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CONTENTS

Trade and climate change: on the road to Copenhagen 13

Julia Hoppstock*, Cecilia Pérez Llana, Eduardo Tempone* and Carlos Galperín[1,2]

Abstract

This paper analyses the relation between trade and climate change from the point of view of a developing country considering the next meeting of the Parties to the United Nations Framework Convention on Climate Change in Copenhagen in December 2009. It includes a review of trade measures related to mitigation and adaptation to climate change; analyses their effects and the arguments used to justify their application; presents the possible links between these measures and WTO rules; discusses the way developing countries could face the effects of these measures; and it finally sums up the present debate at the multilateral level.

Some of these measures are included in the European Union legal framework and in a bill that has so far been approved by the United States House of Representatives. These measures are also being discussed in multilateral negotiations. In this sense, the new scheme to deal with climate change that is expected to be approved in Copenhagen for the full, effective, and sustained implementation of the Convention after 2012 could include compromises that drive to measures with impacts on international trade. Furthermore, in the private sector, requirements and standards are being developed, which although voluntary in nature, will have an impact on trade flows. For this reason, it is important that all these measures be in conformity with Convention and WTO principles and rules so that they do not become disguised trade restrictions.

Besides, with the aim of minimising the negative impacts of climate change mitigation measures on developing countries and achieving the least costly adaptation of their economies, an effective technology and financial resource transfer from developed countries to developing countries should be assured.

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[2] The opinions expressed herein are the sole responsibility of the authors and do not compromise the views of the institution they work for.

1. Introduction

The analysis of the interrelation between trade and the environment has gained importance since the United Nations Conference on Environment and Development held in Rio in 1992. The debate has followed three lines: the environmental impact of increased trade volume; the environmental impact of trade policies and the effects of environmental policies on trade, through either unilateral or multilateral measures.

In this context, the relationship between trade and climate change has mainly focused on the debate about the economic effects of environmental policies on production costs and industrial localization, and of the links between the corresponding multilateral environmental agreement—the United Nations Framework Convention on Climate Change (UNFCCC)—and multilateral trade rules—initially, those of the General Agreement on Tariffs and Trade (GATT 1947), and subsequently, those of its successor, the World Trade Organization (WTO).

The issue of climate change has gained importance of late. New commitments and actions regarding reduction of emissions have been assumed at the UNFCCC, an increasing number of countries have expressed their willingness to adopt environmental measures in order to offset the adverse effects of climate change—and, in fact, many have actually taken steps—and certain countries, such as the United States, are under increased pressure to take environmental measures at the domestic level. This context has given a new dimension to the links between trade policy and climate change.

Thus, the adoption of the Bali Action Plan at the 13th Conference of the Parties to the UNFCCC (COP 13, December 2007) marked the beginning of a negotiation process aimed at establishing an international cooperation system to tackle the challenges posed by climate change at world level after 2012. This process is expected to conclude at the COP 15, to take place in Copenhagen in December 2009.

Negotiations should generate global consensus on: a) a shared view of long-run cooperation actions; b) commitments on climate change mitigation; c) adaptation to mitigation measures; d) technology development and transfer; and e) financial resources.

The international community is well aware that the domestic measures to be taken in order to fulfil future commitments will have economic and trade costs. This is why the scope and the way these costs will be internationally distributed among different categories of countries and sectors lies at the core of negotiations.

Industrialized countries claim that, if there were new reduction commitments, they would be obliged to implement measures to protect the "competitiveness" of their domestic industries against imports from countries not committing to the same reductions. In this regard, recent initiatives proposed by developed countries include from the possible imposition of tariffs, proportional to the contribution of each product's whole supply chain to the greenhouse effect, to new space for "green" subsidies, or the eventual use of trade defence instruments.

These measures, which have broad implications in the field of foreign trade, could affect developing countries' exports, particularly in those sectors most vulnerable to social as well as economic and trade effects of climate change-related measures.

On the other hand, so far there is no clear definition as to the incentives necessary to encourage the participation of developing countries, or the characteristics that an eventual mechanism for the transfer of technology and financial resources aimed at supporting mitigation and adaptation actions in developing countries should have.

The economic and trade character of measures, and of the domestic or international instruments devised to tackle these issues demonstrate the existence of links between climate change and trade. There might be even tendencies promoting a reformulation of certain aspects of WTO rules so as to enhance "mutual supportiveness" between the multilateral trading system and climate change. This possibility was clearly raised by WTO Director General Pascal Lamy at the meeting of Trade Ministers held during the COP 13 (Bali, 8–9 December, 2007):

"…It is not in the WTO that a deal on climate change can be struck, but rather in an environmental forum, such as the United Nations Framework Convention on Climate Change. Such an agreement must then send the WTO an appropriate signal on how its rules may best be put to the service of sustainable development; in other words, a signal on how this particular toolbox of rules should be employed in the fight against climate change" (OMC, 2007 b)

Developing countries must thus carefully assess those trade issues involved in negotiations on climate change. Otherwise, they could be forced to adapt their production patterns to global rules that do not prioritize their interests, and be faced with energy and environmental standards that hamper their competitiveness and, consequently, their development possibilities.

The aim of this paper is to consider the relation between trade and climate change from the point of view of a developing country, identifying trade measures related to mitigation and adaptation to climate change, the possible links between those measures and WTO rules, and the way developing countries could face the effects of those measures. The paper is thus divided into the following sections: the second section summarizes the context of negotiations with a view to a climate change scheme, describing the main elements of the United Nations Framework Convention on Climate Change, the Kyoto Protocol and the Bali Action Plan; the third section analyses the role of environmental and trade policies for climate change mitigation and their links with WTO rules; the fourth section presents the mitigation measures that are currently under discussion in the United States, the European Union and some developing countries; the fifth section introduces the question of adaptation to mitigation measures, focusing on technology and financial resource transfer; the sixth section sums up the current debate on trade and climate change within the UNFCCC; and, finally, the seventh section outlines some final comments.

2. The Framework Convention on Climate Change, the Kyoto Protocol and the Bali Action Plan

The United Nations Framework Convention on Climate Change (UNFCCC) was opened for signature at the United Nations Conference on Environment and Development (the Earth Summit) held in Rio de Janeiro on June 1992, and it constitutes the first global effort made to face the challenge of climate change.[3]

The ultimate objective of the Convention is to achieve "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system." Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change,

[3] At present, the European Community and 192 States are parties to the Convention, which is one of the international environmental agreements of widest scope at the global level. See Secretaría de la Convención Marco sobre el Cambio Climático (2004).

to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.[4]

To this aim, the Convention included some guiding principles to be considered by the Parties in their actions, among which that of "common but differentiated responsibilities and respective capabilities" stands out. It thus acknowledged that, although the challenge of climate change entails a duty common to all countries to cooperate in a spirit of global partnership to conserve, protect and restore the integrity of the Earth's ecosystem, there are differences between developed and developing countries, since they have different levels of historical responsibility for global environmental degradation.[5] Thus, different obligations were established according to their respective responsibilities on the basis of their share of historical emissions of greenhouse gases and their development level.

On the other hand, the Convention urges all Parties to cooperate to promote a supportive and open international economic system that would lead to sustainable economic growth and development in all Parties. Furthermore, it suggests that the measures taken to combat climate change, including unilateral ones, should not constitute a means of arbitrary or unjustifiable discrimination or a disguised restriction on international trade.[6]

In this way, the climate change regime reflected one of the cardinal principles of the multilateral trading system, pursuant to the World Trade Organization Agreements.

Although the UNFCCC outlined a general framework for the reduction of greenhouse gas emissions (GHG)[7] for industrialized countries (Parties included in Annex I),[8] it was not until the signing of the Kyoto Protocol (KP, 1997) that legally binding commitments were established for Annex I countries for the period 2008–2012.

The Protocol obliges 36 developed countries to reduce their GHG emissions by an average 5.2 per cent below 1990 levels during this "first commitment period."[9]

With the aim of assisting Annex I Parties in achieving compliance with their emission reduction commitments, while granting certain flexibility to do so, the Kyoto Protocol provided for three market-based "mechanisms":[10, 11]

> (i) emissions trading: it refers to the possibility that Annex I Parties have of transferring their amounts of emissions—assigned according to their Kyoto Protocol reduction commitments—and the possibility for countries that have not

[4] Article 2 of the United Nations Framework Convention on Climate Change.

[5] Article 3(1) of the UNFCCC and Principle 7 of the Rio Declaration.

[6] Article 3.5 of the UNFCCC.

[7] The greenhouse gases regulated by this agreement are: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6).

[8] The countries included in Annex I to the UNFCCC are as follows: Australia, Austria, Belarus, Belgium, Bulgaria, Canada, Croatia, Czech Republic, Denmark, European Economic Community, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Latvia, Liechtenstein, Lithuania, Luxembourg, Monaco, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom of Great Britain and Northern Ireland and United States of America.

[9] It is worth noting that chlorofluorocarbon (CFC) substitutes, such as HFC, PFC and SF_6, should also be reduced by 5.2 per cent, but taking 1995 rather than 1990 as the base year. See Allin (2000, Vol. II: 430-432).

[10] See Kyoto Protocol, Articles 17 (emissions trading), 12 (clean development mechanisms) and 6 (joint implementation).

[11] Box 1 in Section 3 of this paper includes a brief analysis of its raison d'être and way of operation. For a more thorough evaluation of these instruments, see Estrada Oyuela (2008).

exceeded their quantified emission limitation of trading their emission credits with other Annex I countries that have not complied with their reduction commitments.

(ii) clean development mechanism (CDM): it allows countries included in Annex I to buy certified emission reductions generated by emission limitation projects in non-Annex I developing countries, so that the former can comply with their emission reduction commitments assumed in the Kyoto Protocol;

(iii) joint implementation projects: these are ways of cooperation among Annex I Parties, which have committed to quantified emission limitations; this mechanism enables an Annex I country to accrue certified emission reduction units provided it has invested in emission reduction projects in another Annex I country.

Subsequently, in 2005, the Parties established the "Ad-Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol" (AWG-KP) in order to agree on greenhouse gas emission reduction obligations that industrialized countries shall be subject to upon conclusion of the first commitment period (2008–2012).

At the same time, and bearing in mind the conclusions of the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), which affirms that warming of the climate system is "unequivocal" and that worldwide GHG emissions will continue to grow unless climate change mitigation measures are taken,[12] the Bali Action Plan was agreed upon (December 2007) with a view to supporting full, effective and sustained implementation of the Convention.[13] It was with this objective that negotiations were initiated in the "Ad-Hoc Working Group on Long-term Cooperative Action" (AWG-LCA) within the framework of the Convention.

The Bali Action Plan focuses on measurable, reportable and verifiable mitigation commitments assumed by developed countries and considers, for the very first time, the participation of developing countries by means of nationally appropriate mitigation actions, which should be supported by developed country Parties through the transfer of technology, financing and capacity-building to respond to climate change.

The Plan identifies five fundamental pillars for a future response to climate change:

a) a shared vision for long-term cooperative action, including a long-term global goal for emission reductions;

b) mitigation, including, among other things, consideration of: measurable, reportable and verifiable nationally appropriate mitigation actions and/or commitments by developed country Parties; nationally appropriate mitigation actions by developing country Parties; positive incentives and policy approaches on issues relating to reducing emissions from deforestation and forest degradation; cooperative sectoral approaches; market-based approaches; and economic and social consequences of response measures;

c) adaptation, including consideration of international cooperation; risk management; and economic diversification;

d) technology development and transfer to support action on mitigation and adaptation, including consideration of effective mechanisms for scaling up of the development and transfer of technology to developing country Parties; ways to accelerate deployment, diffusion and transfer of technologies; cooperation on research and development of current, new and innovative technology; and the effectiveness of mechanisms and tools for technology cooperation in specific sectors; and

[12] Pachauri and Reisinger (2007).

[13] The full text of the Bali Action Plan is available at: http://unfccc.int/resource/docs/2007/cop13/eng/06a01.pdf

e) enhanced action on the provision of financial resources and investment to support action on mitigation and adaptation and technology cooperation on the basis of sustainable development policies.

In short, the current negotiation process on the climate change regime has been undertaken by two different groups: (1) the "Ad-Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol" (henceforth, the AWG-KP) within the framework of said Protocol; and (2) the "Ad Hoc Working Group on Long-term Cooperative Action" (henceforth, the AWG-LCA) within the framework of the Convention, in accordance with the Bali Action Plan.

