

THE GLOBAL CARBON MARKET

PERSPECTIVES TO BRAZIL

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I - HISTORICAL PERSPECTIVES

Since the 1960s, the scientific world community has started to become aware of the effects known as greenhouse gases (GHG¹) on global warming and its consequences to human society and earth ecosystem. Environmental pollution intensified and became more widespread. Consequently, environmental awareness was heightened in the developed countries, spawning new environmental ideologies and thinking. With the re-birth of environmentalism at that time, the first green activist groups realized that the planet Earth is a living body and all people as well as all countries are responsible for keeping the planet healthy, for its own benefit.

The first theoretical economic papers that analyzed the effects of pollution on human behavior were formulated during the 1960s. One of the first economists to devise marketable mechanisms to mitigate pollution was J.H. Dules (1968) with the idea of marketable permits.

¹ The main GHG are: Carbon-Dioxide (CO₂), Methane (CH₄), Nitrous Oxide (N₂O), CFC - 12, HCHC-22, Perfluoromethane and Sulphur Hexa-Fluoride (see table page xxx).

Coase (1960) highlight the theory of market solutions to externalities, which spawned a large literature of its own.

In 1970, the United States government established the Environmental Protection Agency (EPA) in order to consolidate into one single agency a variety of federal research, monitoring, standard setting and enforcement activities ensuring environmental protection to American citizens. In 1972, the Stockholm Conference on the Human Environment resulted in the establishment of the United Nations Environment Programme. At last, the world community was awakened to global warming problem.

However, very little had been done during the 1970s and the 1980s to mitigate the harmful effects of the emission of GHG over the atmosphere. Indeed, a substantial growing in the emissions of GHG was observed, mainly by the US, Europe and former the Soviet Republic and its satellite countries².

The first big conference about the effects of human activities on the Earth's climate was held in Toronto, Canada³, on June 1988. In November, the United Nations created the Intergovernmental Panel on Climate Change: a work group to study, analyze scientifically, and suggest actions for a future international agreement to deal with the problem of global warming. As of the understanding firmied in 1992 in Rio de Janeiro City, Brazil - a conference popularly known as the "Rio Earth Summit - three international treaties were agreed upon to deal with climate change and its effects on biodiversity and desertification.

²The United Nations Framework Convention on Climate Change (UNFCCC)

³The Changing Atmosphere: Implications for Global Security

More than 150 countries ratified the Convention⁴ with the objective of establishing a global strategy to diminish GHG. Brazilian congress ratified the convention in February 28, 1994. When governments adopted the Convention, they knew that their commitments would not be sufficient to seriously tackle climate change.

The Kyoto Protocol was adopted at the third Conference of the Parties (COP3) in Kyoto, Japan, on December 11, 1997. The protocol has now been issued as part of the COP3 report and it is an international political commitment to reduce emissions of GHG in an attempt to slow global warming. In order to become a reality the protocol must be ratified by 55 countries that produce 55 per cent of the developed world's 1990 carbon dioxide emissions.

The Kyoto Protocol was threatened of being only a piece of useless paper during the last years because several countries such as the United States⁵ and the Russian Federation, another big emission gas polluter, denied ratification of the treaty. However, after being pressured by the European Union, in November 2004, Russian Parliament ratified the protocol and in February 18, 2005, in a commemorative ceremony, in Kyoto, the Protocol finally entered into force.

Under the Protocol, it was agreed to reduce their collective emissions of GHG of at least 5% from 1990 levels in the commitment period 2008–12. The target to reduce GHG is different for each party. Three main

⁴ Nowadays more than 180 countries are Parties to the Convention.

⁵ Besides USA, other three industrialized countries have not yet ratified: Australia, Liechtenstein and Monaco. Australia and the United States have stated that they do not plan to do so; together they account for over one third of the GHG emitted by the industrialized world. Croatia, Kazakhstan, and Zambia have not also ratified.

groups were created according to specific commitments. The industrialized countries that were members of the Organization for Economic Co-operation and Development (OECD) and countries with economies in transition (the EIT Parties), including the Russian Federation, the Baltic States, and several Central and Eastern European States are all referred to as Annex I Parties. Annex II Parties consist of the OECD members of Annex I, but not the EIT Parties. The third groups are called Non-Annex I Parties and are mostly developing countries.

According Kyoto Protocol the Annex II Parties:

“...are required to provide financial resources to enable developing countries to undertake emissions reduction activities under the Convention and to help them adapt to adverse effects of climate change. In addition, they have to "take all practicable steps" to promote the development and transfer of environmentally friendly technologies to EIT Parties and developing countries. Funding provided by Annex II Parties is channeled mostly through the Convention's financial mechanism”

Developing countries, such as Brazil, India and China, do not have to commit to reducing GHG in the first phase of the protocol reductions because their per-capita emissions are much lower than those of developed countries and they have not contributed significantly to today's levels of pollution - that has been the product of the developed world's Industrial Revolution. This proposal is known as “Brazilian Proposal” and was firstly presented during the negotiations on the Kyoto

Protocol, by the delegation of Brazil, in May 1997, to set differentiated emission reduction targets for countries according to the impact of their historic emissions on temperature rise.

The Protocol does not prescribe how the reduction targets should be met, but proposes three mechanisms, which are designed to help developed and developing countries reduce the cost of meeting their emissions goals:

- The Clean Development Mechanism (CDM) will grant countries credits (called certified emission reductions) for financing developing-country projects that limit emissions and promote sustainable development.

