

CDM PROJECTS IN BRAZIL: MARKET OPPORTUNITY FOR COMPANIES AND NEW DESIGNATED OPERATIONAL ENTITIES

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1. Introduction

Climate change and its negative impacts are a concern to humanity. Determined to protect the climate system for present and future generations, humanity has demonstrated concerns about the fact that human activities are increasing the concentrations of greenhouse gases (GHG) in the atmosphere. This increase intensifies the natural greenhouse effect resulting in an additional heating of Earth's atmosphere and surface, affecting negatively to the natural ecosystems and humanity itself (BRASIL, 1998).

The Intergovernmental Panel on Climate Change (IPCC) is a scientific intergovernmental body that provides regular assessments on climate change. Established in 1988, from the perception that human action could be exerting a strong influence on the climate and that it was necessary to monitor this process. Its main objective is to evaluate in an objective, open and transparent manner the scientific, technical and socioeconomic information that is relevant to three aspects in general: climate change induced by humans, the impacts of anthropogenic climate change and options for adaptation and mitigation and gather comprehensive reports, easy to understand and accessible to the general public.

Since then, the IPCC has published several papers and technical reports. The IPCC first Assessment Report was published in 1990 and gathered arguments for the creation of the United Nations Framework Convention on Climate Change (UNFCCC). The UNFCCC was established in 1992 during the United Nations Conference on Sustainable Development with the final objective of achieving the stabilization of GHG concentration in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.

The UNFCCC is based on the principle of common but differentiated responsibility of States. Thus, all countries should implement national measures to help face the causes and effects of climate change. The economic, environmental and social particularities were

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considered to determine the commitment of each signatory country. Developed countries have a larger historical contribution as they began to emit GHG during the Industrial Revolution and are considered the main contributors to the growth of anthropogenic GHG emissions (GODOY, 2010).

The UNFCCC highlighted that developed countries must take the lead in combating climate change and its effects, and must return their emissions by 2000 compared to 1990 levels. However, in 1995, during the first Conference of the Parties (COP-1) in Berlin, the Parties to the Convention came to the conclusion that the large majority of countries would not be able to return their emissions to 1990 levels by the end of the decade, as highlighted by the UNFCCC. Therefore, a decision called the Berlin Mandate was adopted, with the objective of reviewing these commitments. The Berlin Mandate stipulated that developed countries should establish, in a protocol or another legal instrument, quantitative emission reduction targets for 2005, 2010 and 2020, and also to describe the policies and measures needed to achieve these goals.

During the 3rd COP that took place in Kyoto, Japan in 1997, the Kyoto Protocol (KP) was signed. The KP establishes legally mandatory quantitative targets for limiting or reducing GHG emissions only to nations which are considered Annex I Parties (i.e. industrialized countries that were members of the OECD in 1992, plus countries with economies in transition (the EIT Parties), including the Russian Federation, the Baltic States, and several Central and Eastern European States). Thus, from 2008 to 2012, during the first commitment period of the KP, these nations were mandated to reduce 5% of their GHG emissions based on 1990 levels.

It was known that the necessary economic effort to meet the quantified emission limitation and reduction of emissions of GHG in the Kyoto Protocol would imply high costs to the economy of Annex I Parties to the Convention. The possibility of using carbon market mechanisms for Annex I countries in order to meet their commitments to the UNFCCC was considered the great innovation of the KP.

One of the instruments created by the KP was the Clean Development Mechanism (CDM), with the objective to help non-Annex I Parties to achieve sustainable development and assist Annex I Parties in meeting GHG emission commitments at a lower cost (ELLIS et al., 2007). This mechanism allows a developed country to finance and / or invest in projects in developing countries as a mean to meet their commitments (GODOY, 2010) while fostering the development of more efficient technologies (i.e. with lower GHG emissions) in developing countries. The corresponding reduction in emissions, provided by the project is converted into Certified Emission Reductions (CER or carbon credits), that are bought by Annex I Parties to the Convention. In summary instead of reducing their own emissions, developed countries can buy CER generated by CDM projects implemented in developing countries. These CER are taken out from the GHG emission reduction targets of Annex I Parties to the Convention.