Although no explicit reference was made to international trade in the mandates of the abovementioned Negotiating Groups, it is clear that the balance reached in the Convention and the Kyoto Protocol between trade and climate change should be maintained. This is why both groups' work programmes reflect this symbiosis and, therefore, the trade consequences of the possible response measures are not totally alien to the debates and the negotiation.

In fact, the AWG-KP, in its session in August 2008 (Accra, Ghana), considered the "potential environmental, economic and social consequences—including spillover effects—of tools, policies and measures available to Annex I Parties." On that occasion, it was evident that reaching some common ground between industrialized and developing countries on the potential consequences of response measures and the proper means to overcome them would be a challenge.

This was also considered in the Seventh Session of the AWG-KP (Bonn, March–April 2009), where the G-77 countries and China expressed their concern over the eventual trade impact of the mitigation measures available to developed countries. In particular, they stressed that some of the measures could have trade distorting effects and could be difficult for developing countries to comply with, due to their lower technological development and limited capabilities.

In turn, in the Fifth Session of the AWG-KP (March–April, 2009), it was once again clear that there is no common ground on the potential impact of response measures on trade. While developing countries—represented by the G-77 and China—warned about the potential negative consequences, especially on developing countries' trade, developed countries stressed the positive aspects, namely the creation of "green" jobs and technological innovation.

Common ground on the economic and social effects of response measures thus appears as one of the major challenges facing the UNFCCC Parties, which they will have to tackle in order to reach a definite agreement on the future climate change regime at the Copenhagen Conference.[14]

3. Climate change policy instruments: Environmental or trade policy?

Environmental policy instruments are devised to change agents' actions that are somehow or other harmful to the environment. This is why they seek to influence the decision-making process. The most traditional way to do so is by issuing, and subsequently enforcing, orders to those who pollute. This is a distinctive feature of regulatory instruments: they set caps on emissions, indicate which goods should not be produced, which technologies should or should not be employed, and they consider

[14] For an explanation of the current debate on the economic and social effects of response measures, refer to Section 6.

territorial planning, that is, which activities can and which cannot be carried out in certain areas.

Another way of affecting decision-making is by means of incentives, that is, the agent can no longer use certain environmental resource for free, but they can still choose what to do according to the signals the government sends. This is the main feature of economic instruments of environmental policy, such as taxes on emissions, subsidies for environmental protection, and tradable emission allowances. These instruments are more flexible than regulatory instruments; therefore, they make it possible to reach similar emission reduction objectives at a lower cost.

In the case of taxes, they can be directly applied on the pollutant emission; should this emission be hard to measure, then taxation could be indirectly imposed via taxes on inputs that emit pollutants when they are used.

As to tradable emission allowances, those who emit can buy them or sell them if they are exceeding their emission allowances or if they have emission allowances in excess. Regarding the traditional regulation which sets a cap on emissions per company, tradable allowances give companies greater flexibility to decide the amount of their reductions and the number of allowances they will use. This system leads companies with lower pollution reduction costs to reduce emissions more than companies that are less efficient in terms of pollution reduction. This is why it enables reaching the same emission reduction goal that a regulation would seek, but at a lower cost. This type of instrument was implemented a few years ago in the European Union and it is now under discussion in the United States.

A third set of instruments, though less widespread, are the so-called suasive instruments. The aim of these instruments is to persuade the agent responsible for emissions of the convenience of modifying their behaviour in response to market signals or indirect actions of the government. These include measures such as voluntary and mandatory labelling, environmental education and awareness-raising, and reporting lists of companies responsible for emissions.

GHG emission reduction employs all of these instruments. The most common practice is to supplement regulatory instruments with economic and suasive instruments. For example, setting a cap on GHG emissions while also imposing a tax on their emission or issuing tradable emission allowances. In the case of taxes, they can be directly applied on GHG emissions in the production process or indirectly applied by means of a tax on fossil fuels, since these are the inputs that, when used in the production or transport of goods or services, emit carbon dioxide into the atmosphere. The most widespread suasive measures are the labelling of products so that consumers are aware either of the producer's voluntary actions to reduce GHG emissions or of the GHG emission levels corresponding to the production and transport of that good.

Regardless of an assessment of advantages in terms of efficiency and efficacy of the instrument chosen, inadequate implementation might require changes to the corresponding measures. For example, emission allowance programmes take into account distributive and political feasibility issues by granting some of the allowances for free or at a lower cost to those who produce goods destined to low-income households, or companies which make intensive use of inputs that generate GHGs—since, *a priori*, they face a higher cost in terms of allowances—or more politically influential companies. These preferential distribution conditions usually decrease in a gradual manner. Although this reduces the instrument's efficiency, it enhances the feasibility of actually implementing it (Shogren and Toman, 2000).

When it comes to climate change, we also have to consider that the externality entailed in GHG emissions has global reach, that is, it is detrimental to the inhabitants of the country responsible for the emissions as well as to all others in the rest of the world,

and all countries can either aggravate the problem or be affected by it.[15] This calls for an analysis of two additional elements.

Firstly, with a view to solving this problem, apart from local actions to be taken by each country, other measures aimed at internalizing the effects on other countries are also under discussion. Due to the fact that negative effects are widespread, a way of reducing these internalization costs is by negotiating multilateral agreements, such as the United Nations Framework Convention on Climate Change, in the context of which the Kyoto Protocol was approved. This is a motive underlying the setting of caps on each country's emission levels, while letting each country choose the best way to reach this goal. There are also some economic instruments which enable participation of agents from different countries. Emissions trading, the clean development mechanism and joint implementation—included in the Kyoto Protocol—are examples of this type of instrument (See Box 1).

Box 1

The flexibility mechanisms of the Kyoto Protocol: raison d'être and way of operation[a]

The most distinctive feature of economic instruments is that they give emitters more flexibility to comply with environmental policy objectives and thus enable them to choose the cheapest alternative. By way of example, this flexibility allows emitters to: i) decide how much to reduce in different emitting sources of their own or owned by other emitters provided that the joint emission does not exceed the emission cap; ii) cooperate with other companies so that they achieve an emission reduction similar to the reduction they should achieve; and iii) compensate for higher emissions from one source with lower emissions from another. An emitter will choose one of these alternatives as long as they can comply with the objective set by regulations at a lower cost than if they chose the traditional alternative of reducing emissions in their own emitting source only.

This is the *raison d'être* of the three flexibility mechanisms provided for in the Kyoto Protocol that allow Annex I Parties to seek cheaper emission reduction alternatives.

1. Joint implementation mechanism (JI)

This mechanism entitles an Annex I Party to invest in emission reduction projects in another Annex I Party. The emission reduction units (ERU) thus obtained can be distributed between the parties taking part in the project.

In principle, both parties benefit from this mechanism: the investor can comply with part of the emission reduction it is obliged to, but at a lower cost than in its own country, while the country where emissions are reduced benefits from this foreign investment, technology transfer, and the selling of part of its allocated national emission allowances.

According to whether the country where the project is carried out complies with certain requirements or not—such as having a national mechanism to track their GHG inventories—verification and granting of ERUs can be in charge of the host country (track 1 procedure), or of a Kyoto Protocol committee (track 2 procedure).

By 15 September 2009, 78 track 1 projects and 9 track 2 projects had been approved. In both cases, the main host countries were Eastern European countries (Table 1).

[15] This is a classic example of a global externality related to a global common good (Mäler, 1990).

TABLE 1

Joint implementation: projects approved by host party

as of 15 September 2009

a. Track 1 projects		
Host country	**Number of projects**	**Share (%)**
Czech Republic	24	30.8
Poland	14	17.9
Germany	9	11.5
Hungary	9	11.5
Ukraine	7	9.0
New Zealand	6	7.7
Estonia	5	6.4
France	2	2.6
Romania	2	2.6
Total	78	100
a. Track 2 projects		
Host country	**Number of projects**	**Share (%)**
Lithuania	4	44.4
Ukraine	4	44.4
Bulgaria	1	11.1
Total	9	100

Source: CEI based on UNFCCC data, http://ji.unfccc.int/JI_Projects/ProjectInfo.html

2. Clean development mechanism (CDM)

As happens with the joint implementation mechanism, the CDM allows a country to comply with its GHG emission reduction commitments through participation in emission reduction projects carried out in other countries. As opposed to the JI, the CDM is only intended for projects carried out by an Annex I Party in a non-Annex I Party. As non-Annex I countries have no reduction commitments, the emissions reduced must be additional, that is, reductions which would have not happened if the CDM project had not been executed, and therefore, these are not subtracted from the assigned amounts of the host country. The emission reduction generates carbon credits called Certified Emission Reductions (CERs).

According to how the project is executed, it can entail technology transfer to the host country, though this is not specifically required by the CDM.

CDMs have been criticised because: i) projects do not always entail technology transfer to developing countries; ii) they do not always contribute to global emission reduction; iii) they are geographically concentrated in the largest developing countries. China hosted 35 percent of projects; India, 25 percent; Brazil, 9 percent; and Mexico, 6 percent. Therefore, Asian countries hosted almost three-fourths of all projects and Latin America hosted 24 percent (Table 2). Within Latin America, though with far fewer projects, Brazil and Mexico were followed by Chile, Peru, Argentina, Colombia, Honduras and Ecuador (Table 3).

TABLE 2

CDM projects by host region
as of 15 September 2009

Host Region	Number of projects	Share (%)
Asia-Pacific	1,336	73.6
Latin America and the Caribbean	435	24.0
Africa	34	1.9
Other	10	0.6
Total	1,815	100

Source: CEI based on UNFCCC data.

http://cdm.unfccc.int/Statistics/Registration/NumOfRegisteredProjByHostPartiesPieChart.html

TABLE 3

Registered CDM projects in Latin America and the Caribbean
as of 15 September 2009

Host country	Number of projects	Share (%)
Brazil	163	37.5
Mexico	118	27.1
Chile	35	8.0
Peru	18	4.1
Argentina	15	3.4
Colombia	15	3.4
Honduras	15	3.4
Ecuador	13	3.0
Guatemala	10	2.3
Costa Rica	6	1.4
Panama	6	1.4
El Salvador	5	1.1
Nicaragua	4	0.9
Bolivia	3	0.7
Uruguay	3	0.7
Cuba	2	0.5
Dominican Republic	1	0.2
Guyana	1	0.2
Jamaica	1	0.2
Paraguay	1	0.2
Total	435	100

Source: CEI based on UNFCCC data.

http://cdm.unfccc.int/Statistics/Registration/NumOfRegisteredProjByHostPartiesPieChart.html

3. Emissions trading

According to the Kyoto Protocol, countries which have assumed emission reduction commitments and have emitted fewer units than committed can sell exceeding units to other Annex 1 parties. These reductions include those resulting from the joint implementation and clean development mechanisms.

As happens with any emissions trading mechanism, it makes it possible to fulfil the global reduction commitment while giving parties flexibility to choose the extent of their reduction on the basis of the relation between the unitary cost of reduction and the price of emission allowances. It will be convenient to any given Party to reduce emissions as long as the price of the allowances exceeds the unitary cost of reduction. Thus, countries with lower reduction costs will tend to reduce emissions further than countries facing higher reduction costs. Consequently, the former might reduce more than committed, while the latter might reduce less, so that the surplus emission allowances of the former might be acquired by the latter in order to fulfil their reduction commitments. Unlike the previous two flexibility mechanisms, this not only enables

each Party to choose the most efficient way to fulfil their commitments, but also entails an opportunity for countries with lower reduction costs to profit from the transfer of allowances.

Each country was assigned an amount of emissions with respect to its historical emissions, taking 1990 as the base year, but without considering the disparity between *per capita* emissions. According to this scheme, centrally planned economies were assigned emission amounts higher than the emission levels they actually had in 1997, when the Kyoto Protocol was adopted. This excess was called "hot air", since it allowed countries to profit from the sale of emission allowances corresponding to emissions they had not reduced.

Although the KP emissions trading scheme could have started in January 2008, it has been delayed because countries have failed to submit required information. So far, there are compulsory trading systems, such as that of the European Union, and some voluntary systems, such as those existing in some regions of the United States.

[a] This box is based on Estrada Oyuela (2008) and OMC and PNUMA (2009).