- A Joint Implementation Programme (JIP) will offer allowances (emission reduction units) for contributions to projects in other developed countries (including the countries of Central/Eastern Europe and the former Soviet Union).

- An International Emissions Trading Scheme (ETS) will allow all countries to buy and sell emissions credits among themselves.

Almost at the same time of the Kyoto Protocol entered into force on February 18, 2005, the first Clean Development Mechanism (CDM) project was formally registered – marking the operationalisation of this crucial market mechanism. The NovaGerar landfill gas-to-energy project, a Brazilian project under development by environmental consultants EcoSecurities, engineering, and construction firm SA

Paulista and the World Bank became the first CDM project to be officially registered.

II - THE CURRENT STATE OF THE GLOBAL CARBON MARKET

Basically there are two types of assets that are traded on the so-called world carbon market. Emission Allowances that were created under a cap-trade regime⁶ such as, for example, Assigned Amount Units (AAUs) under the Kyoto Protocol. The main markets for this kind of assets exchanges are EU Emission Trading Scheme, The Chicago Climate Exchange (CCX), UK Emission Trading Scheme and New South Wales GHG Abatement Scheme. The second type, Project-Based Emission Reductions, i.e., GHG certified emission reductions (CERs) generated by a specifically designed project created to reduce GHG emissions. Those kinds of projects can be as target Kyoto pre-compliance or not for Kyoto compliance.

Most of the volumes of trades in the carbon market are from project-based transitions such as those intended for compliance with the Kyoto Protocol (CDM and JI Mechanisms). In 2003, in the carbon market, it was exchanged the equivalent to about 80 million metric tonnes of carbon dioxide, and this growth rate has been steady over the last years. Although Emissions Allowances transactions represent about

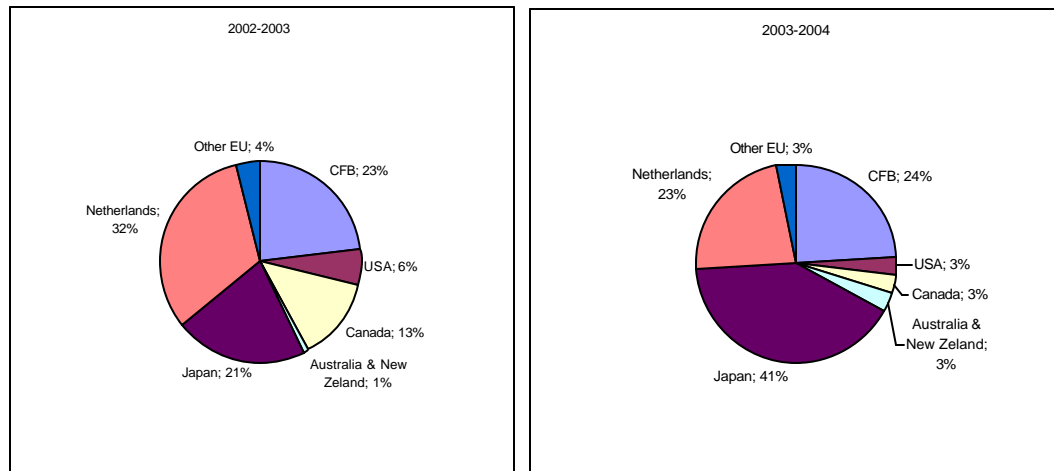
⁶ A cap-trade system is an emissions trading system, where total emissions are limited or 'capped'. The Kyoto Protocol is a cap and trade system in the sense that emissions from Annex B countries are capped and that excess permits might be traded. However, normally cap and trade systems will not include mechanisms such as the CDM, which will allow for more permits to enter the system, i.e. beyond the cap.

70% of total transactions, in 2004 it represented just 3% of the total volume of assets exchanged. The average project size is 500,000 tCO₂e⁷ in Eastern Europe and over a million in Latin America.

An intense growth in the number of Emissions Allowances exchange is expected after the ratification of Kyoto Protocol in February of this year. According to PointCarbon, the leading global provider of market intelligence and forecasting for the emerging carbon emission market estimates, the EU Emission Trading Schemes (EU-ETS) will be responsible for 2.1 billion tonnes of CO₂ per year, about 50 times the total quantity of allowances available in the United States SO₂ allowance trading market in year 2001. The most recent data suggest that the system will cover approximately 13,000 installations in EU.

There are two big buyers in the carbon market: the World Bank (through the Prototype Carbon Fund) and the Government of the Netherlands (through various agencies and intermediaries) which, together with Japanese companies, accounted for virtually 90% of the demand in 2003-2004 (see figure below). Unfortunately, the participation of Canadian companies and United States has been gradually declining over the last years, particularly because of lack of federal requirements in these countries to constrain GHG emissions.

⁷ Metric tonnes of carbon dioxide equivalent



The supply side of carbon market is also very concentrated but the total of the CERs from a project which reduces GHG emissions has been growing steadily during the last years. In the early years, the CERs transactions took place in industrialized countries with very few transactions with developing countries but this situation has evolved fast. According the World Bank, the share of CERs contracted in transition economies and developing countries rose steadily from 38% in 2001 to 60% in 2002, 88% in 2003, and 93% in the first months of 2004. Five countries (India, Brazil, Chile, Indonesia, and Romania) represent two thirds of the supply in terms of volume.

Latin America's participation has dropped over the last years. The region, which used to be responsible for up to 40% of CERs, today has around 27% of participation in it. Such a drop is due mainly to the increase of investments from Japan in the region, since Japanese companies are today the single largest buyers in the carbon market.