Therefore, from the KP results the creation of a regulated carbon market, an environment in which the participants are subject to a regulation that establishes rules and principles for project description and commercialization of CER arising from CDM projects. In addition, CDM is the only regulated instrument in a market dominated by

private actors that depends on a United Nations committee, the CDM Executive Board who is responsible of approving the estimation methods and GHG emission reduction projects. It is a market with great growth potential in developing countries such as Brazil. In addition to obtaining financial benefits from the sale of CER, Brazilian companies can align their image to environmental concerns, the future of humanity and the planet.

Price levels for credits from CDM projects have been on less than US \$ 6 per ton of CO₂e. This can interfere with the standard in large part to the carbon market raising a very important question of finding the balance between encouraging investors to participate in CDM projects (e.g. increasing the volume of CER) and ensure the quality of CER. If the reduction of unit cost is so high, potential investors will not invest. Without investment in the CDM, there is no delivery of CER. However, the government and multinational actors are only interested in getting low cost CER, which will not generate strong incentives to encourage potential investors to develop CDM projects (ZHANG, 2004).

There are clear and strict rules for approving projects under the CDM. These projects must use approved methodologies, they must be validatedⁱ, verified and certifiedⁱⁱ by Designated Operational Entities (DOE), and must be approved and registered by the CDM Executive Board. Such projects must be approved by the government of host countries through a Designated National Authority (DNA), as well as the government of the country that will buy CER (TAKEDA and LAMBERT DE OLIVEIRA, 2009). These DOE are independent validation/verification bodies (V/VB) accredited by the CDM Executive Board to validate project proposals and verify whether implemented CDM projects achieved a reduction of the planned GHG emissions.

2. Objective

In this context, the objective of this work is to do a preliminary map and analyze the market for CDM projects submitted to the CIMGC (i.e. the Designated National Authority (DNA) for approving projects under the CDM and approved under the Resolution No. 1 of 11 September 2003), and to identify new opportunities for CDM V/VB in Brazil.

3. Methodology

This study is classified as an exploratory and descriptive research with the intention of providing a better understanding of the subject, and consequently a greater understanding of the mechanism (GIL, 2007). A bibliographical and documental research was the chosen methodology for this study. The empirical universe of this research includes the 413 activities of CDM projects mapped in the regulated carbon market in Brazil from 2004 to the end of 2013. The data about the activities of the projects are gathered in the portal of the MCTI.

The CIMGC is composed by the MCTI who is responsible for chairing the committee, the Ministry of Environment as a vice chair and other relevant institutions such as the Ministry of Foreign Affairs, Ministry of Agriculture and Supply, Ministry of Transport, Ministry of Mines and Energy, Ministry of Development, Industry and Trade, Civil House

of the Presidency of the Republic and the Office of the Minister of Extraordinary State of Special Projects. It fit the role of executive secretary for the committee to the Ministry of Science, Technology and Innovation (BRASIL, 2009).

The assessment of CDM projects in Brazil is carried out by the CIMGC who adopts the following aspects: (a) voluntary participation approved by each Party involved; (b) real benefits, measurable and long term benefits related to climate change mitigation; and (c) GHG emission reductions that are additional to what would occur in the absence of the certified project activity.

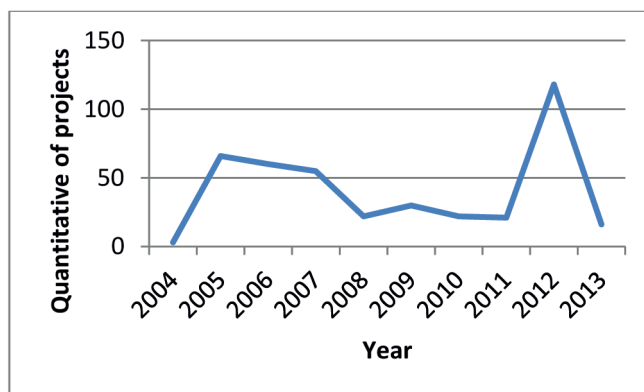
It is worth mentioning that the project activities can be filtered by sectoral scope in the MCTI portal. However, not all projects were assigned to a specific sector. For these, the authors were responsible for proper distribution. This was done by following the standard distribution used by the portal.

4. Results

The analysis showed that: (1) there is a time point in the year 2012 that diverges from the others in the quantitative project activities; (2) there is a predominance of project activities in the sectoral scope of renewable energy; (3) there is a discrepancy between the number of project activities and contribution in reducing emissions in some sectors. The waste management sector, with the largest number of projects than the substitution of fossil fuel sector, resembles the estimated amount of GHG emission reductions. Furthermore, the waste sector, with less than half of the total CDM projects than the sector with more activities (i.e. the renewable energy sector), presents a considerable emissions reduction potential; (4) there is a concentration of project activities in the Southeast region of Brazil; and (5) there is a greater participation of the DOE, DNV Climate Change Services AS, on the validation of project activities.