Secondly, as the atmosphere—the affected good—is a public good, that is, one for which it is hard to determine who can or cannot have access to it, there is another problem: the free rider. GHG emissions affect everybody, no matter where they live; similarly, GHG reduction actions benefit everyone in the planet, but the costs of setting actions in motion are only assumed by those implementing them. Consequently, those who do not take any measure at all benefit freely from the actions taken by those who do. This mismatch between global benefits and local costs might discourage those willing to take measures from doing so, and thus imply a far lower reduction of GHG emissions. Furthermore, in this type of externality, the global benefit entailed in the actions taken by one country can be offset by higher GHG emissions in another, rendering useless the actions of the former. This proves that the presence of the free rider is core to the issue of correcting global externalities that involve global common goods: although the solution requires cooperation of all countries, theoretically, countries' incentives move in the opposite direction (Barrett, 1990). However, in practice, global externalities are treated cooperatively.

This cooperation could occur between all countries or just within a group of countries. The latter is the case with climate change, since only the signatory countries included in Annex I to the UNFCCC have committed to reduce GHG emissions. Thus, each country undertaking commitments establishes its best strategy based on the actions taken by the other signatory countries. Nevertheless, this situation might become unsustainable if some of the countries that have committed to reduce GHGs consider that some of the countries assuming no commitment at all have such high GHG emission levels that they should also reduce them.

Incentives and punishments might be used to try to deter countries from uncooperative attitudes.[16] Incentives include subsidies that are implicit in technology transfer, technical and financial assistance, free distribution of emission allowances tradable either in the global or national carbon markets or incentives granted by the Kyoto Protocol clean development mechanism (Shogren and Toman, 2000). These "side

[16] A country might decide to take part in co-operative actions if their participation in the solution to global environmental problems responds to a moral motivation such as "our country cannot be absent from the solution to this problem". Moral values can also be a factor inducing agents to refrain from individually acting as free riders (Galperín, 1995 a); as happens with people, these moral values can also be a factor inducing governments that want to assume a leading role in international affairs to reduce GHG emissions further than required by international agreements (Barrett, 1990).

payments" are particularly useful to involve countries which have signed no reduction commitments at the multilateral level (Barrett, 1990).

Punishments can be used both to persuade those who are unwilling to reduce GHG emissions and as a multilateral environmental agreement enforcement mechanism. In environmental policy, the most usual punishment consists in fines for non-compliance. However, the lack of an environmental enforcement agency at the international level makes its implementation very difficult. At the national level, a weak enforcement force can be partly compensated for by suasive instruments such as labelling and dissemination of lists of non-compliant facilities, or by actions on the part of consumers aimed at reducing non-compliant companies' profitability. At the international level, these suasive alternatives are less effective because, for example, consumers do not share the same values worldwide, nor do they react the same when a company violates an environmental rule.

Consequently, it is usual to resort to trade policy as an instrument for enforcement of multilateral environmental agreements (OECD, 1999). For example, by limiting imports or exports of products whose consumption or production causes negative externalities according to these Agreements, such as animal and vegetable species that are in danger of extinction—the CITES agreement, Convention on International Trade in Endangered Species of Wild Fauna and Flora—substances that deplete the ozone layer—Montreal Protocol—and hazardous wastes—Basel Convention. The UNFCCC did not include trade policy measures as instruments for the fulfilment of its objectives, but their possible inclusion as well as enforcement at the national level is currently under discussion (see Section 6).

Charnovitz (2003) makes a distinction between the multilateral use of trade measures to encourage compliance with what has been agreed—trade control—and their use to punish non-compliance—trade sanction. In the first case, trade control supplements the main measure in the agreement: the trade instrument limits trade in goods whose consumption or production is sought to be reduced. For example, trade measures can be applied to products originating from countries which have not signed the agreement or have not undertaken the commitments therein. In the second case, the measures are used to persuade those who are in non-compliance to reconsider their attitude, thus acting as a retortion element.

Furthermore, apart from being applicable by multilateral environmental agreements, any individual country can unilaterally resort to trade policy instruments as a means of inducing others not only to become part of the multilateral agreement, but also to be encouraged to adopt measures as demanding as their own, which in fact would serve as a threat useful to persuade those considered to be free riders to change their domestic environmental policy.

These instruments are economically justified on the need to prevent supposedly negative effects on product competitiveness and industrial localization (see Box 2). For this reason, the most affected productive sectors usually demand trade measures as a precondition to accept changes in the domestic environmental policy; at the international level, said measures are proposed by those countries that apply or intend to apply these domestic environmental policy measures.

Box 2

Environmental policy, competitiveness and industrial localization

A long-standing question underlying the debate on the relation between environmental policy and trade is to what extent stricter environmental standards might, on the one

hand, affect product competitiveness, and on the other, encourage investments to migrate towards countries with laxer regulations; this is known as the "pollution haven" hypothesis. Should this be the case, a country might decide not to adopt a measure domestically if the remaining countries do not adopt it either, or it might implement other measures to compensate for cost differences.

While, at the theoretical level, we could analyse how a stricter environmental standard—keeping all other factors constant—may induce a rise in production and management costs, the question of how important the effect on competitiveness and investment localization is requires an empirical answer.

The analyses of this issue carried out throughout the last 25 years conclude that, although said effect does exist, it is not strong enough to alter trade and investment flows, except in specific cases in which **the environmental factor** constitutes a very significant component of overall costs.[a] Nevertheless, it should be pondered to what extent the stricter standards sought by current changes in multilateral and domestic environmental policies might turn the environmental factor into one of the primary determinants of trade and investment.[b]

[a] For a summary of empirical studies and theoretical arguments, see Chidiak (2005), Copeland and Taylor (2004) and Galperín (1995 b).

[b] This is the hypothesis proposed by Copeland and Taylor (2004). In this regard, Reinaud (2004) shows that the European Union Emissions Trading System shall not affect the relative competitiveness of community products in relation to imports, except for some iron and steel products, but he also claims that as the system becomes stricter, this conclusion could change.

The so-called "carbon leakage" problem falls within this context; it refers to a situation in which the emission reduction achieved by one country is offset by higher emissions in other countries (see Box 3), which, as has been mentioned, is one of the problems that a solution to global externalities should address.

Box 3

Carbon leakage

The literature on climate change defines carbon leakage as the ratio between the increase in CO_2 emissions in non-abating countries and the decrease in CO_2 emissions due to the implementation of climate policy in Annex I countries (Sijm *et al*., 2004).

The assumption underlying this definition is that, as a result of the mitigation measures—either regulatory or economic—taken by one country, companies would face higher costs than they would in non-abating countries; this would entail a resource reallocation from countries where relative costs are higher to those where they are lower, that is, a substitution effect. This can occur through different channels: changes in the use of GHG-emitting energy triggered by changes in its price, changes in the production costs of carbon-intensive goods, and relocalisation of carbon-intensive industries (Sijm *et al*., 2004).

However, this effect might also respond to factors other than those derived from environmental policy, such as changes in import demand. We can thus distinguish between a "strong" and a "weak" definition of carbon leakage The former implies that production migrates from a country participating in reduction commitments to a non-participating country; according to the latter, we should estimate how much carbon non-participating countries emit when producing goods to be imported by countries participating in reduction commitments (Peters and Hertwich, 2008). When it comes to responsibility, the "strong" definition tends to blame this leakage on the producing

country because of its lack of environmental measures—it is the producer's fault—while the "weak" definition tends to consider that the importer is also responsible for this externality—it is the consumer's fault.[a]

Regardless of the theoretical approach, the answer as to the magnitude of this phenomenon can only be found empirically. Bearing in mind the "strong" definition, several papers[b] that summarize the results of calculations of this effect made using general equilibrium simulation models conclude that:

i) the "carbon leakage" rate would be between 5 percent and 29 percent of emissions of Annex I countries, which, in turn, can vary according to the mitigation measures adopted by all countries;

ii) at least in the short- and medium-run, the most significant determining factor in quantitative terms would be the change in the price of energy. Different studies agree on the fact that industrial relocalisation would not be a key factor, although they disagree on whether this conclusion would still be valid in the long run.

iii) the greatest rate of "leakage" would be found in energy-intensive industries, such as iron and steel as well as chemical industries.

iv) countervailing measures taken by developed countries, such as the free distribution of emission permits to the greatest emitters, would reduce this "leakage" rate.

Using the "weak" definition and input-output models that, in spite of simulating scenarios, revise trade-related emissions, Peters and Hertwich (2008) estimate the "leakage" in Annex I countries at about 11 percent; that is, the emissions incorporated into Annex I countries' imports from non-Annex I countries amount to 11 percent of the emissions generated by Annex I countries' domestic output.

[a] The Chinese government—among others—has put forward this argument during the negotiations held within the framework of the UNFCCC, stating that the production of export goods generate between 15 percent and 25 percent of Chinese CO_2 emissions (Bridges Between Trade and Sustainable Development, 2009 a).

[b] Sijm *et al*. (2004), Barker *et al*. (2007) and Rauscher (2005).

Therefore, although the specific measures to offset environmental externalities are within the scope of environmental policy, trade measures usually serve as a complement to achieve environmental goals, as an element of sanction, and as a coadjuvant element to tackle resistance to the implementation of environmental policies.

The trade measures employed or proposed as well as their effects are analysed as follows.

3.1. Climate change-related trade and equivalent measures

A country may resort to trade policy instruments as part of its environmental policy in order to fulfil their multilateral, regional or unilateral environmental goals. Some of these instruments are about to be applied, while others have been proposed and are still under debate.

These instruments are:

i. Customs duties on either environmental-friendly or harmful goods in terms of climate change

With the aim of either reducing imports of certain goods or fostering the purchase of others, a country might change its applied tariffs (UNFCCC, 2009) For example, applying higher tariffs on GHG-intensive goods and lower tariffs on those that generate

lower emission levels. In the first case, the tariff increase shall not exceed the bound tariff agreed at the WTO. In the second, tariff cuts and other barriers to trade in environmental goods and services—among which we might include those related to climate change—is one of the items on the agenda for the WTO Doha Round negotiations.[17]

ii. Cross-border payments according to the process and production methods

An importer might be charged according to the GHG emission occurred during the production and transport of the imported good to the destination market. This is known as border carbon adjustment and falls within the scope of a broader debate on specific duties and other barriers related to the process and production methods. These payments can be in connection with the environmental policy instrument employed by the importing country. For example, if domestic products are taxed according to their carbon emissions, the same would apply to imported products;[18] if there is a tradable emission allowance system, the importer will have to present the number of allowances corresponding to the emissions released.[19]

Both taxation and tradable allowances have the effect of increasing the relative price of the goods concerned with respect to other goods that generate lower emission levels. The greater the elasticity of import demand, the greater the impact on trade flows and the need for exporters to change their production processes seeking energy sources that are less GHG-intensive.

As the amount of gases emitted is hard to determine, this measure can lead to arbitrariness and consequently pose the risk of it becoming a disguised protectionist measure, which would be contrary to Article 3.5 of the UNFCCC. In the first place, the amount of the emission, *i.e.*, the taxable basis, should be exactly determined. In the case of traditional customs duties, the payable amount, which can be either a percentage of the price—*ad valorem* tariff—or a fixed amount per physical unit—specific tariff—is determined on the basis of the information required to import the product. If the tax is levied according to the emission level, the taxable basis data correspond to the phase of production; this means that the tax collector needs some extra information. In this case, tax collectors have to trust that the information they are given is true. If they do not want to rely on that data, they should: a) ask for a certification issued by an institution accredited by the importing country; or b) perform their own calculation, which might lead to a higher or lower tax than it should, this being the typical problem known as adverse selection in the analysis of the relationship between the party subject to regulations and that in charge of enforcing them.

The difficulty and the cost of making this calculation for each product that enters the market would lead to the adoption of pre-established emission values per product on the basis of the country's own experience or that of others. Thus, neither the production process nor the inputs of each specific product are taken into account, which may lead to a tax higher or lower than what should have been charged. If a country wants to

[17] One of the problems underlying this negotiation is that it is difficult to identify those goods destined only to the environmental objective declared. Section 5 examines this issue more thoroughly.