The next figures represent the location of emission reduction projects in share of volume supplied

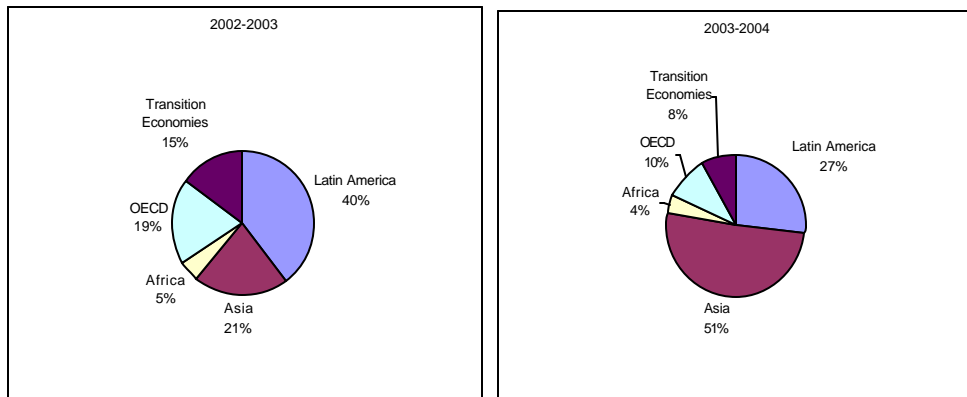
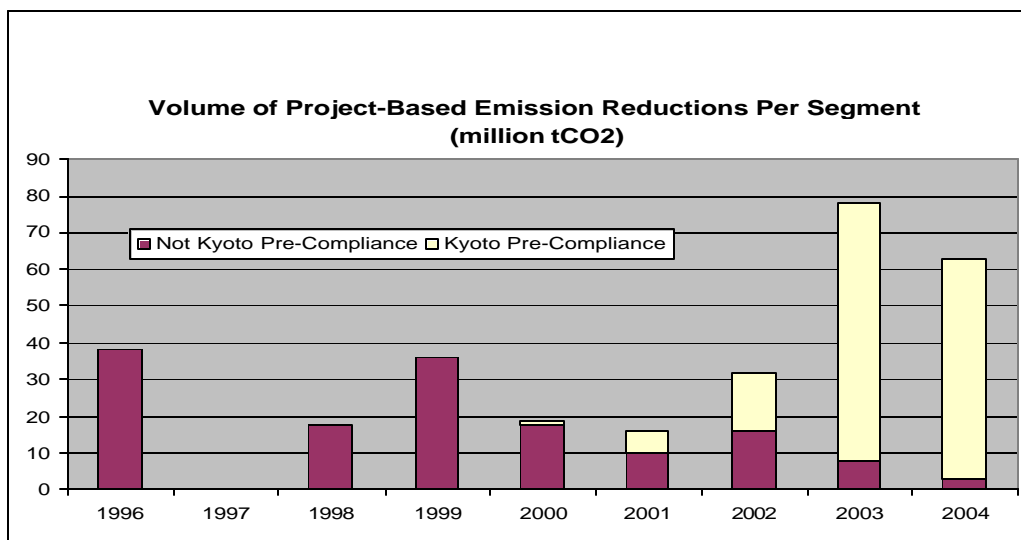


Figure: Location of projects by type of buyer January 2003 – May 2004 (in million tCO₂e)



III - THE FUTURE OF THE GLOBAL CARBON MARKET

Many factors can undermine the growth and the development of a global carbon market. The debates about global warming are still very tense between scientists and economists. Therefore, it is not yet a consensus within the scientific community that the human being has the ability or capacity to control the world climate.

According to Fred Smith⁸ and Patricl J. Michaels⁹, global warming lacks the scientific proof to meet the premises of the Kyoto Protocol and, according to Philip Stott¹⁰, one of the greatest opponents of the idea, considers it the most inefficient, bureaucratic and expensive of all the procedures to control emissions of GHG. Another great critic of the Protocol, Bjorn Lomborg, author of the best seller “The Skeptical Environmentalist”, also shares these criticisms. For him, the Kyoto Protocol will cost \$150 billion per year, money that could be better applied to combat of malnutrition, malaria, AIDS and other programs sponsored by developed countries and unilateral organizations. We could be witnessing the creation of a new generation of bureaucrats that would have as a function to control - through a myriad of laws, norms and instruments - in a discretionary way, without an effective gain to society as whole, the mechanisms of the Protocol. This would generate additional and unnecessary costs that would be a burden to citizens in both developed and underdeveloped countries.

⁸ from Competitive Enterprise Institute;

⁹ from Cato Institute and author of “The Satanic Gases”;

¹⁰ professor emérito de biogeografia na Universidade de Londres;

The last great criticism of the Kyoto Protocol and its harmful effects on the economies of the signatory countries come from the main economic adviser of Russian president Putin. In a recent article published in the Financial Times¹¹, Andrei Illarionov compared the economic growth of 17 pro-Kyoto high-income countries with 11 non-following countries (including US, Australia and South Korea). He has concluded that, between 1997 and 2004, the average GDP growth was 3.3% for the non-following countries and only 1.9% for pro Kyoto countries. The validity of his arguments can be challenged but the question that it must face is that the cost will be higher for the signatory countries to adjust to a new, less polluting energy matrix. One knows that the energy generated from fossil fuels is responsible for 80% of the energy consumed in the planet. To reduce these emissions, and therefore the generation of energy from fossil sources necessitates a brutal increase in energy efficiency.