5. Discussion

Graphic 1: Quantitative of projects per year

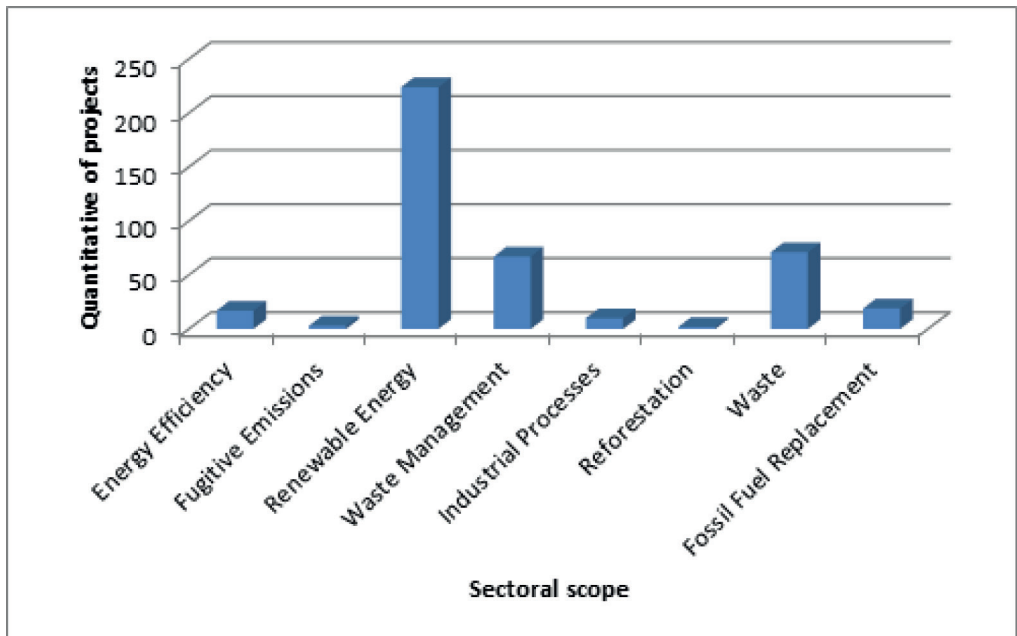


Analyzing the Graphic 1, it is possible to verify that the average of approved projects per year is 41 projects. Disregarding the high value of projects approved in 2012, the annual average falls to around 30 projects.

In November 2004, an important fact contributed to the increased demand for certificates related to CDM projects. The commission responsible for the EU ETS (European Union Emissions Trading System), the largest regulated market of carbon credits in the worldⁱⁱⁱ and the environment in which it has the highest demand for CER (SOUZA et al, 2012), allowed the institutions included in EU to use CDM certificates in order to accomplish their reduction commitments from 2005. This fact has meant that European companies had more interest in buying CER, in order to achieve their reduction commitments (GODOY, 2010).

In 2012, a large concentration of approved projects activities was identified (Graphic 1), probably due to the proximity of the end of the first commitment period of the KP and thus the concern of some signatories to achieve the reduction targets established. However, countries like Canada, Japan, Russia and New Zealand who had already anticipated their intention not to ratify the KP, withdrew from the second commitment period, that started in 2013 and so the subsequent fall to the 2012 boom.