[18] French Law No. 2009-967 of 3 August 2009 on the planning of the implementation of the Grenelle environmental project, in its section II.2 establishes that France shall support the implementation of a border adjustment mechanism for imports originating in countries reluctant to contribute according to their respective capacities and responsibilities to the global emission reduction effort after 2012. Although it does not specify what type of mechanism would be employed, it could be inferred that it refers to taxation, since this paragraph follows another which stipulates the analysis of the creation of a tax to encourage better behaviour in terms of carbon and energy; the purpose of this tax shall be to reflect the effects of GHG emissions on the price system through taxation on the consumption of fossil energies.

[19] This requirement is stipulated by the climate change Act passed by the United States House of Representatives last June. Section 4.1 examines this issue more thoroughly.

block imports of certain products, it just needs to set a high assumed value. It might take a very long time for importers and exporters to challenge these values and they might reach no satisfactory solution.

If, for the sake of simplicity, the same duty were applied to all imports of a certain product, this could be considered discriminatory within the multilateral system of trade as long as the emission levels of different producers are significantly different (Houser *et al*., 2008).

Should the importer be required to present emission permits, the problem of how to calculate the amount of gases released comes on top of other problems, such as whether the permits should be issued by the importing country or by another, how much those permits cost and whether they were bought or received for free.

Annex I countries believe they could compensate for their domestic industries' loss of competitiveness by means of a border adjustment, and they would thus be on an equal footing with countries assuming no emission reduction commitments. Furthermore, this could induce changes in these countries' environmental policy.

Nevertheless, imposing a carbon tariff on imports from developing countries—because of their intensive use of energy—would not be in conformity with the principle of "common but differentiated responsibilities" enshrined in the UNFCCC.

Among these border payments we might include the tax on international maritime and air transport based on CO_2 emission levels, which is currently under discussion as a means of internalizing environmental effects. Given equal energy efficiency, a longer distance entails a higher charge. Consequently, it would reduce the competitiveness of southern hemisphere products in northern hemisphere developed country markets.[20]

iii. Environmental anti-dumping duties and countervailing duties in response to implicit environmental subsidies

These measures are supported by the following argument: if a producer from country A faces environmental costs different from those of a producer from country B because of a more lenient environmental regulation or laxer government controls, the former should estimate the corresponding increase in their overall cost and see whether the end price is still higher than the new cost; if not, they would be incurring in dumping and could be subject to an anti-dumping duty. The countervailing duty is justified on the grounds that the laxer regulations in country A could be considered to amount to an implicit subsidy, which could thus be compensated for by said duty.

These measures are part of a long-standing proposal under discussion in the academic and legislative spheres. In the first case, Daly stated that these anti-dumping duties are not a sign of protectionism, since "That is very different, however, from protecting an efficient national policy of full-cost pricing from standards-lowering international competition" (Daly, 1993: 26). This author considers that "this tariff policy does not imply the imposition of one country's environmental preferences or moral judgements on another country. Each country should set the rules of cost internalization in its own market" and there should be a tariff on imported products that removes the competitive advantage resulting from lower standards (Daly, 1993: 26). He thus argues that, unless the price of each good reflects all the environmental costs of a country, trade will undermine national policies of internalizing the costs of externalities (Daly and Goodland, 1994).

On the contrary, according to Bhagwati (1993), this duty lacks economic logic and disregards the political reality: regarding the former, unlike traditional anti-dumping duties, this would be a duty on not doing something; that is, for lacking a strict

[20] For an explanation of current debates on emissions from international shipping, see Section 6.

environmental policy; as for the latter, the fact that dumping margins would be calculated by politicians could make this duty highly discretional.

There is legislative precedent in the bill S. 984 of 1991, entitled International Pollution Deterrence Act, which was introduced by democrat Senator David Boren before the American Senate with the aim of establishing border duties to compensate for the difference between the cost of complying with the environmental laws of the producer's own country and the cost they would face if they had to comply with American laws (U.S. Office of Technology Assessment, 1992).[21]

This issue is still under debate. Stiglitz (2007: 177) and other authors have recently maintained that inaction regarding climate change would imply avoiding mitigation costs, which could be considered a hidden subsidy. Therefore, either a countervailing duty could be applied to offset subsidies granted by exporting countries to fossil fuels used in production, or an anti-dumping duty on energy-intensive imported products originating in countries assuming no emission reduction commitments.

Domestic subsidies to production and innovation

A country might grant subsidies for domestic production and for research and development of environmental goods and services related to climate change as well as for the conversion of the technologies used in order to make them more compatible with the environmental requirements of local and foreign markets. For example, subsidies for production or consumption of goods with lower carbon dioxide emissions, such as biofuels, and for the development and adoption of solar energy technologies (UNFCCC, 2009). These include agricultural subsidies for the development of practices that favour carbon absorption, known as "carbon sequestration".

Although these measures belong to domestic environmental policies, if they are supply-side subsidies, they can favour exports of the subsidised goods and reduce imports of substitute goods. In turn, demand-side subsidies could favour imports, unless the subsidy is granted on condition that beneficiaries buy domestic goods.

On the other hand, it is also usual to grant subsidies to activities whose unwanted effect consists in GHG emissions or in the intensive use of GHG-emitting inputs. Industries as well as energy, transport and agricultural companies are beneficiaries of this type of subsidy. For example, in the last case, the agricultural practices of producers from different developed countries, which are subsidised by their governments, often release more greenhouse gases than non-subsidised agricultural practices in other countries. Consequently, one mitigation measure that developed countries should apply is the reduction and elimination of trade-distorting agricultural subsidies; this is currently under negotiation at the WTO Doha Round.

v. Access requirements in the form of technical standards and information requirements

The production, consumption and end disposal of a good might generate either positive or negative environmental externalities. In order to classify goods according to their externalities, it is usual to resort to technical standards that regulate authorized and forbidden production processes and inputs, and also to the requirement to inform consumers about products' externalities. Although this set of measures originally belong to the domestic environmental policy, they eventually become market access requirements, which can affect either products or their production processes and be

[21] The bill states that the subsidy would be "the cost that would have to be incurred by the manufacturer or producer of the foreign articles of merchandise to comply with environmental standards imposed on US producers of the same class of merchandise" (quoted in Bhagwati, 1993: 21). Bhagwati (1993) also quotes former U.S. vice-president Al Gore, who in his book *Earth in Balance: Ecology and the Human Spirit* claimed that "a weak and ineffectual enforcement of pollution control measures should also be included in the definition of unfair trading practices".

either mandatory or voluntary (Galperín, Fernández and Doporto, 1999). These include mandatory technical standards, ecological labelling and performance certifications.

These requirements might hamper market access either because: i) exporters do not comply with them; ii) certification criteria do not take all relevant variables into account,[22] iii) the certification process makes it too difficult to obtain the required certificate or labelling.

Requirements related to climate change refer to energy efficiency and GHG emission levels (OMC and PNUMA, 2009). As for technical standards, they usually specify allowed production inputs and types of facility, determine the maximum carbon dioxide emission level or the minimum energy performance level. Labelling—usually applied to electrical appliances and automobiles—is aimed at informing consumers on energy efficiency and GHG emission levels or fuel consumption.

Other labelling systems based on the so-called "carbon footprint" are currently being adopted. The carbon footprint is a measure of the total amount of GHG emissions resulting from the production of a particular good since the beginning of the production process until its arrival to the destination country for consumption. In general, it is presented as an awareness-raising measure to encourage people to consume goods whose production has generated lower GHG emissions, and it is usually related to "buy domestic" policies.

Carbon footprint initiatives are also related to the recently introduced concept of "food miles", which refers to the measure of the emissions generated during the transport of food products from the site of production to that of consumption, and it is based on the grounds that the longer the distance that a product travels to the consumption centre, the most it contributes to climate change. Several studies have challenged this concept arguing that a product's contribution to climate change should only be determined on the basis of its complete life-cycle.[23] This labelling could have trade-distorting effects, benefiting domestic products to the detriment of imports. By way of example, such a measure would hamper access to the European market for products originating from the southern hemisphere.

Within this context, the concept of "fair miles" appears as an interesting alternative; based on this concept, developing countries have pointed out that the total emissions accrued in their products' life-cycles—even including international shipping—are lower than those of importing countries (Sell, 2007).[24]

There are several proposals currently under debate in the United States and the European Union which promote carbon footprint-based labelling, either voluntary[25] or

[22] For example, a producing country might present low negative environmental externalities but its production method might differ from that stipulated by the destination country's standards or labelling rules.

[23] Among these studies, it is worth mentioning those of Williams (2007) and Saunders, Barber and Taylor (2006). For a summary of the different life-cycles relevant to low-income countries' exports, see Brenton, Edward-Jones and Friis Jensen (2009).

[24] Similarly, as stressed by Samaniego (2009), although emissions are measured in relation to the production and transport of goods or services, it should also be borne in mind that the aim of the production and international trade of goods and services is consumers' satisfaction. Consequently, not only the producer but also the consumer—often living in developed countries—could be held responsible for the carbon footprint.

[25] For example, the Waste and Resources Action Programme (WRAP), a non-profit initiative of the British government aimed at reducing emissions through the bulk shipping of wine to the United Kingdom and its subsequent bottling in lighter bottles made in the United Kingdom. Private chains have also furthered other initiatives; for example, Marks and Spencer has committed to buy only food products produced in the United Kingdom and Ireland as far as possible, and also to encourage suppliers to reduce their carbon footprint. Moreover, in February 2007, Tesco announced a binding initiative to label all the products sold in the chain's stores with their carbon footprint (including production, packaging and transport). In turn, Wal-

mandatory,[26] although no agreement has been reached so far on the best measuring method.[27]

vi. Requirements to receive trade benefits

Trade policy might induce changes in other countries' environmental policies through positive incentives as well as punishments. This is the case with tariff preferences granted to countries that comply with certain requirements in terms of both domestic policy and adherence to multilateral environmental treaties. This can be achieved by signing free trade agreements—such as the NAFTA and CAFTA—or by multilateral preferences pursuant to the Generalised System of Preferences, such as the European Union system, which is dealt with in section 4.2.

3.2. Links between mitigation measures and WTO rules

Within this context, the design and implementation of measures to respond to climate change should be in conformity with WTO (World Trade Organization) rules. In general, WTO rules and jurisprudence admit that trade measures might be necessary to reach environmental goals, but that certain basic conditions should be observed, opting for non-discriminatory measures and those with the least trade-distorting effects. These principles guarantee predictability, transparency and a non-arbitrary application of trade measures, so as to prevent them from becoming hidden trade restrictions (OMC and PNUMA, 2009: 99).

Response measures should be particularly considered in view of articles I (clause on most favoured nation), II (relating to tariff concessions), III (principle of national treatment) and XI (general elimination of quantitative restrictions) of the General Agreement on Tariffs and Trade (GATT 1994).

The principle of non-discrimination (clauses on most favoured nation and national treatment) is the main pillar of the multilateral trading system and it requires that the benefits or advantages granted to one country extend to the remaining members of the system and that imported products are guaranteed to receive the same treatment as domestic products.[28]

On the other hand, article II of GATT 1994 bans Members from imposing tariffs that exceed those set forth and provided in their bound schedules, which should be taken

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Mart developed a programme called "Global Sustainable Sourcing Initiative", by which this chain gives priority to suppliers that reduce their emissions.

[26] Though not explicitly, this would be enabled in France by recent law 2009-967 of 3 August 2009 on the planning regarding the implementation of the Grenelle environmental project. Article 2.II states that the objective of national measures is to integrate the cost of GHG emissions into the pricing of goods and services. This can be achieved, for example, by improving consumers' information on the ecological cost of goods and services. This was more explicit in the draft bill, since it proposed an amendment to Article 85 of the Consumption Code by including Article L. 112-10, pursuant to which: "As from 1st January 2011, the consumer shall be informed, by means of a label or by any other proper means, of the equivalent carbon content of products and their packaging, as well as of the natural resource depletion or impacts on the natural environment that could be attributed to these products during their entire life-cycle".

[27] At present, there are different carbon footprint measurement methods already designed or whose development is underway, such as the British initiative called "Publicly Available Specification 2050" (PAS 2050) or the ISO standards currently under discussion intended to be ready by 2011.