The most common criticism made from non-following countries and, especially, the United States, it is that of the five greatest GHG polluters (in order USA, China, Russian, India and Brazil), today only the Russian Federation is obliged to reduce its emissions. Besides being responsible for 75% of the GHG emissions, the known Non-Annex I Parties together with the non-following countries are responsible for 68% of world GDP and almost for 90% of the world population. As you can conclude, the weight of the responsibility to follow the lines of direction of the protocol will fall again on a small parcel of the worldwide population, principally on the Europeans and Japanese.

¹¹ Financial Times November 15 2004;

The treaty has just gone into effect and already three countries are planning to build nearly 850 new coal-fired plants that would release five times as much carbon dioxide into the atmosphere as Kyoto aims to reduce. By 2012, the plants in three key countries - China, India, and the United States - are expected to emit as much as an extra 2.7 billion tons of carbon dioxide, according to a Monitor¹² analysis of power-plant construction data. In contrast, Kyoto countries by that year are supposed to have cut their carbon dioxide emissions by some 483 million tons.

China has not taken serious steps to reduce pollution levels. GHG emissions are still increasing apace, and it remains uncertain to what extent they would be willing to take actions or make more severe legislations to abate emissions targets post-2012. The only way the Chinese will take on emissions restrictions is if it can implement clean energy technologies that will allow its economy to maintain its present growth. Nonetheless, technology transfers from developed countries, on an exceptional scale, are likely the only way to bring about serious cutbacks in emissions while preserving economic growth. In this sense, most of the challenge lies with the industrialized countries to have a consensus in building a framework to efficiently transfer cleaner energy technologies to developing countries. Indeed, China's carbon dioxide emissions, projected to grow by 65% between 2000 and 2010¹³, will be larger than the total global increase between 1990 and 2001. China is now the second largest polluter in the world after the US, and worse than the entire European Union, according to UNFCCC and the World Bank. The nation is already the engine behind the present high global oil demand and two-thirds of its energy is currently supplied by coal, the

¹² The Christian Science Monitor, 2004

¹³ Pan, Jiahua: Chinas industrialization and reduction of GHG, China and the World Economy (2004).

dirtiest way to generate power (because when burned, it releases twice as much carbon dioxide per unit of energy as natural gas). China's GDP has been growing at exceptional rate during over the last 20 years and it is expecting an 8 percent average GDP in growth in the coming years. By no means is their energy demand liable to slow down anytime soon.

Another big issue that can weaken the Kyoto's mechanisms is that there are no financial penalties for those that do not meet their targets. If a country fails to meet their Kyoto targets, it will be required to compensate with accelerated rate of emission reduction after 2013. It will also have reduced ability to take advantage of flexibility mechanisms, such as international emissions trading, after 2013. This is considered a very weak mechanism of punishment and it may induce some countries to have a slack in their environmental responsibilities.

In Europe, some countries are already reconsidering its position on how much to obey the pollution targets set by the Protocol. The UK is in a legal battle against the European Union for more flexible carbon dioxide targets for its London industries. Italy is complaining about the high cost of adaptation and Spain, Portugal and Ireland are exceeding their emissions levels of GHG and are unlikely to reach their target levels by 2007-12.

Brazil is not free of criticisms, quite on the contrary. The Brazilian government issued, on December 8, 2004, the Brazilian Inventory of GHG Emissions, which, as published in the press, supposedly was delayed several times because the country figures in the list of the great countries that emit carbon dioxide and methane. Probably the delay

was due to fear that the country might face strong pressure to reduce its emissions. Up to now, we saw ourselves as potentially great sellers of certificates granting rights of polluting. Now, we find ourselves on the opposite end of what it would like and had planned on being, the country may face pressure to adopt concrete measures to reduce its GHG emissions. According to the inventory, 75% of Brazilian carbon dioxide emissions derive from burnings in the Amazon forest, and 80% of methane emissions – a gas 21 times stronger than carbon dioxide in increasing the greenhouse effect – are produced by emissions that originate from the flatulency (accumulation of gas in the stomach) of Brazilian cattle, estimated in 180 million animals, or almost one animal per person.

Many in the business community consider the Kyoto's mechanisms to reduce GHG emissions excessively bureaucratic and risk-prone – a view that has been reinforced by the continued stalling of the first two CDM projects due to be registered in World Bank¹⁴.

The highest expectations of the Kyoto success were deposited on Emissions Trading Scheme (ETS), which have become a legal and practical reality. According to financial experts¹⁵, this market-based approach will improve the efficiency and cost-effectiveness of emissions cuts and it will be a multibillion market during next years.

Even though the story of the global carbon market to date is a litany of complaints, disappointments and delays, the World Bank has seen far more activity than it foresaw five years ago. The Bank launched its Prototype Carbon Fund in November 1999 with the aim of channeling

¹⁴ The two projects were proposed to UK chemicals company Ineos Flour and local partners and both were related to destroy HFC23, a potent GHG which is a by-product of the manufacture of refrigerants

¹⁵ Environmental Finance Magazine

public and private capital into projects in developing countries that reduce GHG emissions.

Kyoto Protocol has been faced a two-fold criticism, mainly from the US federal government and from US energy companies, that its money would be better spent by directly financing clean energy projects instead of running a fund; and that it risked distorting a market that would be better developed by the private sector. It countered that this fund was meant but to be a mechanism to pave the way for investments from the private sector, and that no additional Bank funds were planned.