Graphic 2: Quantitative of projects by sectoral scope

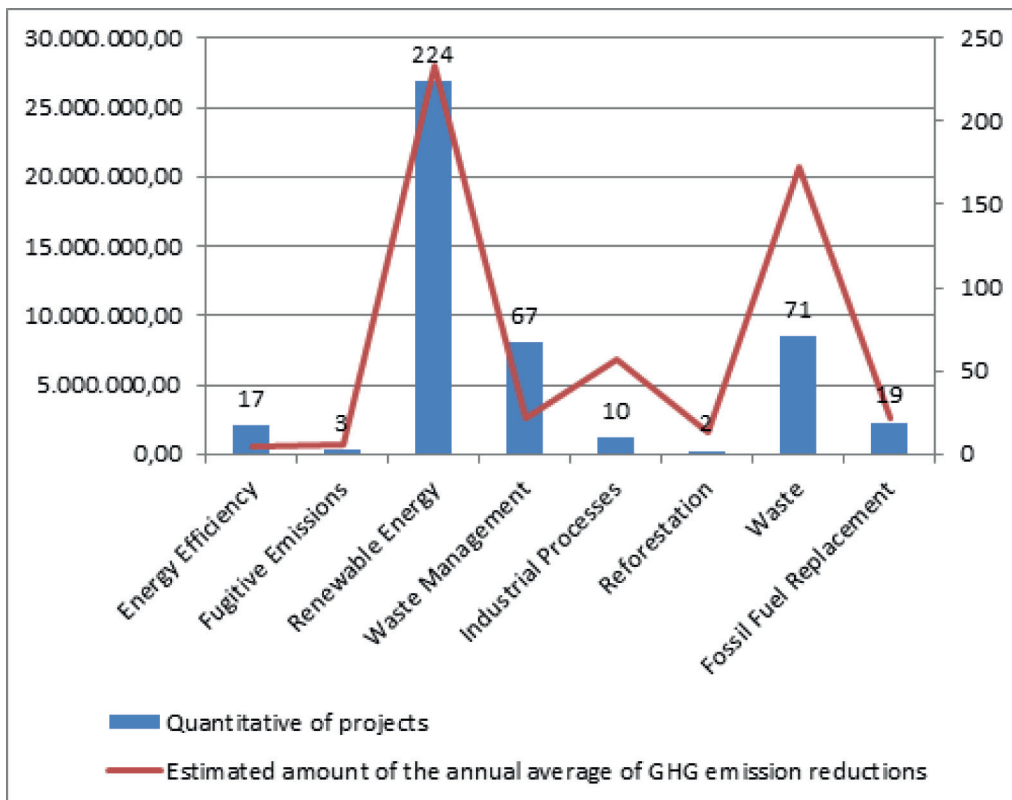


It is evident the predominance of project activities in the sectoral scope of renewable energy (Graphic 2), probably due to the reason that the Brazilian energy matrix is composed of 39,4% renewable energy sources (MME, 2015). Most types of renewable

sources addressed in project activities were hydropower (especially small hydro power plants - SHP), wind and biomass (i.e. such as sugarcane bagasse, rice husks, etc.). On the other hand, many energy sector projects received federal incentives through PROINFA (Incentive Program for Alternative Sources of Electric Energy) program launched by the Ministry of Mines and Energy based on the Law 10,438/02 to promote the development of alternative sources of energy. PROINFA aims to create incentives for the development of alternative energy sources such as wind power projects, small hydroelectric plants and biomass projects.

The great advantage of SHP is the lower environmental impact through the use of small water bodies, because do not demand the use of large reservoirs. Therefore, SHP are considered to have a lesser impact than large hydroelectric plants. In addition to this, one of the goals of the National Plan on Climate Change is to increase the supply of electricity cogeneration, mainly from the sugar cane bagasse.

Graphic 3: Estimated amount of the annual average of GHG emission reductions compared to the amount of projects.



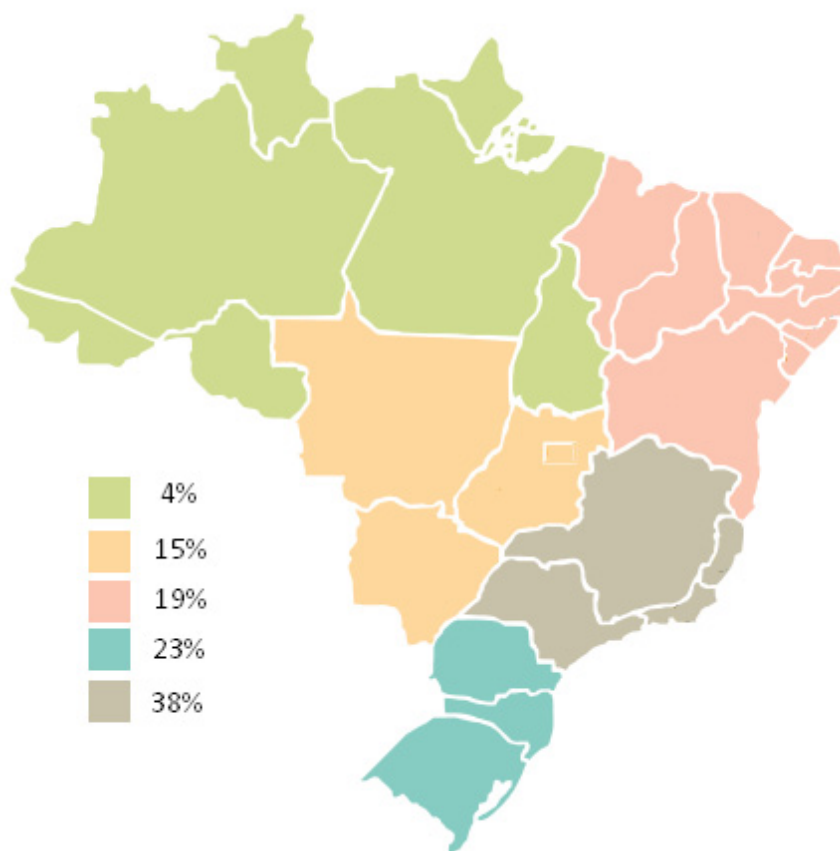
It is inferred that although the projects in the waste sector do not have a significant number of projects developed as the renewable energy sector, the waste sector is in the second place with regards of emissions reduction potential (Graphic 3).