[28] In this sense, paragraph 1 of article I of GATT 1994 states that any advantage, favour, privilege or immunity granted by any contracting party to any product originating in or destined for any other country shall be accorded immediately and unconditionally to the like product originating in or destined for the territories of all other contracting parties.

into account if mitigation measures, such as border carbon adjustment taxes, are to be applied. Furthermore, it should also be considered that, although paragraph 2) a) of article II of GATT 1994 entitles WTO Members to impose a charge on the importation of any product equivalent to an internal tax imposed on the like domestic product, much debate has arisen over another phrase in the same paragraph which mentions "an article from which the imported product has been manufactured or produced in whole or in part". In this sense, it is still uncertain to what extent fossil fuels used in production could be included in said category, or whether it would only comprise inputs physically incorporated into the imported end product or part of it (OMC and PNUMA, 2009: 117).

In turn, paragraph 2 of article III of GATT 1994 (principle of national treatment) establishes that "The products of the territory of any contracting party imported into the territory of any other contracting party shall not be subject, directly or indirectly, to internal taxes or other internal charges of any kind in excess of those applied, directly or indirectly, to like domestic products", which raises the question of whether it will be possible to apply mitigation measures in general, and border carbon taxes in particular, in relation to internal taxes imposed on inputs used in the production process of the like domestic product.

In line with the principle of non-discrimination, it should be remembered that WTO rules and jurisprudence require that "like" products receive the same treatment. Therefore, it is uncertain whether initiatives that result in a differentiation of products on the basis of the emissions generated by their production or transport or, in more general terms, by the "non-product-related process and production methods" would be admissible within the multilateral trading system. Traditionally, developing countries have not accepted the legitimacy of the differentiation of products on the basis of "non-product-related process and methods", that is, unless they result in a distinctive feature of the end product.

Mitigation measures should be in accordance with article XI of GATT 1994, in the sense that no prohibitions or restrictions other than duties, taxes or other charges shall be instituted or maintained by any contracting party on the importation of any product of the territory of any other contracting party or on the exportation or sale for export of any product destined for the territory of any other contracting party, which could be the case of measures such as emissions trading systems and carbon taxes.

Even if mitigation measures were considered contrary to GATT 1994 provisions, it would be necessary to consider whether they could be within the scope of the "environmental clause" of article XX (paragraphs b and g) of said Agreement. In order to conform to that exception, these measures should: i) be necessary to protect human, animal or plant life or health (paragraph b); or else measures relating to the conservation of exhaustible natural resources (paragraph g); and ii) not constitute an unjustified trade restriction, that is, not applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail, or a disguised restriction on international trade.[29]

In order to assess the relationship between mitigation measures and WTO Agreements, other provisions included in other agreements—apart from those of GATT 1994—are also relevant; namely: the Agreement on Technical Barriers to Trade (on the design and implementation of technical standards and rules and, particularly, carbon footprint labelling); the Anti-dumping Agreement, the Agreement on Subsidies and Countervailing Measures and the Agreement on Agriculture (with regard to subsidies,

[29] In line with article XX of GATT 1994, it is worth noting that the climate change regime also includes provisions tending to prevent response measures from constituting a disguised restriction on international trade (article 3.5 of the UNFCCC) and to minimise the adverse effects of response measures, including effects on international trade, and social, environmental and economic impacts on other Parties, especially developing country Parties (articles 2.3 and 3.14 of the Kyoto Protocol).

countervailing and anti-dumpling measures); the Agreement on Trade-Related Aspects of Intellectual Property Rights (regarding technology transfer); and the General Agreement on Trade in Services (compliance with its provisions in the case of environment-related services).

4. Unilateral trade and environmental mitigation measures

By virtue of the United Nations Framework Convention on Climate Change and the Kyoto Protocol provisions, developed countries shall legally establish GHG emission reduction objectives after 2008–2012.

By way of example of unilaterally adopted mitigation measures, the United States and European Union action plans as well as domestic policies implemented by some developing countries are presented as follows, particularly focusing on measures with an impact on trade.

4.1. United States

The United States environmental policy to respond to climate change has historically been based on voluntary measures to reduce GHG emissions, apart from the already existing GHG reduction programmes driven by reasons of local rather than global pollution (National Center for Environmental Economics, 2001; US EPA, 2009).

These initiatives are part of the Climate Change Action Plan, and they include measures such as technical and financial assistance and labelling, aimed at the use of efficient lighting (green lights), the promotion of energy efficient products and buildings (energy star), the promotion of production methods and raw materials that reduce emissions (climate wise) and methane recovery. The *Climate Change Technology Initiative* subsidises technological change, either through tax reliefs or research and development funding.

Nevertheless, several states have gone further than the federal government by establishing emission standards and tradable emission allowance systems as well as other instruments (Pew Center on Global Climate Change, 2009).

At the federal level, different bills aimed at adopting a definite policy on this issue have been introduced in the US Congress. During the previous democrat presidency—the Clinton Administration—several trade-related environmental bills were introduced in Congress but lacked the necessary quorum to become a law. There were also some bills introduced during the Bush Administration, but they were not approved either.

In January 2007, during the presidency of George Bush, senators Bernie Sanders (independent) and Barbara Boxer (democrat) introduced the *Global Warming Pollution Reduction Act* and, during the same year, Senators Joseph Lieberman (democrat) and John Warner (republican) introduced the bill entitled *America's Climate Security Act.* This bill provided for the implementation of a tradable emission allowance system and the possibility of implementing corrective measures if the economy were prejudiced by mitigation policies.

It was not until June 2009 that the House of Representatives granted preliminary approval to the American Clean Energy and Security Act, which has now been placed on the Senate calendar. This bill not only defines domestic environmental policy instruments, but also contains measures with an impact on trade and other measures that affect imports because it deals with issues such as the impact of measures on domestic companies' competitiveness and on migration of companies to countries with laxer environmental regulations.

4.1.1. American Clean Energy and Security Act

On 26 June 2009 The United States House of Representatives passed the American Clean Energy and Security Act (ACES; H.R. 2454) by a close vote of 219–212. This act was voted for by 211 democrats and 8 republicans; while 168 republicans and 44 democrats voted against it.

The House Committee on Energy and Commerce approved the Act on 21 May 2009, and it was subsequently submitted to other 12 committees: Agriculture, Ways and Means, Science and Technology, Transportation and Infrastructure (four times), Education and Labour, Natural Resources, Financial Services and Foreign Affairs.

This legislation was introduced by Committee chairmen Henry A. Waxman and Edward J. Markey with the aim of establishing a clean energy policy that ensures job creation, reduces energy costs, strengthens the United States energy independence and reduces global environmental pollution.

The new act is in line with the political priority that the new Administration gives to the environment and the adverse effects of climate change both in the United States and globally.[30]

The bill was widely supported by energy companies, industries, corporations, trade unions, the community in general and environmental organizations.

Congresspeople expect the bill to become law before the Copenhagen summit takes place next December. Nonetheless, it is also possible that the bill may not be passed before the summit. As for the likelihood of having this bill passed this year, it should be noted that it competes with the healthcare system reform, which is considered more relevant at the domestic level. In this sense, the Obama administration's new Deputy Special Envoy for Climate Change, Jonathan Pershing, claimed that even if the bill under negotiation were not passed, an emission reduction package could nonetheless be introduced in Copenhagen (Max, 2009). Although he added that they would work hard to have it passed, he did not deem its non-approval would constitute an obstacle to reaching a multilateral agreement.

Several Republican and Democrat senators have criticised a provision of the Act in relation to importers purchases of allowances for goods originating in countries which are not actively limiting gas emissions. Moreover, a few hours before the Act was approved, President Obama himself also criticised this provision. He then claimed that, "at a time when the economy worldwide is still deep in recession and we've seen a significant drop in global trade, I think we have to be very careful about sending any protectionist signals out there" (Bridges Weekly Trade News Digest, 2009 b). Regarding the possible loss of competitiveness of domestic industries, he added that the Act already had various kinds of transitional assistance, such as industry support in the form of free emission permits and tax reliefs.

Main provisions

This act amends the Clean Air Act as regards GHG emissions. Apart from specific measures to reduce global warming pollution, it includes provisions on clean energy, energy efficiency and measures for the transition to a cleaner energy economy, where foreign trade policies are included. It also includes measures aimed at the agricultural and forestry sectors.

[30] For more information on this new Administration's approach, see Pérez Llana (2009).

a. With environmental objectives

The act sets domestic GHG emission reduction targets as from 2012, and it stipulates that in 2050 the quantity of the United States GHG emissions shall not exceed 17 percent of said quantity in 2005.

The main programme aimed at reducing GHG emissions is that of tradable emission allowances. This programme sets a maximum number of allowances to be distributed per year, which constitutes a cap on emissions; said number shall be gradually reduced by 2050.

The act also stipulates the way free emission allowances shall be distributed and who shall receive them in view of different objectives. Throughout the first years, nearly 80 percent of allowances shall be distributed free of charge. This percentage shall gradually decrease and, by 2031, 70 percent of allowances shall be offered for sale at auction (Committee on Energy and Commerce, 2009). The free distribution of allowances shall no affect the maximum emission level but the cost incurred by emitters to comply with emission limits.

b. With trade-related objectives

The act reflects congresspeople's true concern about the potential loss of competitiveness of domestic products and the possible emigration of industries, in both cases as a consequence of higher costs driven by instruments for GHG emission control. Trade measures are introduced in order to counter these effects.

This issue is dealt with in Title IV of the Act—Transitioning to a Clean Energy Economy—Subtitle A, entitled "Ensuring Real Reductions in Industrial Emissions."[31]

To that aim, it proposes two programmes. The first, destined for domestic industries, is an emission allowance rebate programme, by which certain companies will be given free allowances to offset the higher costs they will have to incur to acquire tradable allowances. As was commented in section 3, this is a common practice to reduce the resistance of domestic agents to the implementation of tradable emission allowances.

These allowances shall be distributed among manufacturers of a set of goods within the sectors classified as "eligible". Producers of agricultural and mineral manufactures and of industrial products shall be among eligible sectors,[32] to be defined by a regulation of the Environmental Protection Agency (EPA) that shall be in force by mid-2011. These sectors shall have significant energy costs, a minimum level of GHG emissions per product, and trade with other countries, as exporters as well as importers.[33] This latter provision seems to be aimed not only at those sectors which might lose competitiveness vis-à-vis imported products, but also at exporters. Each company shall receive a certain number of allowances in relation to their carbon emissions (direct emission) and to that emitted during the generation of the electricity it consumed (indirect emission). Direct emissions are calculated on the basis of the average emission of the industry per unit of product, benefiting those who emit less than the average, since they will receive more allowances than they would if the calculation were made on the basis of their own emissions.The distribution of these

[31] This subtitle was more explicit in the first draft of the bill: "Ensuring Domestic Competitiveness."

[32] As defined in the 2002 North American Industry Classification System (NAICS) codes 31, 32 and 33.

[33] In order to be eligible, an industrial sector shall present: i) an energy cost of at least 5 percent of the value of its shipments (energy intensity); ii) a ratio between tons of GHG emissions and the value of shipments of at least 5 percent (GHG intensity); and iii) a ratio between total foreign trade (exports + imports) and the value of shipments plus imports of at least 15 percent (trade intensity). If the energy intensity or the GHG intensity is of at least 20 percent, the sector shall be also eligible regardless of whether foreign trade is significant to that sector. Petroleum refineries are excluded. Any non-selected sector that meets these criteria is entitled to demand to be taken into consideration.

allowances will begin in 2012; the number of allowances to be distributed will be reduced as from 2026, and the programme will end in 2035. However, as this bears some relation to the loss of competitiveness caused by differences with the measures taken by other countries, the programme stipulates that in those sectors where more than 85 percent of imports originate from countries with GHG reduction commitments similar to those made by the United States, this 10-year period of reduction of allowances available for distribution might commence before 2026.

This programme is based on the bill introduced by democrat representatives Inslee and Doyle in September 2008.[34] In their bill, they suggested the inclusion of iron, steel, pulp, paper, cement, rubber, basic chemicals, glass, industrial ceramics, aluminium and other non-ferrous metals as eligible industrial sectors and subsectors. These sectors are among the possible beneficiaries mentioned in the summary of the bill prepared by Congress (Committee on Energy and Commerce, 2009).

