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Carbon Market: Business Incentives for Sustainability

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Abstract

The Protocol resulting from the 1997 Conference of Parties in Kyoto finally set emission caps for several developed countries and introduced the possibility of market creation mechanisms based on carbon emission trading. The Clean Development Mechanism (CDM) was then created for emission trading between countries with caps and those with no caps. The CDM market will pursue the opportunities for lowest costs on carbon reductions available in each country with no emission target, as is the case of Brazil. The positive differentials of Brazil will only be realized if there is, mainly in national terms, a favorable atmosphere to the development of new business and the proper importance to the environmental commitments of reduction of the greenhouse effect. The excess of bureaucracy and governmental controls added to the lack of a policy and of a clear institutional guidance of support to the consistent initiatives of CDM projects. They are decisive obstacles for the achievement of the potentialities and for a good position of Brazil in the trade of CERs. Making use of the teachings of Nobel Prize Ronald Coase, this paper has as a goal to show the necessary institutional conditions for Brazil to make use of the development from this market.

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1. Introduction

It was mainly from the beginning of the 80s that the questions related to climate change, global warming and greenhouse effect started to have an important position in the list of the environmental threats that most put in risk the planet integrity. And, since then, each year, scientific evidences stronger and stronger have shown that the humans activities (so called anthropic actions), resulting from the pattern of production in force, are some decisive factors for these threats aggravation.

So the United Nations Framework Convention on Climate Change (UNFCCC) was adopted in 1992 at the "Earth Summit" in Rio de Janeiro and has been ratified by more than 185 countries plus the European Union. The UNFCCC is an international legal framework with the ultimate objective of stabilizing greenhouse gases (GHG) in the atmosphere at a level that would prevent dangerous anthropogenic adverse interference in the global climate system. The manner in which this objective is to be set was not defined at the Convention, but it established a framework for continuing the negotiation process and to define the mechanisms to achieve it.

At the third meeting of the Parties (COP-3), in December 1997, the *Kyoto Protocol* to the Convention was adopted. Established as the first step towards meeting the ultimate objective of UNFCCC, the Protocol set legally binding GHG reductions targets for industrialized countries so that emissions are reduced by at least 5.2%, on average, in relation to 1990 levels, between 2008 and 2012 – the first commitment period. The emission reduction targets apply exclusively to the Parties listed in Annex I of the UNFCCC, known as the *Annex I Parties*¹, who assumed at the Convention a number of exclusive commitments based on their historical responsibilities. Countries that do not have emission reduction commitments are, in general, developing countries and are referred to as Non Annex I Parties. The Kyoto Protocol enters into force when at least 55 countries ratify the treaty and these countries represent at least 55% of total Annex I countries' 1990 emissions levels. The Clean Development Mechanism (CDM), the main focus of this paper, is one of three additional mechanisms of implementation, along with Joint Implementation and Emissions Trading. Through these mechanisms, the CDM is the only one that allows the participation of developing countries like Brazil.

The Kyoto Protocol and the additional implementation mechanisms, particularly the CDM, required complementary regulations which were provided by the Marrakech Accords, agreed upon in November 2001, during the Seventh Conference of the Parties (COP-7).

¹ Annex I of the Convention lists Parties that in 1990 belonged to the OCDE as well as the industrialized countries of the ex-Soviet Union and Eastern Europe.

Within this context, Brazil is a country recognized internationally for having one of the cleanest and renewable energetic matrixes in the world. However, in the course of the history it has not been fruit of the environmental worries. The fact is that, for having its electricity stock based in water sources and for having an important program of use of biomass fuels (alcohol), which are used in substitution of the petrol derivatives, Brazil – among the countries which present equivalent levels of development and of economical dimension – has an energetic curriculum which qualifies itself positively in the process of implementation at the CDM.