The graphic 3 also shows that, although the sector of fossil fuel replacement has less projects than the waste management sector, they are similar with regards to the estimated annual average of GHG emission reductions.

This fact can be explained due to the difference in global warming potential. Thus, while carbon dioxide (CO_2) has a global warming potential of 1, methane (CH_4) resulting from anaerobic decomposition in landfills, and nitrous oxide (N_2O), resulting mostly in fossil fuel replacement projects, have, respectively, the global warming potential^{iv} of 21 and 310, thereby explaining because these projects, though with a smaller number of activities greatly contribute to the reduction and / or mitigation of greenhouse gases.

Moreover, it is also worth highlighting that the sector of industrial processes which most projects address the reduction of N_2O , is located in third place with regards to the emissions reduction potential.

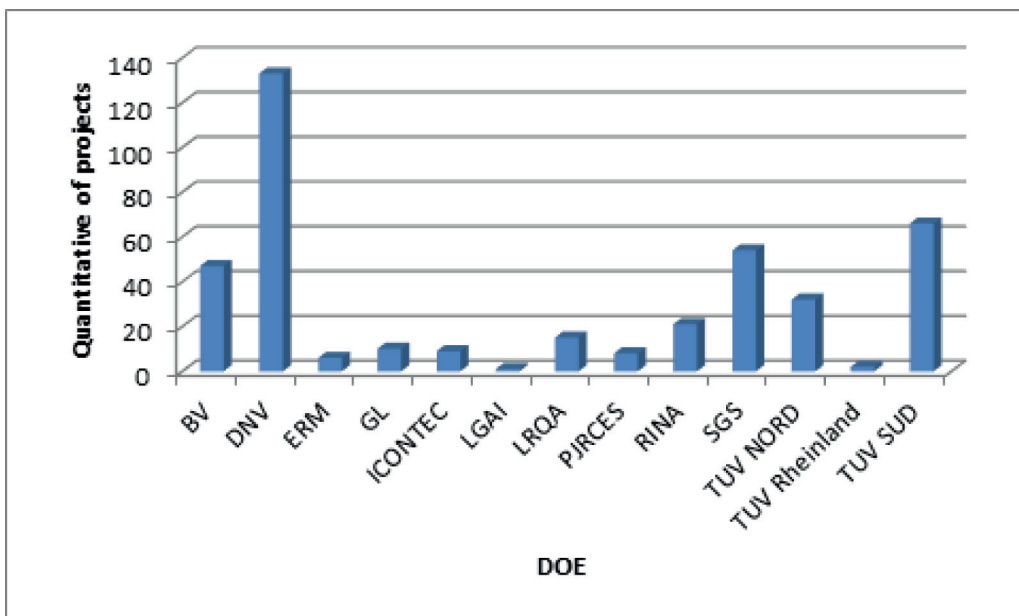
Figure 1: Quantity of projects by geographical region of Brazil



It is observed a concentration of project activities in the southeast region (Figure 1) which is the one with greater participation in the emission of greenhouse gases and this can be explained by the high degree of industrialization, population and strong farming.