The second programme was entitled "International Reserve Allowance Program" and it refers to the allowances importers must submit in order to import goods into the US market. This is presented as a means to encourage emission reductions in other countries; that is, a domestic environmental measure with extraterritorial scope, since it resorts to trade instruments to influence the environmental policies of third countries. But the text also claims to be aimed at minimizing carbon leakage, defined as "any substantial increase in GHG emissions by manufacturing facilities located in countries without commensurate GHG regulation caused by an incremental cost of production increase in the United Stated resulting from the implementation" of the act. This definition is in line with those mentioned in Box 3.

After affirming that multilateral negotiations are the best way to tackle the issue of climate change, it defines the United States negotiating objectives as follows:

i) to reach a binding agreement in which all major GHG-emitting countries contribute equitably to the reduction of global GHG emissions;

ii) to include in such international agreement provisions that recognize and address the competitive imbalances that lead to carbon leakage between parties and non-parties to the agreement, and also among countries that are parties to it.

iii) to include in such international agreement agreed remedies[35] for any party to the agreement that fails to meet its GHG reduction obligations.

iv) to allow implementation of the emission allowance rebate program as set forth in the act.

This programme would be launched in 2020. It would be applicable to products manufactured by sectors eligible for the emission allowance rebate programme. The programme would not be launched if, by 2018, a multilateral agreement consistent with the negotiating objectives set forth in the US Act had entered into force; or if the president determined that such programme would not be in the national economic interest or in the environmental interest of the United States. This determination of the President must be subsequently approved by Congress. The programme would not be applied either to goods produced by eligible sectors in which more than 85 percent of US imports are originated in countries that are parties to an international agreement by which they have assumed emission reduction commitments at least as stringent as

[34] Bill introduced under number HR 7146, entitled "Carbon Leakage Prevention Act".

[35] The text does not specify what measures these would be, although it mentions "remedies", a term that usually refers to countervailing and anti-dumping duties and safeguards. This would serve as a trade sanction for cases of noncompliance rather than as a supplement to the economic and regulatory environmental measures contained in the multilateral agreement.

those of the United States; and if the sectors have not too high an energy or GHG intensity.

Products from countries with gas reduction commitments equal to or higher than those assumed by the United States are exempt from these obligations, as are products originating in least developed countries and in those responsible for less than 0.5 percent of global emissions and which, at the same time, account for less than 5 percent of United States imports.

The price for purchasing these allowances shall be equivalent to the domestic market auction clearing price. The government shall establish the methodology for calculating the quantity of allowances that the importer of any covered product must submit as a precondition to enter the market. The quantity of allowances to submit may be adjusted according to the free allowances received by each domestic industrial sector. Thus, the Administrator of the programme may decide that certain importers are not obliged to submit any allowances.

In its first paragraphs, the act reflects some concern about “unfair” competition and the supposedly "uneven playing field”, and it instructs EPA to prepare a report to the Congress regarding whether China and India have adopted standards as strict as those of the United States, thus making direct reference to the possibility that imports from both countries be subject to the purchase of allowances unless they modify their GHG reduction objectives. In this sense, title III of the act stresses the importance of the United States approving a policy to address climate change so as to induce other countries to join multilateral efforts.

Box 4

International reserve allowance program: preliminary assessment of its impact on Argentine exports

Pursuant to this programme, the entry of certain products into the United States market shall be accompanied by the submission of the corresponding GHG emission allowances, as set forth in the Act passed by the US House of Representatives. The covered goods shall be the same as those included in the emission allowance rebate program, which is part of the domestic environmental policy adopted to tackle climate change.

Although the act does not specifically list these covered goods, it does mention the conditions they must meet. A preliminary assessment of the impact of this programme on Argentine exports to the United States can be made on the basis of said conditions.

The first condition is that they are manufactured goods. As can be seen in Table 4, at first, in 2006–2008 the universe of goods potentially affected amounts to slightly more than USD 2.6 billion on average, nearly 60 percent of exports to the United States. Industrial manufactures account for two thirds of exports of manufactured goods. Five percent of exports of manufactures of agricultural origin were destined to the United States; while in the case of manufactures of industrial origin, the share of exports to the US in total exports of the sector was 9 percent.

TABLE 4

Argentine exports to the United States and to the world, by major item

2006–2008 average, in millions of USD

	United States		World		USA/World
	Millions of USD	**% share**	**Millions of USD**	**% share**	**%**
Primary products	274	6	12,398	22	2.2
Fuels and energy	1,560	35	7,586	13	20.6
Manufactures of agricultural origin	979	22	19,454	34	5.0
Manufactures of industrial origin	1,649	37	18,078	31	9.1
Total	4,463	100	57,516	100	7.8

Source: CEI based on INDEC.

The second condition the sector must meet is a set of requirements already described in this section (see footnote 33). Three of them are necessary and two are sufficient. The necessary conditions—which must all be met—are: i) the good must be energy-intensive; ii) it must be GHG-intensive; iii) it must present certain degree of trade openness (trade intensity). The sufficient conditions are: iv) the good must have high energy intensity; and v) it must have high GHG intensity. In the last two, the indicator must be over 20 percent.

The data on energy and GHG intensities and value of shipments used as a first approach to the identification of the sectors that could be included in the programme were those included in Ho *et al*. (2008), which shows data for the 52 sectors in which the United States economy was subdivided on the basis of the input-output matrix. The indicator was calculated using similar variables to those described in the Act: the energy intensity was calculated using data on share of the energy cost in overall costs instead of value of shipments; the GHG intensity calculation only includes data on carbon dioxide.

According to these indicators, five sectors meet the sufficient condition of having an energy intensity higher than 20 percent: petrochemicals and organic chemicals; plastics; fertilizers; manufactures of cement, lime and plaster; and cast iron; while two of these sectors also meet the sufficient condition of having a GHG intensity higher than 20 percent: manufactures of cement, lime and plaster; and cast iron. The remaining economic sectors do not meet the two first necessary conditions; therefore, the calculation of their trade intensity is no longer relevant.

In order to calculate the potential impact on Argentine exports from these sectors, this preliminary assessment established the equivalence between the sectoral classification of the act and the Harmonized Commodity Description and Coding System; however, this impact seems to be overestimated because the level of chapters was used instead of that of products. This equivalence should be made at a more disaggregate level for a more precise definition of sectors.

Table 5 shows that exports from these sectors to the United States totalled USD 493 million, nearly 19 percent of exports of manufactures and 11 percent of total exports. The importance of the United States as a destination market indicates the degree of vulnerability of Argentine exports to this measure. The most vulnerable sectors are aluminium; petrochemicals and organic chemicals; and manufactures of cement, lime and plaster. In the worst-case scenario, that in which exports from these sectors would be unable to present the required tradable emission allowances, almost 40 percent of aluminium exports would be affected, as would 28 percent of exports of petrochemicals and organic chemicals, and 14 percent of exports of manufactures of cement, lime and plaster.

TABLE 5

Sectors potentially harmed by the international reserve allowance programme.

Argentine exports, 2006–2008 average, in millions of USD

Harmonized System chapter	Sector	United States	World	USA/World (%)
29	Petrochemicals and organic chemicals	170	610	27.8
31	Fertilizers	2	103	2.2
39	Plastics	30	1,302	2.3
68	Articles of stone, plaster, cement, or similar material	10	69	14.1
72	Iron and steel	41	558	7.3
76	Aluminium	241	608	39.6
	Total	493	3,249	15.2

1. The table indicates the chapters that use the sector definitions closest to those provided by Ho *et al*. (2008), using the information therein to identify the sectors potentially affected by the international reserve allowance program.

Source: CEI based on INDEC.

4.2. European Union

The European Union has historically played a leading role in environmental matters and in the implementation of sustainable green policies.

Apart from voluntary commitments to mitigate the effects of climate change, the European Commission resorts to trade agreements as a way of committing third countries to fight against climate change and transfer green technologies from market to market (Mandelson 2008). By means of trade preferences, the Commission offers tariff reductions to developing countries provided they have ratified and implemented environmental agreements. Within the Generalized System of Preferences (GSP), countries benefitting from the GSP-plus[36]

Since the early nineties, the European Commission has set up different initiatives related to climate change, both at domestic and Community levels (Unión Europea, 2009 a). It launched the European Climate Change Programme (ECCP) in 2000; this initiative encourages the use of electricity from renewable energy sources, establishes voluntary emission reduction commitments for the car industry and proposes the taxation of energy products.

One of the pillars of the Community policy to tackle climate change is the Emissions Trading System (ETS) set up in 2005. Community governments have imposed limits on the allowed annual emission of carbon dioxide for around 10,500 facilities (power stations and large combustion plants), which total almost half of the EU's emissions.

On 5 June 2009 the Commission introduced the Climate and Energy Package, which includes Directive 2009/29/EC (henceforth the Directive) amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme (Unión Europea, 2009 b). What follows refers to said Directive.

[36] Special Incentive Arrangement for Sustainable Development and Good Governance. This arrangement is intended only for those developing countries that the EU defines as 'vulnerable' due to lack of diversification of their export supply and poor integration into global trade. To date, 16 countries benefit from this regime: Armenia, Azerbaijan, Bolivia, Colombia, Costa Rica, Ecuador, Georgia, Guatemala, Honduras, Sri Lanka, Mongolia, Nicaragua, Peru, Paraguay, El Salvador and Venezuela. See Molle and Zamorano (2009).

i. Purpose

In March 2007, the European Council took on a unilateral commitment to reduce global GHG emissions by at least 20 percent by 2020, based on 1990 levels. The Commission is willing to reduce emissions by up to 30 percent provided that other countries make comparable efforts and that economically more advanced developing countries contribute adequately according to their respective capabilities and responsibilities.

The Emissions Trading System will be applied to all large industrial emitters, which according to the Directive are the following: refining of mineral oil, production of coke, steel, ferrous and non-ferrous metals, aluminium, cement, lime, glass, ceramic products, mineral wool insulation material, gypsum products, pulp, paper or cardboard, ammonia and other acids, chemicals, hydrogen, soda ash and sodium bicarbonate, transport of greenhouse gases by pipelines, and aviation. Sectors excluded from the ETS, such as construction, transport, agriculture and wastes, should reduce emissions by 10 percent of their 2005 levels.

ii. Subsidies, enhancement of competitiveness and tariffs

The European Community states that it will continue to play a leading role in negotiations towards an ambitious international agreement on climate change so as to limit global temperature increases.

According to Directive 2003/87/EC, by which the emissions trading system was implemented, in the period 2008-2012 member states shall allocate at least 90 percent of their emissions allowances free of charge, so that companies are able to adopt new environmentally friendly technologies without losing competitiveness.

As from 2013, free allowances will be gradually reduced with the aim of falling to zero percent in 2027. Nevertheless, should an international agreement on climate change not be signed, the Directive provides for temporary exceptions for those industries exposed to the risk of carbon leakage due to the amount of energy they use. These industries must be identified no later than 31 December 2009. The Community shall then allocate 100 percent of emission allowances to the affected sectors free of charge. The Community shall analyse the measures to be taken and the industries involved so as to avoid overcompensation. Once the Community has approved an international agreement on climate change establishing mandatory GHG emission reductions comparable to those imposed by the Community, the Commission shall revise these measures so that emission allowances may be allocated free of charge only when this is fully justified in the light of the agreement.

The deadline for the Commission to assess the situation, engage in consultations with relevant social interlocutors and, in the light of international negotiations, table a report together with their proposals is 30 June 2010. Assessment should be based on the inability to adapt to measures and the consequent market loss in favour of extra-Community facilities not taking comparable emission reduction measures.

Large energy-intensive industries exposed to significant risk of carbon leakage shall be entitled to receive more emission allowances free of charge than they would receive if they were not exposed to said risk.

Although the Directive does not impose tariffs on imported products based on their carbon content, it does state that an effective carbon equalisation system could be introduced with a view to putting Community installations on an equal footing with third-country installations. Nonetheless, it does not specify what these measures could be.

The Directive states that such a system could apply requirements to importers that would be no less favourable than those applicable to installations within the Community, for example, regarding the surrender of allowances.

According to the Directive, any action taken would need to be in conformity with the principles of the UNFCCC, in particular the principle of common but differentiated responsibilities and respective capabilities, taking into account the particular situation of least developed countries. It would also need to be in conformity with the international obligations of the Community, including the obligations under the WTO agreement.

