

## Chapter 2

# Perspectives on the Implementation of Climate Change Public Policies in Brazil

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### Introduction

As a developing country, Brazil plays an important role in the global scenario for the reduction of greenhouse gas (GHG) emissions. Several public policies have been created towards the reduction of pollution levels. Brazil's participation in international agreements and the creation of a positive agenda for the development of new regulations for environmental presentation direct the country to the construction of a cleaner scenario.

Brazil participates in the Kyoto Protocol (largest international agreement signed for the reduction of GHG emissions), but still does not count with established mandatory reduction levels. However, the country already acts in a pro-active way through the creation of several sectional plans for mitigation and adaptation

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(Brasil 2011). These plans contemplate strategic areas (forests, energy in agriculture, urban mobility) and industry intensive sectors (metallurgy, mining, transformation). The focus is to reduce the levels of pollution and at the same time, improve the performance and competitiveness of companies. The process of implementing these regulations is slow, as several bureaucratic and cultural barriers still remain, which hinders the obtainment of better results.

A positive point that helps the country to maintain acceptable levels of pollution is the constitution of its energy matrix, which is mainly constituted of hydroelectric plants and therefore presents lower levels of pollution. Incentives to energy generation utilizing renewable sources is still very limited. In a different direction, in 2013 in the European Union it was observed that the energy generation sector was responsible for the largest share of CO<sub>2</sub> emissions—70 % of these companies were located in Germany and England (Carbon Market Data 2014).

Despite the existence of policies directed to the strengthening of energy generation from renewable sources, implementation is still expensive and complex, hindering its application for the majority of the population. Developing countries, such as China and India, count with greater incentives for the installation of residential equipment that better utilize renewable energy sources (World Bank 2014). Regarding the logic of reduction of emissions, the European Union created the European Union Emission Trading Scheme (EU ETS), responsible for regulating the operation of the market for reduction of carbon emissions, establishing goals for the reduction of pollution and distributing the allowance quotas for carbon emissions (European Emission Allowances, EUA) among the members of the European community (Freire 2014).

Currently, the European Union is the largest negotiator of EUAs in the world, also gathering the largest number of companies that follow the determinations of the Kyoto Protocol. Globally, this new active (EUA) has been widely negotiated since the mid-2000s, mainly in stock markets that deal with energy-related contracts, taking advantage of the already existent structure and know-how (Knox-Hayes 2009). The EUA market has grown substantially in the recent years, and can reach the position of being one of the largest commodity markets in the world in the next decades (Pirrong 2011).

However, after the drop in value of EUA's during the 2006 and 2007 crisis and re-establishment of carbon markets, similar methodologies to EU ETS have been applied to several countries, such as Japan, Canada, New Zealand, Australia and United Kingdom—the U.S.A. (especially the state of California) and China deserve special mention (Perdan and Azapagic 2011).

The creation of these new markets shows the directions of public policies that aim at finding a way to reduce levels of emission of pollutants as well as contributing to energy and operational efficiencies of companies, creating therefore a new entrepreneurial culture that is directly related to the wellbeing of the society. A companion paper on the promotion of sustainability by quantifying and reducing the carbon footprint lays the foundation for environmental awareness in consumers (Carvalho et al. 2015).

On the basis of an agreement with the United Nations, Brazil established voluntary actions for the mitigation of GHG, with the objective of reducing between 36.1 % and 38.9 % until 2020, fostering national policies on climate change. Among these actions, the development of a Brazilian Market for Reduction of Emissions is stimulated. The possibility of creating a nation-wide carbon market, with its own regulation and interconnection with other markets in the world, can bring positive contributions from economic and environmental viewpoints. This manuscript aims to deepen the discussion on the subject, highlighting the benefits and opportunities that can be generated by the implementation of public policies, as well as the creation of new supplementary regulations.

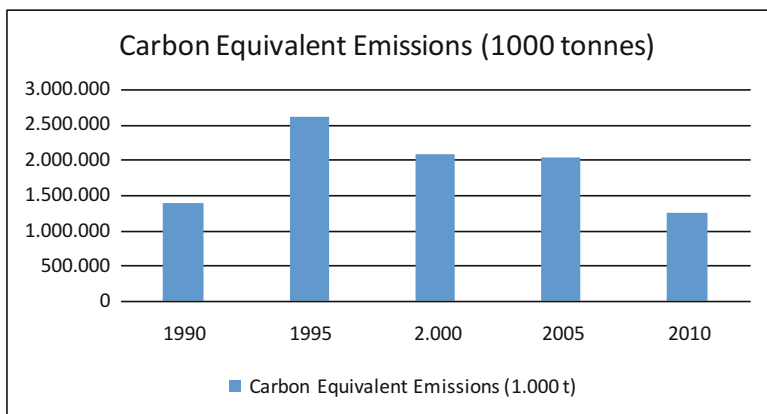
## Public Policies

The oil crisis, in the beginning of the 1970s, led the Brazilian government to create its first study group on alternative sources of energy, being the first step towards the creation of public policies regarding energy efficiency. After crystallization of the first research efforts on conservation of energy, the first national program on conservation of energy was launched in 1985. In the early 1990s, the first programs that aimed at rational production and use of energy were created, along with programs for better use of oil and natural gas derivatives. These programs represented a milestone for environmental and energy efficiency policies.