The positive differentials of Brazil will only be realized if there is, mainly in national terms, a favorable atmosphere to the development of new business and the proper importance to the environmental commitments of reduction of the greenhouse effect. The excess of bureaucracy and governmental controls, added to the lack of a policy and of a clear institutional guidance of support to the consistent initiatives of CDM projects will be decisive obstacles for the achievement of the potentialities and for a good position of Brazil in the trade of CERs.

2. Objectives

Making use of the teachings of Nobel Prize Ronald Coase in his work “The Problem of Social Cost”, this paper has as a research problem to study the definition process of the property rights and institutional change to creation and development of the carbon market.

We begin our paper exposing the externality concept. The central problem is that there is no market for pollution, especially for the atmospheric pollution. That it is an externality. By definition, externality means that the allocation of resources happens in an inefficient way and that the private costs don't correspond to the generated social costs. The greenhouse effect and the climate change are temporary externalities; in other words, their effects are felt in the long term. I pollute today, but only in 50 years will the problem come up.

As remedies for the damages caused, the government regulation tries to internalize these external costs with tax policy - only solution possibility according to Pigou (1932), with regulation (norms, rules and fines) and with the creation of Market. Based on the market of dioxide sulfur created in the USA at the beginning of the 90's, we will analyze the case of the Carbon Market.

We have as objectives in this work: first, to analyze the institutional changes that allowed the formation of the carbon market; and second, to identify the necessary institutional characteristics for Brazil to take advantages on business opportunities created by the CDM of the Kyoto Protocol. Our hypothesis is that, specifically in Brazil, property rights are not well defined raising transaction costs.

3. Theoretical References

Externalities exist when the actions of one party affect the utility or production possibility of another party outside an exchange relationship. Externalities can prevent a free market from being efficient. If a firm emits pollution into the air, it can adversely affect the welfare of the firm's surrounding neighbors. If the firm does not bear these costs, it likely will select an inefficient level of pollution (that is, to over pollute). In choosing how much to invest in pollution-control equipment, the firm will consider only its own personal costs and benefits. Efficient investments would also consider the costs and benefits imposed on the neighbors (the efficient level of investment is where the total marginal costs of additional investment equal the total marginal benefits – not just those incurred privately by the firm). In 1960, Nobel Prize winner Ronald Coase presented a convincing argument that free-market exchange is much more powerful in producing efficient results than many economists thought. As long as property rights can be traded, there is an incentive to rearrange these rights to enhance economic efficiency. The often-recommended government intervention might be unnecessary and in many cases undesirable.

Supposing that a firm has the legal right to pollute as much as it wants, neighbors can always offer to pay the firm to reduce its pollution level. Thus, the firm faces a cost for polluting (if the firm pollutes, there is an opportunity cost of not receiving compensation from its neighbors). The firm will pollute only if it is more valuable to the firm than the costs to its neighbors. This efficient solution is obtained without a pollution tax. The same degree of pollution can occur even if the neighbors have the legal right to stop the firm from emitting any pollution (COASE, 1960).

Nevertheless, as Coase points out, free-market exchange will not always solve the problem of externalities. The transactions that are necessary to overcome this problem are not free – there are *transaction costs*². These costs include basically search and information costs, bargaining and decision costs, policing and enforcement costs (DAHLMAN, 1979). In our example, transaction costs are important because positive transaction costs can make the meeting between buyers and sellers to exchange pollute rights difficult.

It is also important that property rights be clearly assigned and exchangeable. Supposing that there was no legal system to enforce property rights. Neighbors would be reluctant to pay a firm not to pollute – they do not obtain an enforceable property right to prevent the firm from polluting. After collecting the payment, the

² Kenneth Arrow (1969) has defined transaction costs as “the costs of running the economic system”. Addicionaly, Yoram Barzel (1997) defines transaction costs as “the costs associated with the transfer, capture, and protection of rights.

firm could renege on its promise to reduce pollution and the neighbors would have no recourse.