Although the World Bank's involvement in six funds over the last five years, there is still more to come. The six funds together amount to nearly 25% of all purchases of project-based carbon credits. While critics claim that the Bank's participation distorts the market for potential agents from the private sector, it is obvious that, along with the International Emissions Trading Association, it has done a lot to raise consciousness of the possibilities of carbon market finance and help lay the foundations for global trade to undertake this global problem

IV - PERSPECTIVES TO BRAZIL

Ever since understandings at a global level about GHG emission control have started, Brazil has stood out as a leader and an innovator among the other developing countries. The country was host to the “Rio Earth Summit,” considered the first great meeting among nations about Global Warming issues, and the cradle for the Kyoto Protocol. The proposal that defined different treatment for developed and developing countries within the mechanisms of Kyoto is known as the “Brazilian Proposal,” and the first officially recorded CDM project was from a Brazilian company. Soon the country will be the first among developing nations to have a market dedicated exclusively to businesses with carbon credits generated by CDM projects.

The Brazilian Mercantile & Future Exchange (BM&F) launched on December 6th, 2004 the “MBRE” Brazilian Carbon Trading Market, scheduled to start operations in 2005. MBRE will work as a platform for negotiating titles issued by projects that promote GHG reduction. The initiative intends to create a more professional, liquid, and transparent market for carbon credits, given that nowadays most businesses are done in a bilateral manner, which often contributes for reducing contract prices and for developing irregular prices. The first step to be given by BM&F is the development of a Bank of Projects for GHG Emission Reduction, so that proposals that should be presented may be transparent (as is the case in a primary stock market). On a second moment, it is planned the implementation of a trading system for a forward market of securities.

Some Brazilian states are already at work to take advantage of the business atmosphere that is arising with the beginning of the protocol. The government of Rio de Janeiro State, the state in which the Stock Exchange processing MBRE¹⁶ deals will be located, is preparing a program to subscribe to the Kyoto Protocol. The idea is to record emission reductions accomplished through incentives to the use of vehicular natural gas (VNG) and to obtain emission reduction credits or certificates that in the future may be negotiated on the international market. The state of Rio de Janeiro is the state where natural gas has the largest share in the energy matrix, accounting for 19.5% against 7% in the national average¹⁷. The state's incentives program for natural gas use has been demonstrating rapid growth, considering that, when it was first introduced in 1999, it applied only to the state's capital, whereas today it is present in 33 municipalities. Such rapid growth in the use of the VNG as an energy alternative should be intensified, as other states seek incentives mechanisms that increase the use of alternative fuels as a means of obtaining incomes generated from CDM.

A great market that opens itself up to Brazil, with the perspective of increase in the volume of carbon credit international transactions, is the export market of alternative fuels. Possessing good soil and climate conditions, Brazil is considerate an excellent country for production of biofuels such as those obtained from sugar cane alcohol, soy bean, sunflower, peanut, castor bean, and palm oil. Foreign companies interested in obtaining carbon credits through investments in biofuel

¹⁶ The Rio de Janeiro Stock Exchange (BVRJ), a wholly owned subsidiary of BM&F since 2002, will be the stage for negotiations of carbon contracts in Brazil, given the state's natural vocation for subjects referring to the energy market.

¹⁷ Rio de Janeiro State Energy Balance

production may either make direct investments or obtain carbon credits from Brazilian companies that produce these kinds of fuel.

The European market in special is a market with great potential for carbon credit trades through biofuel projects. Currently, there is strong pressure within the European Union that countries lagging behind in the compromises with the Protocol adopt more energetic measures to restrain increase in the levels of GHG emissions. Since 1993, the EU has made substantial efforts to build up a common, stable policy framework in European to foster market penetration for renewable energy sources. Seeking this goal, several countries of the European Union signed the Declaration of Madrid, which set up a 15% substitution of primary conventional energy demands by renewable energy sources by 2010. Today, only 14% of the energy the world uses comes from renewable sources, and renewable sources account for only 6% of the energy used by developed countries. Brazil has 40% of its energy deriving from renewable sources, and the country may sell it through CDM projects to countries and/or companies that may need to reduce their levels of GHG.

Another sector with great potential for attracting investments in CDM projects is the market for reforestation activities and treatment of residues (transformation of trash into a sanitary landfill). Almost all large Brazilian companies that operate in the paper and cellulose segment already have expertise and either develop or have developed reforestation and environmental recuperation projects. Aracruz Celulose, Votorantim Celulose e Papel, and Kablin are examples of Brazilian companies with international recognition in the environmental area. The first two companies are listed on the NYE American

Depository Receipts) and follow international standards in accountancy and for audit. In addition, Kablin was the first company of the world to receive the FSC (Forest Stewardship Council) certificate. One great advantage Brazil has over other nations – of which the country must take advantage – is that, being a country with vast territorial extension, and possessing vast areas still scarcely populated, land price is relatively very low, offering lower abatement costs and, consequently, greater opportunities of investment returns.

In order for Brazil to enjoy the benefits generated with negotiation of credits at the international level, it is pivotal that the country offers a transparent, stable institutional environment. Both foreign and Brazilian investors need to be sure that their investments will not be at the mercy of either political tides or economic turmoil, which are so common to developing countries. Brazil can maintain its comparative advantage in this market if it adopts rules that are compatible with a stable business environment. The country has already created in 1999 its Designated National Authority¹⁸, which is the Interministerial Commission on Global Climate Change. Presided over and staffed by the Minister of Science and Technology, it is the specific body that coordinates and articulates the actions necessary to develop institutional mechanisms aimed at fulfilling Brazil's original compromise regarding the United Nations Panel Convention on Climate Change. The Commission's first resolution established rules for projects that wish to obtain approval in the CDM sphere. Two projects have already been approved: The Vega sanitary landfill in Bahia State, and Nova Gerar, in Nova Iguaçu, Rio de Janeiro state (the first project in the world to be registered in the UN's executive

¹⁸ Kyoto Parties participating in the CDM shall designate a national authority to validate CDM projects in the respective countries.