Regarding the use of border tariffs to avoid carbon leakage, the former EU Trade Commissioner Peter Mandelson affirmed that these tariffs are intended to punish free-riders who do not sign up to a global climate deal and who, therefore, do not bear the competitiveness costs of paying for the carbon they emit (Mandelson, 2008).

iii. Support for third countries

The Directive stipulates that, when the emission allowance auction proceeds are used, special attention should be given to least developed countries. Their adaptation to the impact of climate change should be facilitated. These benefits shall be made effective provided that said countries have ratified either an international or a bilateral agreement with the Community.

4.3. Developing countries: the cases of China and India

Although non-Annex I developing countries are not internationally obliged to present a national gas reduction scheme, several governments have implemented national policies aimed at achieving sustainable development and mitigating climate change effects. Any action taken by developing countries, either voluntary or internationally agreed, is of the utmost importance to the struggle against climate change.

Most developing countries are currently implementing domestic policies to reduce GHG emissions and make production processes more energy efficient. However, developing countries other than Russia have no mandatory reduction commitments before 2012. As is the case in other negotiation spheres, developing countries share a common position as regards what should be expected of them and what available means they have to reach global goals. Any concrete measure necessarily requires the transfer of technology and financial resources. These measures should also be in line with national development and eradication of poverty.

The People's Republic of China's stand on environmental negotiations is crucial for the achievement of global emission reduction objectives, since China and the United States are the two largest GHG emitters. As a developing country, it has undertaken no mandatory emission reduction commitments under the current regime. Nevertheless, it is an active participant in the Clean Development Mechanism (Pew Center on Global Climate Change, 2007) and has voluntarily adopted a series of energy and industrial mitigation policies with the aim of increasing energy efficiency and curbing emission growth.

The eleventh five-year plan of the Chinese government includes a programme to enhance energy efficiency at the national level, so as to reduce energy intensity by 20 percent below 2005 levels by 2010. A plan to improve energy efficiency in the 1,000 largest Chinese companies has also been launched. The use of energy shall be monitored and each plant shall commit to develop an improvement plan.

India, one of the largest GHG emitters, has several environmental policies in place which, although not motivated by environmental concerns, contribute to mitigation since they either reduce or prevent emissions. A recent study carried out by The Energy and Resources Institute (TERI) of India concluded that, if the current policies were not in place, emissions would be 20 percent higher in 2021 and 2031 compared to a scenario with no exogenous changes—a so-called 'business-as-usual' scenario—(Pew Center on Global Change, 2008 a).

Developing countries have not used trade policy instruments, except for China, whose Finance Ministry increased export duties on products from energy-intensive industries in November 2006. It imposed a tariff of 15 percent on copper, nickel, aluminium and other metals; of 10 percent on primary products from steel; and of 5 percent on oil, coal and coke. The aim of this measure was to discourage exports of energy-intensive products and to preserve domestic sources of energy.

5. Adaptation to mitigation measures: financial resource and technology transfer

The previous sections (3 and 4) dealt with the fact that developed countries which have assumed emission reduction commitments to tackle climate change are currently considering the implementation of mitigation measures, such as carbon taxes and emissions trading systems. Although certain developed countries justify said measures on the grounds that exports from Annex I countries could eventually lose competitiveness against exports from non-abating countries, said initiatives might have trade-distorting effects for carbon-intensive products.

In this context, it is deemed essential to ensure that the future climate change regime prevents the transfer of mitigation costs to developing countries if those Parties assuming reduction commitments impose certain response measures which might have adverse effects on developing countries' export competitiveness. The possibility of the richest economies applying trade-restrictive measures to developing countries—on the grounds of climate change mitigation—might be detrimental to the latter's export outlook. In particular, countries with an energy-intensive and highly GHG-emitting export structure—mostly developing countries—will suffer mitigation trade measures more intensely than countries that have consolidated an export matrix with higher technology content and lower GHG emission intensity.[37] Costs arising from climate change mitigation would thus be transferred to developing countries, which have not historically been the largest GHG emitters.

Therefore, developing countries need to adapt to mitigation measures so as to respond to said measures and minimise their adverse effects. With the aim of minimising the negative impacts of climate change mitigation measures on developing countries and achieving the least costly adaptation of their economies, an effective technology and financial resource transfer to these countries should be assured, as set forth in paragraphs 1 (d) and (e) of the Bali Action Plan.

It must be borne in mind that technology transfer encompasses two aspects: one relates to the incorporation of technology into either physical assets or capital goods; the other refers to knowledge, production methods and information, i.e., intangibles connected with the corresponding technology (OMC and PNUMA, 2009: xi and 47). In this sense, technology transfer refers not only to the possibility of acquiring the capital goods available in the international market, but rather to the second aspect, relating to capacity-building so that developing countries can transform their energy-intensive production schemes into environmentally friendly ones and gain access to cutting-edge technologies (that is, latest generation technologies rather than obsolete ones) under preferential conditions.

Therefore, current negotiations for a new climate change regime should guarantee that developed countries encourage the use of sustainable production methods by developing countries. This requires an understanding of technology transfer not just from the commercial point of view, but rather as something beyond technical

[37] Samaniego (2009: 85-86) and Kejun, Cosbey and Murphy (2008: 5).

cooperation and assistance or the liberalisation of environmental goods and services fostered by developed countries in the negotiations taking place within the WTO Committee on Trade and Environment in Special Session.[38]

Only by giving concrete content to technology transfer in developing countries and dealing with those factors which might hamper the incorporation of environmentally friendly technological advances in these countries will it be possible to prevent the transfer of mitigation costs—which should be assumed by developed countries pursuant to the principle of "common but differentiated responsibilities"—to developing economies.

Although the IPCC Fourth Report states that there are several mitigation technologies in the market at present (Pachauri and Reisinger, 2007: 60), the transfer of technology to developing countries has not materialised yet. One of the factors which have not contributed to this transfer is the protection of intellectual property rights (patents) that grant exclusive use to their owners and allow them to limit the availability, use and development of technologies, which thus increases the cost of acquiring them.[39] The problem lies in that companies from developing countries lack the necessary financial means to access the expensive patented technologies which could be used to tackle climate change.

In this context, it is deemed necessary to revise how intellectual property rights and current patent systems hamper developing countries' access to new technologies and their ability to afford them (Lowenstein, 2008). It should be thus reconsidered whether WTO provisions facilitate a prompt dissemination and transfer of technology to developing countries, particularly in terms of emission reduction technologies.[40] In relation to this, it should be borne in mind that, within the framework of the WTO, technology transfer is related to the incentives and flexibilities provided for in paragraph 2 of Article 66 and Article 67 of the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS).

Although Article 66.2 of the TRIPS Agreement refers to incentives aimed at promoting and encouraging technology transfer from developed country Members to least-developed country Members, the extension of these provisions to developing country Members could be pondered. In turn, Article 67 states that "…developed country Members shall provide, on request and on mutually agreed terms and conditions, technical and financial cooperation in favour of developing and least-developed country Members…"

In general, this would enable a flexibilisation of the TRIPS Agreement, for example as regards the granting of compulsory licences to produce technological products related to climate change mitigation and adaptation. In this case, paragraph 6 of the Doha Ministerial Declaration on the TRIPS Agreement and Public Health could be taken as an illustrative example for climate change-related technologies, since it instructs the TRIPS Council to find "an expeditious solution to the problem of WTO Members with insufficient or no manufacturing capacities in the pharmaceutical sector which could

[38] According to paragraph 31 (iii) of the Doha Ministerial Declaration of November 2001, WTO Members have agreed to pursue negotiations on "the reduction or, as appropriate, elimination of tariff and non-tariff barriers to environmental goods and services", within the framework of the WTO Committee on Trade and Environment in Special Session. In this context, developed countries promote the definition of lists of environmental goods and services, so as to reduce or eliminate the tariffs levied on them, while certain developing countries, such as Argentina and India, further a more comprehensive approach, by which preferential access would only be given to goods used in specific national environmental projects and only for the duration of the specific project. See the Communication from Argentina to the WTO (OMC, 2005) and from Argentina and India (OMC, 2007 a), and Fastame and Niscovolos (2007).

[39] Hutchison (2006) and Littleton (2008), cited in OMC and PNUMA (2009: 49).

[40] Samaniego (2009: 82-83).

face difficulties in making effective use of compulsory licensing under the TRIPS Agreement".[41]

On the other hand, since "strong patent protection helps to minimize the effects of innovation spillover away from the developing firm" (Pew Center on Global Climate Change, 2008 b), the endogenous capacity of developing country firms should be incentivised so that they can develop clean and less carbon-intensive technologies by themselves. A low-carbon investment regime might be necessary to achieve effective technology transfer, which is in turn necessary to improve developing countries' export competitiveness and, therefore, to attain sustainable development (Samaniego, 2009: 83-84). This would require taking into account international regulations on investments, such as the WTO Agreement on Trade-Related Investment Measures (TRIMs). In this sense, it could be necessary to explore the possibility of imposing performance or domestic content requirements to foster endogenous development of technology in developing countries.

The projects provided for in the Clean Development Mechanism (CDM) should be noted as an additional means for technology dissemination and transfer. In this regard, it is worth mentioning that although the CDM has been the most active Kyoto Protocol flexibilisation mechanism worldwide and has gained impetus since 2005 (when the Protocol entered into force), its geographical distribution has been asymmetric and concentrated in the Asia-Pacific region, as was pointed out in Box 1.

In this context, the reduction or elimination of tariff and non-tariff barriers to the environmental goods and services used in the execution of CDM projects pursuant to the Kyoto Protocol, within the framework of WTO Doha Round negotiations, may constitute a means for developing countries to incorporate new and clean technologies. This could boost the growth of CDM projects, thus correcting the unequal regional distribution of CDM. Furthermore, it would contribute to the development, dissemination and transfer of new technologies in developing countries.

In short, it is crucial to improve the environmental and energy performance of developing countries through an effective technology and financial resource transfer that enables the productive restructuring of said countries' economic matrix towards less carbon-intensive energies.

Only thus will it be possible to reduce the negative impact of mitigation measures adopted by developed countries, preserve export competitiveness and maintain growth levels compatible with the economic and social development needs of developing countries.

[41] It is worth noting that on 30 August 2003, the WTO General Council adopted a Decision on the implementation of paragraph 6 of the Doha Declaration on the TRIPS Agreement and Public Health. This Decision provides for two exceptions: one relating to the obligations set out in paragraph f) of article 31—which stipulates that a compulsory licence should be issued predominantly for the supply of the domestic market—and another one relating to the obligations provided for in paragraph h) of the same article of the TRIPS Agreement—that is, the obligation to pay an adequate remuneration to the patent holder in cases of compulsory licensing. On 6 December 2005, the TRIPS Council adopted by consensus an amendment to the TRIPS Agreement, in relation to the implementation of paragraph 11 of the General Council Decision of 30 August 2003 on the implementation of paragraph 6 of the Doha Declaration on the TRIPS Agreement and Public Health (IP/C/41). This amendment could be inserted in the TRIPS Agreement as article 31 bis, which is currently under discussion and likely to be approved by WTO Members. For a possible Declaration on the TRIPS Agreement and Climate Change, see New (2009).

6. The current debate within the UNFCCC

In view of the forthcoming UNFCCC 15th Conference of the Parties (COP 15), to be held in Copenhagen in December 2009 and within the framework of the Ad-Hoc Working Group on Long-term Cooperative Action under the Convention, the Parties are currently discussing the key issues under negotiation which will have to be agreed upon in order to reach an agreement on climate change by the end of 2009.

Present negotiations show that developed and developing countries have clearly divergent views on the core issues under discussion for a new climate change regime: reduction commitments, financing, technology transfer, economic and social consequences of response measures, and sectoral approaches. These issues are further developed below, with a particular focus on the link between trade and climate change.

a. Mitigation in terms of emission reduction commitments

What is under discussion here is which countries should adopt mitigation commitments, and in particular what their legal nature and scope should be.

Developed countries—for example, the United States and Australia—propose making a distinction among developing countries according to their mitigation actions, so that the largest emitters—among developing countries—or those with greater capabilities and responsibilities, should implement quantifiable emission reduction actions. In this sense, developed countries reinterpret the principle of “common but differentiated responsibilities” and stress both the responsibilities that are “common” to all Parties regarding climate change and the fact that it is necessary for the most advanced developing countries to assume low-emission strategies.