Mueller (2002) in Cooter and Ulen (1988) define a property as a bundle of rights about a resource, whose owner is free to act, and whose practice is protected against the interference by other agents. This owner does not have necessarily the total right about all aspects of that resource, but has a list of them. Therefore, according to Zylbersztajn and Sztajn (2002), what has been dealt isn't the goods object as a right, but they are property rights about goods dimension.

According to Coase, if property rights are clearly assigned and the transaction costs are sufficiently low, the parties will negotiate freely rights to pollute and they will achieve the economic optimum. Contradicting Pigou, Coase affirms that there will exist a free market exchange to solve the problem without government regulation. This general principle is often referred to as the Coase Theorem (COASE, 1960).

4. The Clean Development Mechanism (CDM)

The purpose of CDM is to provide support to Non-Annex I Parties in achieving sustainable development through the implementation of project activities and to contribute to the ultimate objective of the Climate Convention (UNFCCC). At the same time assisting Annex I Parties in meeting their GHG emission reduction commitments (FUNDAÇÃO GETÚLIO VARGAS, 2002).

The objective of mitigating climate change is achieved through the implementation of project activities in developing countries that result in the reduction of GHG emissions or removal of CO₂ through investments in more efficient technologies, in the replacement of fossil fuel use by renewable sources, and in more rational use of energy, forestation, etc (FUNDAÇÃO GETÚLIO VARGAS, 2002).

According to the Annex A of the Kyoto Protocol, projects activities that qualify are those related to specific greenhouse gases types, and to the sources and sectors responsible for the majority of emissions (see Figure 1) (O ACORDO DE MARRAQUECHE, 2001).

Figure 1. Sectors/ Source Categories

Greenhouse Gases Emissions Reductions			
Energy	Industrial Processes	Agriculture	Waste
CO ₂ – CH ₄ - N ₂ O	CO ₂ – N ₂ O – HFCs – PFCs – SF ₆	CH ₄ – N ₂ O	CH ₄
Fuel combustion <ul style="list-style-type: none"> ▪ Energy Industries ▪ Manufacturing industries ▪ Construction ▪ Transport ▪ Other sectors 	<ul style="list-style-type: none"> ▪ Mineral products ▪ Chemical industry ▪ Production and consumption of halocarbons and sulphur hexafluoride ▪ Solvent use ▪ Others 	<ul style="list-style-type: none"> ▪ Enteric fermentation ▪ Manure management ▪ Rice cultivation ▪ Agricultural soils ▪ Prescribed burning of savannas (cerrado) ▪ Field burning of agricultural residues 	<ul style="list-style-type: none"> ▪ Solid waste disposal ▪ Wastewater handling ▪ Waste incineration
Fugitive emissions from fuels <ul style="list-style-type: none"> • Solid fuels • Oil and natural gas 			
CO₂(*) Removals			
Florestamento/ Reforestamento			
Remove: CO ₂		Emit: CH ₄ – N ₂ O – CO ₂	

* Removals by sinks can be used to meet the commitments assumed, as authorized by Decision 17/ CP.7 of the Marrakech Accords. Even though there are greenhouse gas emissions, the net result is removal.

Source: Annex A of The Kyoto Protocol

The verified amounts of GHG emission reductions or removals of CO₂ attributed to a CDM project activity result in Certified Emission Reductions (CERs), measured in metric tons of carbon dioxide equivalent (CO₂ equivalent)³ (EARTH NEGOTIATIONS BULLETIN, 2001).