Council). There are 29 CDM projects at present at different analysis stages in this Commission.

There is currently a bill in Brazilian Congress, introduced by Representative Eduardo Paes (PSDB-RJ) that attempts to organize and regulate future carbon credit transactions. The bill (PL 3552/04) outlines the issuing of titles (Certified Emissions Reduction – CER) in CDM projects, regulated by the Kyoto Protocol, and determines that CERs have security value in their judicial nature, for effects of regulation, inspection, and sanctioning by Brazil's Securities and Exchange Commission (CVM¹⁹). According to this bill, the title issuers would have to furnish all relevant information aimed at protecting the investor, as already happens in other kinds of securities. The bill is currently inert.

CVM²⁰ has not yet defined the rules for the Brazilian carbon credit market Brazilian but it has been monitoring closely the implementation of BM&F's MBRE. CVM does not see now the need for establishing rules for a market that has not yet been defined. It will act as the market grows and becomes a financial funding for popular savings. Probably the first step that will be taken will be the creation of specific instructions for registering CDM projects that use popular resources, as is the case today with Instruction XXX. On a second moment, when carbon credits generated by CDM projects CDM are being negotiated in the stock market, CVM would establish rules and procedures for operations taking place in the floor or in electronic negotiation systems, similarly to CVM's current Instruction no. 387.

¹⁹ In Portuguese: Comissão de Valores Mobiliários.

²⁰ CVM issues its rules to the market through what are known as Instructions.

Concerning international transfers of resources generated from CDM projects and from carbon credit trades, we believe that the involved parties (banks, consultant companies, financial intermediates etc.) should find no difficulty in adapting to the current existing rules for the financial and banking market. The current rules in force in the country strongly facilitate international transfers of resources and the entire process, performed through the SISBACEN system, is quick and with no bureaucracy.

Because it is a market still taking its first steps in the world, the international market of carbon credit also needs strong, consistent rules of settlement and custody. The United Nations Framework Convention on Climate Change must act firmly in this matter, for the whole process designed by Kyoto for employing trading of emission reductions between developed and developing countries (ETS) may be at risk.

Another important matter is how enforcement and compliance issues are resolved. This matter will be of critical concern to businesses and industry, since they will influence the feasibility, credibility, usage, and market price of the Kyoto Protocol Mechanisms, and ultimately the extent to which they are used by industry to a country's domestic climate change under the Kyoto Protocol. Companies from developed countries will have to adapt to the protocol's new rules by buying credits. Because of that, several countries already administer funds aimed at buying carbon credits. Japan Bank for International Cooperation (JBIC) for example has a fund with resources that amount to US\$ 140 million for the purchase of projects originated in China, India, and Brazil.

Forecasting analysis show that the value of the global emissions trading markets – including trading allowances as well as in credits generated through CDM and JI projects – is likely to reach 34 billion dollars in 2010. Some 4.5 billion metric tonnes of carbon dioxide or equivalent would be traded. A huge increase in only 5 years, if one considers that an amount of 2.5 billion tonnes is forecasted for 2005. The EU emissions trading scheme²¹, which formally began on this year's January 1st, is expected to be worth around 16 billion in 2010, almost half of the global total, with some 1.7 billion tonnes traded.

These figures are based on a 'reference' scenario developed by Point Carbon, in a recent analysis that looks at market developments in similar markets as well as likely politics scenarios and price and volume forecasts. In a 'compliance' scenario, the total global market would be worth €4 billion, while in the 'high' scenario, where the private sector drives emissions trading in North America, albeit outside the Kyoto fold, the global market would be worth €200 billion.

According to estimates from the World Bank²², Brazil might have a 10% share in the CDM market. Carbon credit transactions are already close to US\$ 1 billion a year. In the global carbon credit market alone, according to figures from PointCarbon, the volume should reach US\$ 13 billion by 2007.

As previously mentioned, the US non-ratification of the Kyoto Protocol does not exclude this country from participating in the global carbon market. The US has a dynamic market on ample growth, opening up

²¹ European Commission's Emission Allowance Trading Directive

²² <http://carbonfinance.org/>

great possibilities at the level of bilateral exchanges of permits with Brazil.

V - CONCLUSION

As we have examined, several factors may undermine the success of the newborn global carbon market. Nonetheless, criticisms from the United States concerning the effectiveness of the GHG emission control mechanisms created by the Kyoto Protocol have met no support either from European Union countries or from Japan, which instead have preferred to bet on the protocol's success and have put it in action since February of this year. Since then, we have been watching the birth of a new international market that should be worth billions of dollars, according to the most conservative estimates. If Brazil takes the right steps, it could have an important share in this market, and could benefit from the newly generated businesses.

Since the start of negotiations that originated the Kyoto Protocol, the country has bet on the Protocol's success, and now, when the race is on, we can say that Brazil has started ahead of the game. As previously highlighted, there is still much to do, but the Brazilian government and the private sector – BM&F in special – have already taken the first steps to foster a favorable business environment that may attract a significant share of the resources destined to CDM projects. Although there is no

consensus about the value of business that will be generated over the next years, the country also has great chances of attracting a significant share of business from the global carbon market specified in the International Emissions Trading Scheme (ETS).