However, there is the possibility of increasing the participation of other states, for example, due to the Technical Cooperation Agreement between Rio de Janeiro and Acre where Acre, in the north region, due to the vegetation cover of the Amazon, can provide the demand of the Southeast to promote shares in its production matrix to reduce their emissions of carbon dioxide, balancing this equation. Hence the importance of encouraging the exchange market of environmental assets across States.

Graphic 4: Quantity of projects per DOE



A DOE is an entity qualified by the Conference of the Parties upon the recommendation of the CDM Executive Board to validate proposed CDM projects or verify and certify GHG reductions resulting from the project. To operate in Brazil, a DOE should additionally be recognized by the Brazilian Designated National Authority and be fully established in the country.

In Graphic 4 there is a greater participation in the validation of projects approved by the DOE DNV Climate Change Services AS, followed by DOE TUV SUD South Asia Private Limited, SGS United Kingdom Limited and Bureau Veritas Certification Holding SAS. This is probably due to the performance of DNV on the major sectoral scopes. While perceives a concentration of activities of TUV SUD in sectoral scopes of renewable energy and waste management and a restriction of the activities of SGS and

BV in the sectoral scope of renewable energy. It should be noted that none of these DOE is Brazilian.

In all procedures involving the DOE, both validation as verification and certification, there are costs involved. For example, the cost of validation of a reforestation project was estimated at US\$ 15,000 to 25,000, and may be even higher, depending on the methodology used. (GERA *et al*, 2009). According to Lederer (2010), the costs involved in a CDM project cycle range from US\$ 80,000 to 230,000 for the initial step (which involves the preparation, validation and registration), while the operation phase (involving monitoring, verification / certification and emission of CER) costs range from US\$ 20,000 to 35,000 in the first year, and US\$ 15,000 to 25,000 in subsequent years.

Many DOE remain uninterested in validating projects in Brazil and in other countries. Moreover, it should be noted that when a DOE accepts to validate a project, the values of the process can generate an additional economic barrier to possible projects. Moreover, the fact that there are few DOE acting in the market makes the activity possibly be subject to a monopoly (GREEN, 2007). It should be noted that the World Bank published a study in 2010 titled "Survey of barriers and potential of programmatic clean development mechanism in Brazil", which contains the recommendation to the Brazilian government, in promoting and encouraging the development of national DOE from the public, private or nonprofit sector (WORLD BANK, 2010).

6. Final Considerations

Brazil who actively participates in the Clean Development Mechanism (CDM) without having any sort of mandatory requirement, enacted the National Policy on Climate Change (PNMC, its acronym in Portuguese) in 2009. Through this legislation, in its Article 12, the country establishes a voluntarily commitment to reduce from 36.1% to 38.9% the GHG emissions projected by 2020, compared to 2005 (BRASIL, 2009).

In Brazil, the possibilities to develop a carbon market increases with the voluntary targets included in the PNMC, and by other States that have developed laws on climate change. Some States enacted their climate change laws even before the national law 12,187 of December 29, 2009 (which established the PMMC) was enacted. This was the case for the Amazonas (Law 3,135, of June 5, 2007), Goiás (Law 16,497, of February 10, 2009), Santa Catarina (Law 14,829 of 11 August 2009) and São Paulo (Law 13,798, of November 9, 2009).

In Article 11, Paragraph 1 of the PNMC is established sectoral plans for mitigation and adaptation to climate change in order to consolidate a low-carbon economy, in the generation and distribution of electricity in order to accomplish gradual, quantifiable and verifiable anthropic emission reduction goals, considering the specificities of each sector, including through the CDM (BRASIL, 2009). Still, the Brazilian participation in CDM projects supply segment is occupying the third place in number of projects (4.4%), and China and India accounted respectively for 49.6% and 20.3% of the total in 2014 (CIMGC, 2015). It is, therefore, a market still incipient and open to the entry of new competitors.

The IPCC predicts that developed countries reduce their emissions of greenhouse gas by 25-40% until 2020 and by 80% until 2050 compared to their 1990 levels in order to avoid dangerous impacts of climate change. Understandably, the US and other industrialized countries would like to see developing countries, in particular the major emerging economies such as China and India, to go beyond that because of concerns about their own competitiveness. They are considering unilateral trade measures to induce developing countries to do it (ZHANG, 2011). These “voluntary” actions once developing countries do not yet have committed to reducing their GHG emissions, may be, in turn, encouraging the construction of the voluntary market.