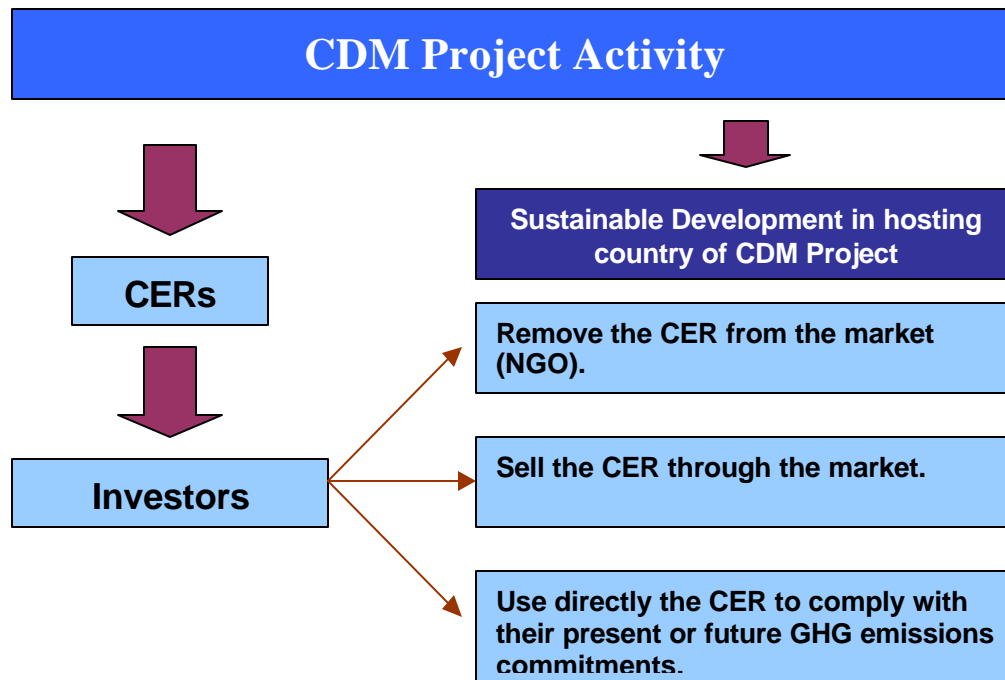
The additional mechanisms of implementation will stimulate the development of a new international market, where the commodity are credits for certified GHG reductions or removal of CO₂. Annex I Parties - and their public and private

³ One unit of CER is equal to one metric ton of carbon dioxide equivalent, calculated according to the Global Warming Potential (GWP), based on an index announced by the International Panel on Climate Change (IPCC) allowing expression of the quantities of different GHGs in terms of CO₂ equivalent and making it possible to add up the reductions of different gases.

entities - that have reduction targets will be the main participants in this market from the demand side, seeking CERs to offset their commitments. The benefits to the foreign participant are the possibility for complying with its emission reduction targets at a lower marginal cost. In the particular case of the CDM, developing countries will play a significant role in this market, especially in the supply of CERs.

Annex I Parties can use the CERs generated to assist in compliance with their existing or future GHG reduction commitments. The participants in CDM project activities may also have the objective of selling their CERs in the expectation of benefiting from future appreciation and profit gains, as a result of the increased demand from Parties that have emission reduction commitments. In addition, NGOs may seek for purchasing CERs in order to simply remove them from the market, for strictly environmental purposes (see Figure 2) (ROSALES, J. & PRONOVE, G, 2002).

Figure 2. Application of the CERs



Project activities related to emission reduction that meet the following eligibility requirements are eligible under the CDM (EARTH NEGOTIATIONS BULLETIN, 2001):

- participation is voluntary;
- host country approval is obtained;
- meets the sustainable development goals defined by the country where the project activities will be implemented;

- reduce GHG emissions in a manner additional to what would occur in the absence of the CDM activity (*Additionality*);
- CDM projects account for GHG emissions that occur outside the project boundary that are attributable to the project (*Leakage*);
- projects include the participation of all stakeholders and their opinions are taken into consideration;
- projects do not have negative collateral impacts on the local environment;
- projects are able to show quantified real long-term climate change mitigation benefits;
- projects are related to the gases and sectors defined in Annex A of the Kyoto Protocol or related to afforestation and reforestation.