In turn, developing countries—represented by the G-77 plus China—insist that the principles of the Convention should be respected, such as that of "common but differentiated responsibilities", according to which only developed countries must assume binding and quantifiable reduction commitments. These principles thus establish that the domestic mitigation actions that are appropriate for developing countries are different from developed countries’ quantifiable mitigation commitments due to both their magnitude and their voluntary nature. In this sense, developing countries insist that the proposals must take into account this distinction as well as developing countries’ legitimate priorities in the context of sustainable development, so as to avoid non-differentiated mitigation across-the-board by all Parties.

b. Funding

Current negotiations are focused on determining where the necessary funding for climate change mitigation and adaptation should come from, given the divergent views of developed and developing countries on the source of funds—public and/or private—and on the role of market mechanisms and trade-related measures in the future climate change regime.

In turn, developed countries—among others, the European Community, the United States, Canada and Australia—stress the importance of private funding, assigning a key role to market mechanisms—such as emissions trading at the sectoral level—and to the creation of a global carbon market. Likewise, they consider that the countries that are most vulnerable to climate change should be given public funding and they support initiatives to create a contingency fund, to which all Parties to the Convention would contribute financial resources to offset the impact of climate change. The magnitude of each country’s contributions would depend on criteria such as the country’s total emissions, per capita emissions and gross domestic product (GDP).

On the other hand, through the G-77 and China, developing countries insist that developed countries commit to providing public funding, on the grounds of equity and

of the principle of "common but differentiated responsibilities". Thus, funds shall be contributed mainly by developed countries' public sector, and market mechanisms shall be understood as supplementary to public funds in industrialized economies. In this sense, they emphasize that the proposals which include developing countries as potential contributors to mitigation and adaptation funds are unacceptable. Moreover, they express concern about funding initiatives based on trade instruments, such as carbon tariffs imposed on civil aviation emissions and on international sea transport, on the grounds of their link to the principles set forth in the Convention—the promotion of an open international economic system that would lead to sustainable economic growth and development in all Parties[42]—and their link to the multilateral trading system principles. Furthermore, they point out the need for a financial mechanism to be enforced by the Conference of the Parties to the UNFCCC and the importance of a mechanism for monitoring, reporting on and verifying financial agreements.

c. Technology transfer

This issue has proved to be one of the most controversial as developed and developing countries disagree as to what should be understood as technology transfer and how technology could be transferred in the best and most effective way. First, current negotiations reveal that there are different interpretations of the concept of technology transfer.

As was analysed in Section 5, developed countries consider that technology transfer would best be ensured through the protection of intellectual property rights, technical cooperation and assistance, and/or the liberalisation of environmental goods and services currently under negotiation within the WTO. In this context, it is worth noting that during the last informal consultations regarding the climate change regime, held in Bonn, Germany, on 10–14 August, the United States claimed they would not accept a reduction in the protection of intellectual property rights in the new regime to be agreed upon in Copenhagen, on the grounds that these are crucial to technological innovation.

In turn, developing countries consider that effective technology transfer requires the removal of obstacles resulting from the protection of intellectual property rights. In this regard, some developing countries deem it necessary to innovate in the field of climate change-related intellectual property rights, since this issue is crucial to the survival of humanity. They also demand further analysis of the flexibilities contained in the TRIPS Agreement so as to adequately respond to the challenges posed by climate change.

d. Economic and social effects of climate change response measures

Current negotiations reveal divergences between developed and developing countries regarding the application of trade-related measures to address climate change and regarding their scope and the way of addressing the economic and social consequences of said response measures. First, it should be borne in mind that current debates refer to the inclusion of these trade measures in the new climate change regime, and that they will be probably enforced at the national level. In this sense, as was pointed out in section 4, developed countries are currently designing trade-related mitigation measures with the alleged intention of "levelling the playing field" between abating and non-abating countries so as to prevent "carbon leakage" to countries that have not assumed any emission reduction commitments.

Developed countries claim that the WTO is the proper forum in which to discuss measures relating to trade and climate change, while developing countries have insisted that these issues should be discussed not only within the WTO but also within the UNFCCC, on the grounds that they are related to the mandate of paragraph 1 (b) (vi) of the Bali Action Plan to discuss the "economic and social consequences of

[42] See article 3.5 of the UNFCCC and Section 2 of this paper.

response measures", and to the principles of the Convention to promote an open international economic system.

In this respect, it is worth noting that during the last informal consultations on the climate change regime, held in August 2009, the G-77 and China have adopted a unified position on this issue expressed along the following lines:

- All developing countries will suffer the economic and social consequences of response measures. Policies and measures should take into account the potential negative consequences for developing countries, and consideration must be given to concrete remedies in order to minimize any such consequences.

- Developed countries are in the process of designing and implementing measures—such as carbon border adjustment measures, carbon tariffs and carbon footprint labelling—which could have distortive effects on international trade, restrict the exports of developing countries and negatively affect the workers of those sectors that would face response measures, and therefore hinder the social and economic development of developing countries.

- Developed countries should not adopt unilateral trade restrictive measures against developing countries in contravention of the provisions of the UNFCCC. Otherwise, developed countries would be passing on their mitigation burden to developing countries, and this would contravene the principles and provisions of the Climate Change Convention, in particular, the Convention's principles of equity, "common but differentiated responsibility", and the principle enshrined in article 3.5 of the UNFCCC.[43]

- There is a need for concrete action related to funding and technology transfer for developing country parties, and for the establishment of a mechanism, such as a forum, to identify and minimize the adverse economic consequences of response measures by providing support for the integration of economic diversification into sustainable development strategies, encouraging direct investment—in particular through technology transfer from developed countries—addressing the extent to which measures taken to mitigate climate change constitute restrictions to trade and removing the barriers for an effective transfer of technology and of financial resources.

On the other hand, while developed countries insist on attaching more importance to the positive consequences of response measures—such as the competitiveness certain companies would gain from technological innovation and job creation—developing countries stress that the focus should be placed on the negative consequences of response measures, such as trade-distorting effects, the increase in administrative costs and the social consequences for workers from the sectors that would be most affected by these measures.

Furthermore, developed countries agree on the need to share more information on the consequences of response measures. In contrast, developing countries insist that it is necessary to go beyond merely sharing information, and that concrete action should be taken in order to prevent and address the impact of response measures on developing countries' trade.

e. Sectoral approaches

Developed and developing countries also disagree on the issue of how useful sectoral approaches are for mitigation purposes. This approach refers to the establishment of a standard or benchmark for the reduction of emissions or for the use of certain specific technologies or technological advances within a certain sector or subsector—among others, aluminium, steel, cement, paper, transport and agriculture.

[43] See article 3.5 of the UNFCCC in Section 2 of this paper.

Since the start of climate change regime negotiations, there has been considerable debate over the usefulness of sectoral approaches, in contrast to a comprehensive approach that involves all GHG sources regardless of the emitting sector.[44] In this regard, the UNFCCC has adopted a comprehensive approach, covering all greenhouse gas sources and sinks generated by all sectors. The Convention thus establishes that the policies and measures taken to reduce or limit GHG emissions should involve “all economic sectors”, promoting the development and transfer of technology in “all relevant sectors” (articles 3.3 and 4.1 c). Along similar lines, instead of establishing separate sectoral protocols, the Kyoto Protocol set comprehensive emission limits, covering the main six greenhouse gases through the emissions trading system. The sectoral approach is present in the negotiations currently being held within the Negotiating Groups under the UNFCCC.

In general, developing countries claim that, in terms of technological cooperation, sectoral approaches should be voluntary in nature instead of tied to a mandatory definition of universal standards. Actions—including sectoral actions—should be compatible with article 3.5 of the UNFCCC, promoting an open international economic system and excluding proposals that constitute a restriction on international trade. They also maintain that it is necessary to take into account article 4.1 (c) of the UNFCCC, which refers to technology transfer in all relevant sectors, and the chapeau of this article, which refers to “specific national and regional development priorities, objectives and circumstances". They insist on the need to prevent harmonization of sectoral emission intensities, since it would be impossible for a sector to achieve this due to intra-sectoral differences.

In turn, developed countries state that sectoral approaches have the potential to reduce emissions in developed and developing countries, favouring technology transfer, particularly to developing countries, and also offer opportunities for cost-effective mitigation.

On the other hand, sectoral approaches that refer to international maritime and air transport deserve a separate mention. In this regard, some developed countries insist on the need for both developed and developing countries to include international transport emissions within the Copenhagen agreement sectoral approaches by a binding commitment at the global level. In turn, developing countries claim that only the Parties included in Annex I should limit emissions from international transport, according to article 2.2 of the Kyoto Protocol and to the principle of "common but differentiated responsibilities", and that this should be negotiated in competent fora, such as the International Civil Aviation Organization and the International Maritime Organization. In this regard, international aviation sectoral approaches should not affect developing countries and should be cooperative, respecting the differentiation between UNFCCC Annex I and Non-Annex I Parties.

[44] See Bodansky (2007) for a discussion on sectoral approaches.

7. Final comments

As happens in other spheres of negotiation, environmental issues—particularly those relating to climate change—are intertwined with other related issues by the complexities of the current international scenario. The decision to adopt a certain position or the desire to contribute to improving the environment in the long term cannot be analysed separately from the collateral effects of mitigation measures. National policies have an impact on the international scenario, and this in turn constitutes a straitjacket for domestic policies and for highly polluting industrial sectors.

Regardless of the link between environmental and trade policies, the crux of negotiations will be whether or not to take part in an international cooperation scheme, facing the benefits and costs of the corresponding measures.

In this context, it will be crucial for developing countries that the international regime eventually agreed upon to respond to climate change does not imply hidden restrictions on trade and does not worsen current economic asymmetries. On the road to Copenhagen, the international community faces the challenge of tackling climate change without compromising sustainable development, which should be the guiding principle of the negotiations.

Moreover, Copenhagen negotiations should contemplate the fact that, in the future, developing countries could adopt trade-related measures as a response to developed countries' mitigation measures with an impact on trade. This could lead to a trade war and reprisals that would be far from compatible with the principles and goals of the multilateral trading system. This would consequently trigger controversies that would have to be dealt with by the WTO dispute settlement system, yielding uncertain results, since there have been no cases relating to the trade effects of climate change mitigation measures so far (Quick, 2008).

On the other hand, due to the fact that developing countries lack access to developed countries' cutting-edge technologies—which are necessary to reduce emissions generated by production processes—exports originating from developing countries would be the most affected by trade-related response measures.

In this context, developed and developing countries should reach an agreement in order for the latter to receive technology and resource transfers so as to reach global emission reduction targets. Historical emissions, which date back to the Industrial Revolution, correspond to northern hemisphere countries. It is for this reason that these countries bear more responsibility in this matter, as stated in the UNFCCC.

Among developed countries, it is the European Union that has taken the lead in environmental issues, since they have been implementing unilateral policies for several years and are willing to deepen their emission reduction scheme even further, as long as other actors also do so.

On this issue, the United States has repeated the same course of action it had followed on other relevant international issues: it has waited for others to make the first move before deciding its domestic policy. It was not until the Obama administration took office that environmental concerns became a political priority, since these had been one of the central issues during the election campaign. The US Congress is currently discussing the Clean Energy and Security Act, which may or may not become law before the Copenhagen summit. Although there have been previous bills, this is the first time the bill might actually become law and have extraterritorial effects through trade-policy instruments. These instruments would particularly affect imports of goods originating from countries which have not adopted the same environmental standards as the United States or which are not party to any eventual international agreement.

With or without cooperation and regardless of whether an agreement is reached in Copenhagen to effectively, comprehensively and lastingly implement the Convention, trade-related environmental issues are very likely to end up being tackled within the WTO. Furthermore, as most countries are taking part in this forum, developing countries should be watchful of this process in order to prevent developed countries from using the argument of defending competitiveness and preventing carbon leakage in order to impose carbon tariffs or take equivalent actions.

In any case, several developing countries have already taken appropriate mitigation actions and actions to efficiently use energy and other resources. It can be stated that the main international actors share a strong commitment to the environment. However, as is well known, not all of them have the same technologies or resources necessary to make progress towards a radical change in production processes. In this regard, if the current pattern of GHG emissions is to be corrected and sustainable development achieved, it will be crucial for there to be cooperation, technology transfer and financial resource transfer from developed to developing countries according to historical responsibilities, the principle of common but differentiated responsibilities and that of equity.

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