicophaccord_app2.pdf
- UNFCCC. 2010(c). Brazil's Pledge in Copenhagen Accord. http://unfccc.int/files/meetings/cop_15/copenhagen_accord/application/pdf/brazilcphaccord_app2.pdf
- UNFCCC. 2010(d). Costa Rica's Pledge in Copenhagen Accord http://unfccc.int/files/meetings/cop_15/copenhagen_accord/application/pdf/costaricaphaccord_app2_2.pdf
- UNIDO. 2011. Industrial Development Report 2011. United Nations Industrial Development Organization
- U.S. Securities and Exchange Commission. 2010. Commission Guidance Regarding Disclosure Related to Climate Change. <http://www.sec.gov/rules/interp/2010/33-9106.pdf>
- Wagner, G. 2011. But Will the Planet Notice? How Smart Economics Can Save the World. Farrer, Straus and Giroux.
- Winchester, N. 2010. The Impact of Border Carbon Adjustments under Alternative Producer Responses. American Journal of Agricultural Economics. Agricultural and Applied Economics Association

Which? 2010. Making sustainable food choices easier. A consumer focused approach to food labels. Published September 2010.

World Bank. 2008. “International Trade and Climate Change: Economic, Legal and Institutional Perspectives”, Washington, D.C.

BOX: Brazilian Ethanol

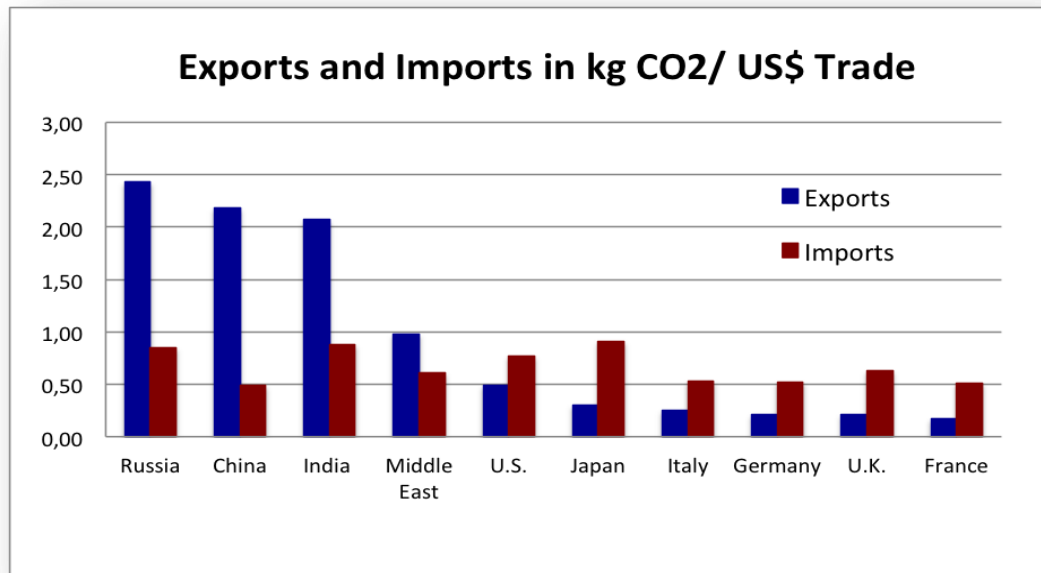
U.S. Congress. 2007. Bill Text 110th Congress (2007-2008) H.R.6.EAS. Renewable Fuels, Consumer Protection, and Energy Efficiency Act of 2007 (Engrossed Amendment Senate - EAS). SEC. 111. Renewable Fuel Standard. <http://thomas.loc.gov/cgi-bin/query/F?c110:1:./temp/~c110HY1VeE:e18123>

The Economist. 2012. Brazilian brew: America opens up to Brazilian Ethanol. 7th January 2012. <http://www.economist.com/node/21542431>

Colitt, R., Nielsen, S. 2012. Brazil Ethanol Drive Falts on Domestic Supply Shortage. 13th March 2012. Bloomberg. <http://www.bloomberg.com/news/2012-03-13/brazil-ethanol-slows.html>

Annex 1

Graph 1. Exports and Imports in kg CO₂/US\$ Trade



Graph 1) illustrates the mean CO₂ intensity of imports and exports to and from the largest net importing/exporting countries (and Middle East region) taken from Davis and Caldeira (2010). Trade is valued at its export prices.