For project activities related to the removal of CO₂ (*land use, land use change and forest-LULUCF*), due to their own peculiarities and complexities, the modalities and applicable rules have not been defined yet. Decisions on these definitions and modalities will be taken in the Ninth Conference of the Parties (COP-9), to be held in 2003 (O ACORDO DE MARRAQUECHE, 2001).

4.1 Institutional Structure

The GHG emission reductions and removals of CO₂ attributed to CDM project activities must undergo a process of evaluation and verification through institutions and procedures established at the COP-7 in Marrakech. The main institutions related to CDM are described as the following (ROSALES, J. & PRONOVE, G, 2002.):

CDM Executive Board

The Executive Board will supervise the CDM. The main responsibilities of this Board are: (i) the accreditation of the Designated Operational Entities; (ii) registry of CDM project activities; (iii) the emission of CERs; (iv) the development and maintenance of the CDM registry; (v) establishment and improvement of methodologies related to baselines, monitoring and leakage.

Governments in developing countries need to designate under the UNFCCC a national authority for CDM projects. The Designated National Authority (DNA) certifies that the country participation is voluntary and, in the case of countries where the activities will be implemented (host country), that those activities contribute to its sustainable development. The DNA must approve CDM project activities.

Designated National Authority (DNA) in Brazil

The DNA in Brazil is the Interministerial Committee for Global Climate Change (Comissão Interministerial de Mudança Global do Clima – CIMGC), established by

Presidential Decree on July 7th 1999. CIMGC is chaired by the Minister of Science and Technology and the vice-chair is the Minister of the Environment. It is also composed of members of the following ministries: Foreign Relations; Agriculture, Livestock and Supply; Transportation; Mines and Energy; Development, Industry and Foreign Trade, and the Chief of Staff of the Presidency of the Republic. The Executive Secretariat of the Commission is under the responsibility of the Ministry of Science and Technology (CEBDS, 2001).

Designated Operational Entities (DOE)

Operational entities are domestic or international entities accredited by the Executive Board and designated by the Conference of the Parties (COP/MOP) that will ratify or not the accreditation by the Executive Board. The responsibilities of the Designated Operational Entities (DOEs) are:

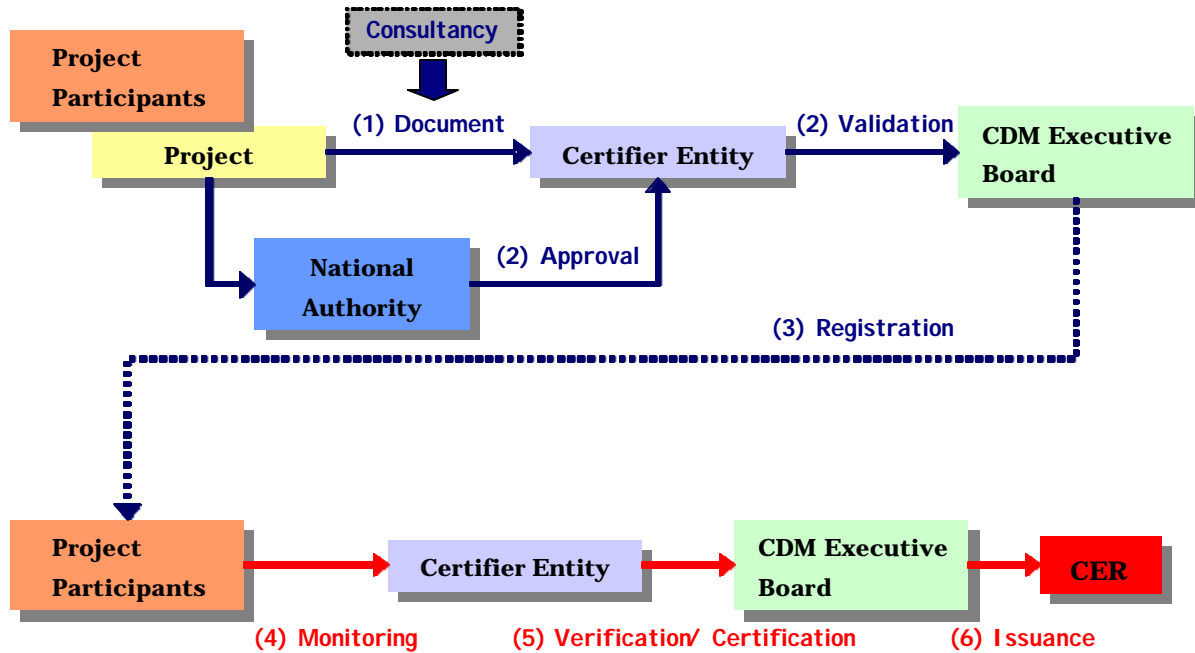
- To validate CDM project activities according to the Marrakech decisions;
- To verify and certify emission reductions and removals of CO₂;
- To maintain a public list of CDM project activities;
- To submit an annual report to Executive Board;
- To make information about CDM projects publicly available, unless deemed proprietary or confidential by project participants.