Certainly, Brazil has a large potential for the use of Kyoto's flexible mechanisms, and it should realize how to take advantage of it. Developed nations, particularly European Union countries, are under tremendous pressure to reduce their GHG levels and, produce an enormous compulsory demand for pollution credits. According to the most active market agents, like PointCarbon for example, there is great expectation that the global carbon market grows considerably over the next years.

Estimates about the business volume over the upcoming years vary greatly, and they might be biased, both overestimating and underestimating Brazil's future participation in that market. Considering even the most conservative estimations, the country is pointed out as being one of the most promising nations in attracting CDM project investments among developing countries. Brazil's greatest challenge is to overcome China. Nowadays, according to the World Bank, China's CDM potential is comparable to that of Latin America, Africa, and the Middle East combined. However, as previously analyzed, China has demonstrated that it will not allow bureaucratic treaties to reduce its growth rate.

Nevertheless, it will not be easy for Brazil to maintain such favoritism. Even though Brazil, like the other developing countries, is not required

to reduce its pollution levels before 2012, the Brazilian government is already suffering strong foreign pressure to adopt measures concerning the rising levels of GHG emission, especially those related to burnings in the Amazon forest. A negligent attitude concerning this issue might cause Brazil to lose a significant share of investments that otherwise would be channeled to it. The governments of European countries and the World Bank tend to be politically influenced to take concrete measures against countries that do not adopt serious environmental policies, or that do not comply with international treaties.

Finally, it is important to that internationally tradable emission credits creates opportunities as well as new challenges and risks for investors. The key challenge to Brazil for the coming years is therefore to benefit of the current momentum, and to persuade the world financial market, the governments of developed countries, and the World Bank that the country is a safe port for CDM and ETS projects.

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TABLES

Greenhouse gases	Chemical formula	Pre-industrial concentration	Concentration in 1994	Atmospheric lifetime (years) ^{***}	Anthropogenic sources	Global warming potential (GWP) [*]
Carbon-dioxide	CO ₂	278 000 ppbv	358 000 ppbv	Variable	Fossil fuel combustion Land use conversion Cement production	1
Methane	CH ₄	700 ppbv	1721 ppbv	12,2 +/- 3	Fossil fuels Rice paddies Waste dumps Livestock	21 **
Nitrous oxide	N ₂ O	275 ppbv	311 ppbv	120	Fertilizer industrial processes combustion	310
CFC-12	CCl ₂ F ₂	0	0,503 ppbv	102	Liquid coolants. Foams	6200-7100 ****
HCFC-22	CHClF ₂	0	0,105 ppbv	12,1	Liquid coolants	1300-1400 ****
Perfluoromethane	CF ₄	0	0,070 ppbv	50 000	Production of aluminium	6 500
Sulphur hexa-fluoride	SF ₆	0	0,032 ppbv	3 200	Dielectric fluid	23 900

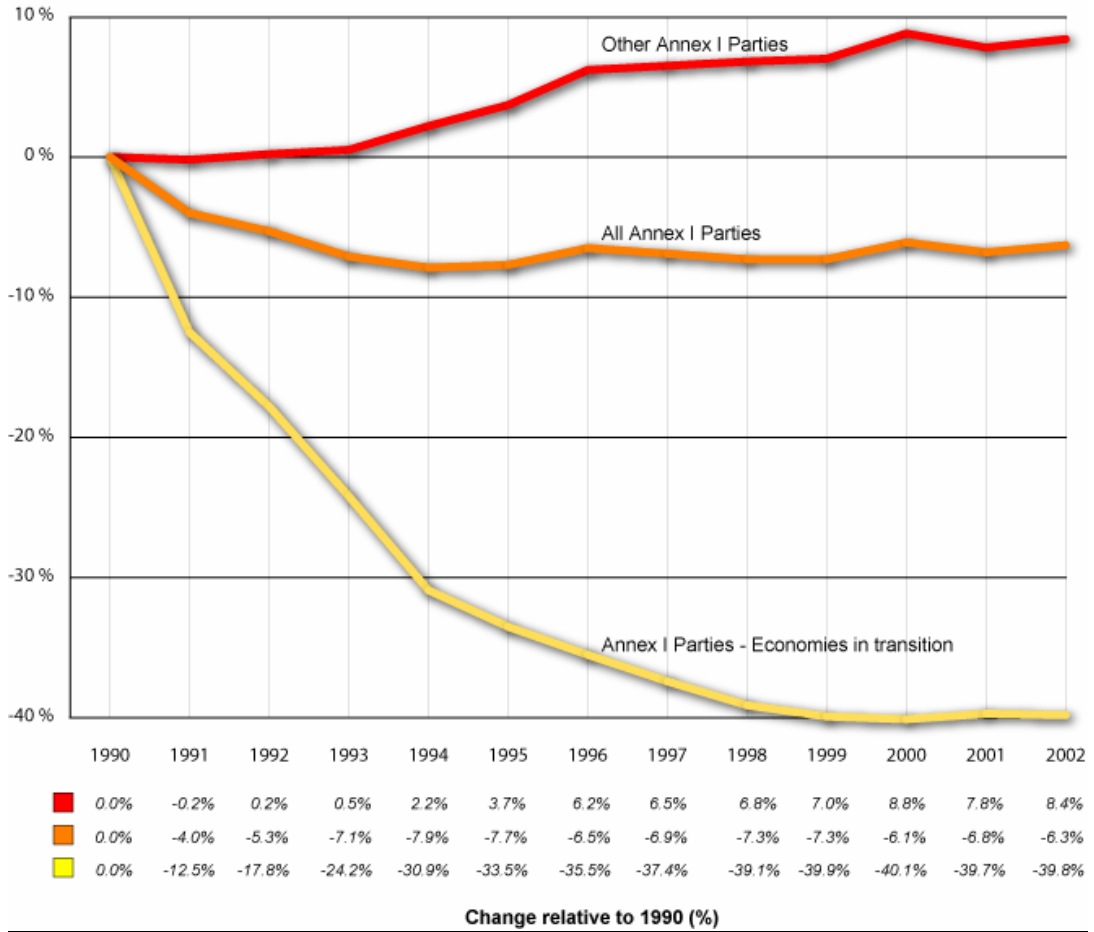
Note : pptv= 1 part per trillion by volume; ppbv= 1 part per billion by volume, ppmv= 1 part per million by volume