With discussions on the second commitment period of the Kyoto Protocol, the question of whether the CDM should be continued beyond 2012 and how it would be addressed, many governments and companies have expressed their disappointment with the CDM, stating that it was “heavy and unrewarding” and “bureaucratic” (PEARSON, 2007).

The extension of the Kyoto Protocol, from 2013 to 2020, was of great importance for the growth and consolidation of the international carbon market, which may contribute to the increased number of activities of worldwide emission reduction projects.

A Working Group was established to develop a protocol, another legal instrument or an agreed outcome with legal force under the Convention applicable to all parties. The objective was to complete its work earliest possible, but no later than 2015 in order to adopt this protocol, legal instrument or an agreed outcome with legal force in the twenty-first session of the Conference of the Parties and that it enters into force and to be implemented from 2020 (UNFCCC, 2014).

Moreover, with the additive of the agreement, developing countries can make commitments to reduce emissions, like the emerging Brazil, China and India, that in the first period of the agreement did not have targets, but with the extension of the agreement these countries may have mandatory target emission and should send their internal targets of GHG emission reduction for the United Nations (UN), to setting a global target emission reduction (SOUZA, 2011). Currently emerging nations contribute significantly to global emissions, a fact corroborated by China’s position as the world’s largest emitter. A new climate agreement should start in the coming years.

Will be 37% until 2025 Brazil’s contribution to reducing emissions of greenhouse gases and for 2030 the reduction target is 43% - said the president Dilma Rousseff in a speech at the UN headquarters in New York. The basis are the 2005 emissions. This is the proposal that Brazil took to the climate summit in Paris, COP 21, realized in December 2015 (PLANALTO, 2015).

Developing countries are not obligated by the Kyoto Protocol to reduce emissions of greenhouse gases, but they can find excellent opportunities to trade carbon credits on the international market through projects aimed at reductions in anthropogenic emissions by sources or increase removals by sinks (PELLEGRINO et al, 2007).

With the Paris Agreement, expected to come into force in 2020, developing countries must make commitments to reduce emissions, is identified here an opportunity for

development of a voluntary carbon market which would anticipate the Brazilian participation to the new regulations.

In Article 9 of the PNMC is provided the Brazilian Market for Emission Reduction (MBRE, for its acronym in Portuguese) to be operationalized in commodities and futures, stock exchanges and organized over entities authorized by the Brazilian Securities Commission (CVM, by its acronym in Portuguese), where representative of securities of GHG emissions avoided certified will be traded (BRASIL, 2009).

In addition, the environmental stock exchange BVRio and Sustainability Studies Center (GVces) of the Getúlio Vargas Foundation School (EAESP / FGV) within the Platform Companies for Climate (EPC) promotes, since 2013, a simulation of Emission Trading System (ECS EPC). A partnership to implement a carbon market simulator. The BVRio sees this simulation as an important step in the development process of a national carbon market. The first operating cycle of the ECS EPC was conducted from March to November 2014. The ECS EPC already has in 2014, 20 participating companies, including AES Brasil, Braskem, Banco do Brasil, CCR, Camargo Correa, Duratex, Eco Frotas, Eletrobras Itaipu, Oi, Raizen, Suzano, TAM, Telefonica and Vale. (FGV, 2015).

The discovery that energy consumption causes economic growth does not necessarily mean that energy conservation will jeopardize economic growth if efficient production technologies are used. For example, energy conservation policies by performing a reduction in energy consumption due to energy efficiency improvements can increase the productivity of energy consumption, which in turn can stimulate economic growth. Thus, a change from less efficient energy sources for more efficient and less polluting options may provide a stimulus and not an obstacle to economic growth (BELKE; DOBNIK; DREGER, 2011). Evidenced the potential economic gains from reducing pollution and better management of natural resources, it is concluded that this type of market may be of interest to Brazilian companies that want to have the pillars of sustainability in their policies and missions.

Finally, the basic sanitation sector, in particular the treatment of waste, has high potential for the use of a sectoral CDM. Law 12,305 / 2010 establishing the National Policy on Solid Waste (PNRS) initially predicted the closure of dumpsites until August 3, 2014. However, the deadline was extended by four years (BRASIL, 2010). The final destination environmentally of waste includes reuse, recycling, composting, recovery and energy use or other destinations permitted by the competent authorities, including the final disposal, i.e. orderly distribution of waste in landfills, noting specific operational rules to avoid damage or risks to public health and safety, and to minimize adverse environmental impacts. Moreover, as seen in this article, the waste sector has considerable potential to reduce GHG emissions.