4.2 Project Cycle

For being able to result in CERs, the CDM project activities must necessarily go through all the following steps of the Project Cycle (CEBDS, 2002):

- (1) Preparation of the Project Design Document (PDD);
- (2) Validation/Approval;
- (3) Registration;
- (4) Monitoring;
- (5) Verification/Certification;
- (6) Issuance and approval of the CERs

Figure 3. CDM Project Cycle



Source: Proper elaboration from CEBDS (2002).

This chart describes the cycle that any project should pass to obtain CERs. The project participants should produce a document, usually together with a technical consultancy, to be approved by the National Authority (in Brazil, it is the Interministerial Committee for Global Climate Change) and validated by the certifier agent (Designated Operational Entity – DOE). The CDM Executive Board (part of the United Nations - UN) registers the project as eligible to CDM. In this moment, the project begins with the monitoring of the emissions of GHG by project participants (PP) and, later, verification and certification by the certifier agent (DOE). Being the project in agreement with the objectives of the Climate Convention, the CDM Executive Board issues the CERs.

5. Methodology

Through the light of theoretical concepts, we have prepared a questionnaire that led the interviews with five pioneer companies of Brazil in CDM projects. At the present stage of development of this market, these companies make up a representative sample showing Brazilian companies, which dared in prospecting the activity of GHG mitigation. It follows a brief presentation of the project activity for each company, comprising secondary information of the companies, as well as a qualitative analysis of results obtained in the interviews as a total.

6. Results Analysis

6.1 Interviewed Companies

The companies interviewed were Plantar S.A. (associated with Prototype Carbon Fund from World Bank), Sasa Sistemas Ambientais (Onyx – Veolia Environment Group / France), Usina Catanduva (Grupo Virgolino de Oliveira associated with CERUPT / the Netherlands), Companhia Açucareira Vale do Rosário and JESA (Jari Energética S.A., part of the Holding Grupo Orsa).

Figure 4. Empirical Application

Plantar / Prototype Carbon Fund (World Bank)

Plantar has a project of production of pig-iron with vegetable coal coming from certified renewable forests. It transacted with Prototype Carbon Fund of the World Bank. This fund was especially formed to foment the carbon market.

Usina Catanduva / CERUPT (Netherlands)

This is a project of co-generation of energy with crushed cane. Energy to internal activities and for “export”. Sugar Company Usina Catanduva sold his credits to CERUPT of the Netherlands, Auction Program of Reduced Emissions Certificates promoted by the Dutch Government.

Sasa Sistemas Ambientais (Onyx-Veolia Environment Group) / CERUPT (Netherlands)

Sasa and Usina Catanduva are the two approved Brazilian projects in the world auction. Sasa Environmental Systems is a landfill. This is a project of utilization of the biogas (CO₂ plus methane) generated in a landfill to produce electric energy.