^{*} GWP for 100 year time horizon. ^{**} Includes indirect effects of tropospheric ozone production and stratospheric water vapour production. ^{***} On page 15 of the IPCC SAR. No single lifetime for CO₂ can be defined because of the different rates of uptake by different sink processes. ^{****} Net global warming potential (i.e., including the indirect effect due to ozone depletion).

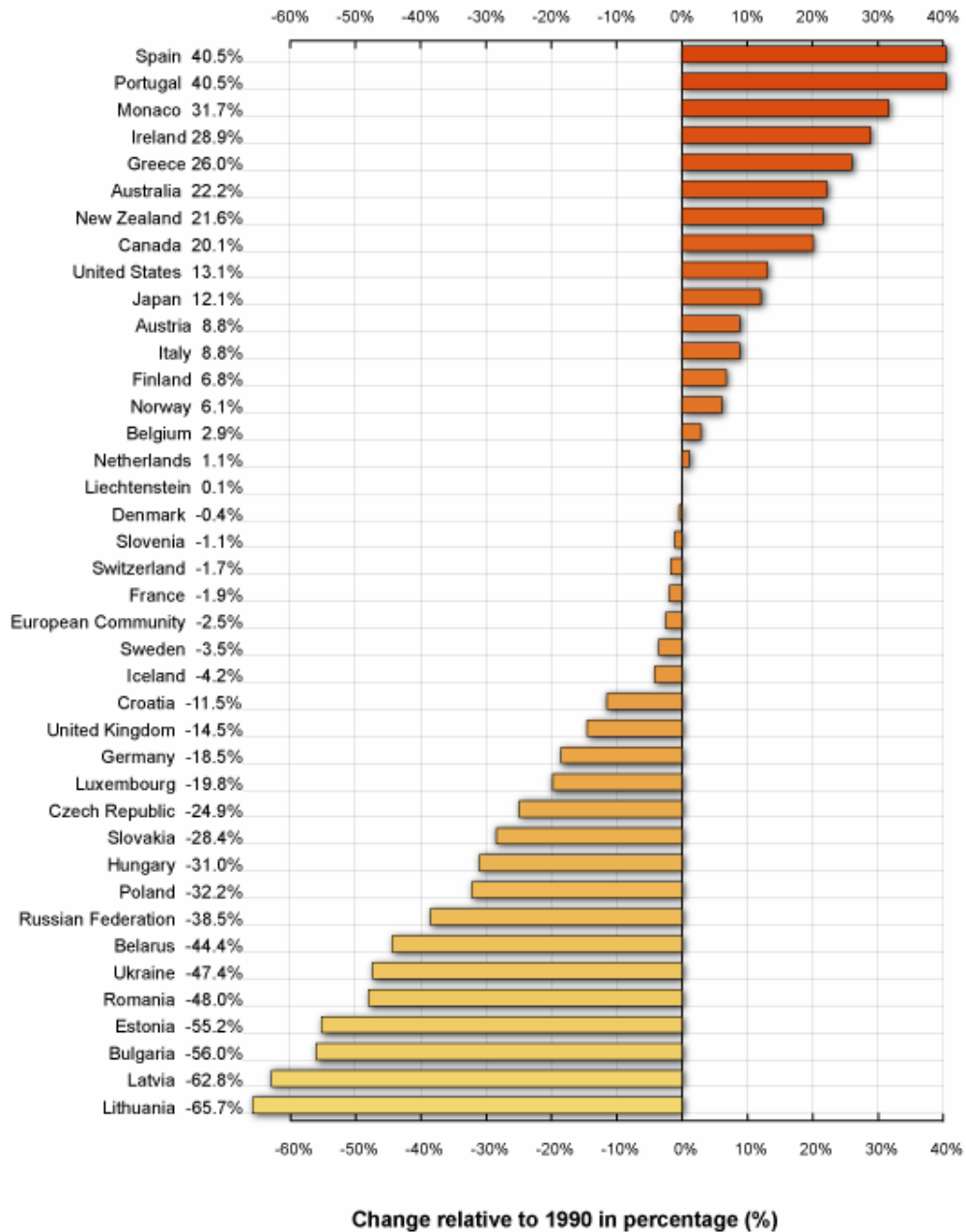
Source: IPCC radiative forcing report, Climate change 1995, The science of climate change, contribution of working group 1 to the second assessment report of the intergovernmental panel on climate change, UNEP and WMO, Cambridge press university, 1996.



Trends in aggregate greenhouse gas emissions, 1990-2002



Total aggregate greenhouse gas emissions of individual Annex I Parties, 1990-2002*



* The change related to 1990 shown here is for 2002 except for Liechtenstein (1990), Poland (2001) and Russian Federation (1999)