Therefore, this sector could be exploited by an incoming body in the validation and project verification market. The identification of the basic sanitation sector as a market niche for performance of incoming bodies minimize the barriers to entry into the projects business, enabling the accumulation of knowledge and experience that they must act *posteriori* in other sectors.

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Notes

- i The validation consists on ensuring that the project is in accordance with the regulations of the multilateral system of global climate change (Kyoto Protocol, decisions of the Conference of the Parties and decisions of the Executive Council) in relation to CDM. The DOE contracted by the project participants is responsible for this phase.
- ii Through the verification and subsequent certification, the DOE confirms that the monitoring plan has been properly implemented and that the data shows the actual emissions reductions (or removal of CO₂), translating them into a Certification Report to be submitted to the Executive Board for the issuance of the corresponding CER.
- iii According to Souza et al (2012), there are several international-sized environments that commercialize CER, among which stands out the EU-ETS regulated by European Directive 87/03, which is composed of 10,000 companies, as companies that produce thermal energy, oil refineries, paper and cellulose industries, ferrous metals companies, among others.
- iv Global warming potentials used by the Parties shall be the ones provided by the Intergovernmental Panel on Climate Change in its Second Assessment Report ("1995 IPCC GWP values" - global warming potential values established in 1995 by the IPCC) based on the effects of greenhouse gases considered in a horizon of 100 years.

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Abstract: Brazil actively participates in the Clean Development Mechanism (CDM) without having any kind of mandatory requirement. The objective of this study is to map the activities of CDM projects approved by interministerial Commission on Global Climate Change (CIMGC, for its acronym in Portuguese) and to identify new opportunities for CDM validation and verification bodies in Brazil. This paper was done by gathering information on CDM projects approved in Brazil and listed in the portal of the Ministry of Science, Technology and Innovation (MCTI, by its acronym in Portuguese). This research resulted in identifying a decrease in the registration of new CDM projects in Brazil. Furthermore, landfill projects in the waste sector has been identified to have the highest potential to be exploited in Brazil. This study also shows an opportunity to enhance the participation within voluntary carbon markets in Brazil.

Keywords: Greenhouse Gases; Carbon Market; Clean Development Mechanism.

Resumo: O Brasil, embora ainda não tenha metas obrigatórias para redução de emissões de gases de efeito estufa (GEE) por meio do Protocolo de Quioto, participa ativamente do Mecanismo de Desenvolvimento Limpo (MDL). O objetivo do presente trabalho é mapear as atividades de projetos de MDL aprovados pela Comissão Interministerial de Mudança Global do Clima com vistas a identificar as oportunidades de entrada no mercado de novas certificadoras de projetos MDL no país. Através de uma pesquisa feita no portal do Ministério da Ciência, Tecnologia e Inovação onde se encontram reunidas as atividades de projetos aprovadas, foi observada, principalmente, uma queda no quantitativo de projetos do mercado regulado. Por outro lado, foi identificado o setor de resíduos do tipo aterro com grande potencial para ser explorado por um entrante neste mercado. O estudo também revela uma oportunidade de desenvolvimento de um mercado de carbono voluntário brasileiro, antecipando futuros marcos regulatórios.

Palavras-chave: Gases de Efeito Estufa; Mercado de Carbono; Mecanismo de Desenvolvimento Limpo.

Resumen: Brasil, a pesar de no tener metas obligatorias para reducir las emisiones de gases de efecto invernadero a través del Protocolo de Kyoto, participa de forma activa en el Mecanismo de Desarrollo Limpio (MDL). El objetivo de este estudio es trazar un mapa de actividades de proyectos de MDL aprobados por la Comisión Interministerial de Cambio Global del Clima con finalidad de identificar oportunidades de entrada de nuevos organismos de certificación al mercado de proyectos de MDL en Brasil. A través de búsquedas realizadas por el Portal de Ministerio de Ciencia, Tecnología e Innovación donde se reunieron las actividades de los proyectos aprobados, fue observada una disminución en la cantidad de proyectos. Además el sector de residuos fue identificado con potencial para ser explorado por un entrante en este mercado. El estudio también revela una oportunidad para desarrollar un mercado voluntario de carbono en Brasil anticipando los hitos normativos futuros.

Palabras clave: Gases de Efecto Invernadero; Mercado de Carbono; Mecanismo de Desarrollo Limpio.