Companhia Açucareira Vale do Rosário (Grupo Virgolino de Oliveira)

This is another project of co-generation of energy with crushed cane. Energy to internal activities and for “export”. It became the first Brazilian company to receive the pre-certification to trade carbon credits.

Jari Energética - JESA (Holding Grupo Orsa)

Jari Energética is a energetic company in the Amazon forest. It has a project of replacement of the Thermoelectric Plant that supplies its cellulose company by a hydroelectric plant. The Plant will generate energy not only for the company (30% Jari), but also for the State of Amapá

Source: Proper elaboration

6.2 Obtained Results

We are going to describe below the main points arisen in the interviews. We will show the main sources of high transaction costs and we will suggest something for improvements.

Figure 5. Survey Results



Source: Proper elaboration

Phase Project Participants (PP)

Most of companies say the attainment of information about CDM and how to be a potential in this market was costly considering the study availability about the issue in Brazil is still scarce, mainly literature in Portuguese. Nevertheless, they agree that the national organizations have been mobilizing themselves to supply this need, mentioning the example of BNDES (Bank of Social and Economic Development in Brazil) and of the Ministry of Science and Technology.

It's real that all the companies, except one, contracted a specialized consultancy on the elaboration of the Project Design Document (PDD) with the definition of the base line and addition mensuration, but they haven't stirred up in making an internal group of staff able to deal, among other attributions, with the issues related to the CDM project.

Phase Technical Consultancy

Some companies argue these consultancies have made mistakes in the process of the project formation, pre-certification and attainment of the endorsement letters from Designated National Authority (DNA); rising the time foreseen for the beginning of the activity. However, others value the good technical know-how of these agents permitting the elaboration of a consistent project with the Convention of the Climate principles and with the Kyoto Protocol objectives.

Phase Designated National Authority (DNA)

The obtained answers in this phase show the presence of a neck in the process of projects approval. Formally, an Interministerial Commission was constituted with the objective of centralize the dynamics of governmental regulation, but into practice there is an uncertainty of the private agents about the governmental organs to be found to the checking of projects potentials seeing that some of them contacted the Ministry of Science and Technology while others contacted the Ministry of Environment.

It's a general assent among the interviewed companies that the Inter-ministerial Commission has got a staff of great quality, but it is very small. So, this DNA needs to be better organized, with a staff enlargement to supply the request when the Kyoto Protocol will be approved.

Phase Certifier Entity

Among the main factors considered in the decision of hiring a DOE, we can number: good international reputation reducing the informational asymmetry in the sale of CERs, the warranty of approval of the project close to the Designated National Authority (DNA) and the CDM Executive Board, service price and contact facility.

Phase Sale of the CERs

As there is a large uncertainty at the Institutional Environment, the companies try to minimize the risk signing contracts of long term with multilateral organisms as the World Bank (*Prototype Carbon Fund-PCF*) or with the government of developed countries (as the CERUPT from Holland). Even those companies that haven't traded their credits yet showed their desire of following the same path.

In almost all the projects analyzed the CERs price was from US\$ 3 to US\$ 5 per ton of CO_{2e}. This price is considered very low in the companies' opinion, below the market potential due to the institutional uncertainty. Therefore, they believe in the elevation potential of the Kyoto Protocol taking effect.

7. Conclusions

Despite the fact of the Kyoto Protocol hasn't been approved – it is a restrictive factor for the investment decision - companies believe not only on its approval but also in the existence of the market regardless the protocol. The private agents are mobilizing themselves to start up the market worried in minimizing the social pressure on their productive activities, as the example of *Chicago Climate Exchange (CCX)* formed by USA polluted companies.

As conclusions, Brazil has business opportunities to benefit from the development of the carbon market, but the survey demonstrates that there are obstacles for it. And as suggestions, there is the need of institutional changes in Brazil like CDM national regulation with the definition of domestic rules and guarantee of property rights. However, the national rules must be lined up to the international ones for the national market to succeed, because much permissive rules blacken the image of the national market and close the doors to clients worried with the project integrity.

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