In the following decades, Brazil continued to create and improve its national policies on climate change, involving different production sectors and governmental organs. The objective is to create synergy between the involved areas, and the main expected result is the sustainable development of the country, balancing economic growth with environmental preservation. The current economic moment presents low growth, hindering therefore the implementation of environmental regulations that entail excessive costs. Laws that stimulate investments in new equipment, processes or green products, through tributary incentives or for the generation of green revenues, are seen as possible solutions for the mitigation of climate change.

Political guidelines lead the path to be followed by companies and society in general, in the form of incentives such as tax reductions for the companies that reduce their emissions or apply resources to efficiency energy researches. The creation of new mechanisms to this kind of development and GHG control, especially in the most polluting sectors is fundamental to implement a new culture of environmental preservation. In this new environment, the organizations will be required to optimize its processes/products in order to mitigate the effects of pollution generated.

The Brazilian National Policy of Climate Change (PNMC) was established in 2009, through the adoption of Law 12.187 (Ludeña and Netto 2011). PNMC pursues voluntary actions for the mitigation of GHG emissions, including reduction in deforestation (Amazon and Cerrado), reduction in energy consumption (energy



**Fig. 2.1** Overall carbon emissions for Brazil (Brasil 2015)

efficiency, alternative energy sources, etc.), stabilization of the share of renewable energy sources in the energy matrix, and increased use of biofuels, among others. Brazil's GHG emissions are calculated every 5 years, and Fig. 2.1 shows the reduction of emissions through the implementation of PNMC, a non-mandatory policy. These data represent the first results after its implementation.

The Brazilian legislation aims equalize sustainable development with economic growth, eradicating poverty and reducing social inequalities. This new interconnected vision drives the country to build a wide platform of emission reduction alternatives. The Brazilian law also encourages the development of a national market of reduce emissions, which in practice is not yet operational, however the main focus is economic and social development compatibility with the protection of the climate system (Brasil 2009, 2010).

The changes in the carbon market could modify the pollution levels defined by the legislation (Montgomery 1972), resulting in greater control of the most polluting activities. The restrictions imposed on companies that exceed the pollution limits could be seen as barriers to competitiveness, which would affect those that pollute more (Perdan and Azapagic 2011).

Several countries are adapting their energy and climate policies to impose a new behavior to the companies, one that focuses on cost optimization and reductions of GHG emissions, representing a new era for sustainable development. This represents a new view that economy growth is inextricable from environmental preservation.

The conclusions of the European Council in 2011 (CO EUR 2 CONCL 1 2011) highlight the direction taken by the European Union regarding much necessary environmental policies, with emphasis on sustainable growth, energy efficiency and the necessity of creating policies that are capable of providing more investments in research, development and innovation (Freire 2014). These three pillars are united to create a more modern, safe, sustainable and low carbon energy system (European Council 2011). In 2014, the European Council ratified the relevance to improve the

economic growth through the use of energy efficiency and the improvement of competitiveness, maintaining the targets of greenhouse gas emission reduction (CO<sub>2</sub> EUR 2 CONCL 1 2014). Using similar strategy, China has created its own ETS in seven regions of the country. The system will be in adaptation stage until the end of 2015, when the emission reduction plan will be in force for the entire country (Zhang et al. 2014).

Under a regulated market, managers will be enforced to create a new vision of company, using threats as opportunities in the carbon market, creating competitive advantage aims to maximize the shareholders' wealth on behalf of other stakeholders (society and government). Clearly the new ETS needs changes to adapt local/regional issues, but implementation is the first step for developing countries and shows the government provides good conditions for the carbon market start up.

Brazil could follow the same path of other countries, but first needs to implement the existing legislation and adapt/create complementary rules to improve the creation of its own ETS, to create a positive chain between companies-government-society.

## Perspectives and Opportunities for Mitigation

Until recently, environment and sustainable development were considered problems and risk factors: however nowadays, these "problems" are seen as opportunities, as possibilities for growth and efficiency improvement (Carvalho et al. 2015). Building upon the work of Carvalho and Freire (2014), mitigation of climate change involves serious reduction in emissions, which can be achieved through the better utilization of natural resources (energy efficiency concept). Obviously, if the same amount of product can be obtained with reduced consumption of resources, lower production costs are also achieved, which is a win-win situation for managers and entrepreneurs.

The rise of new technologies and its learning curve costs contributes to a reduction of transaction costs of organizations (Williamson 1994, 1995), as well to reductions of pollutants gases (Blyth et al. 2009). R&D investments in production models more "clean" and efficient, linked with new environmental policies rise as option to improve energy efficiency consumption in companies, specially to pollution reduction (Gans 2012).

Important opportunity for mitigation of climate change in Brazil include deforestation (Ludeña and Netto 2011) and energy-related carbon emissions (Melo et al. 2013). These mitigation efforts are translated into challenges at federal, state and municipal levels, for both public and private sectors in Brazil.

The reduction of GHG emissions from deforestation and forest degradation is now an important strategy for mitigating climate change, particularly in developing countries with large forests, such as Brazil (Arima et al. 2014). National forest policies designed to slow deforestation on public lands in developing countries have had mixed success. However, there have been successful experiences (IPCC

2007): due to severe environmental and public health consequences, China, the Philippines and Thailand have considerably reduced deforestation rates; in India, there has been effective partnering with communities to reduce forest degradation. The implementation of effective public policies needs backup from government institutions and the general public. Considering the Brazilian scenario of limited budgets, divergent interests and legal obligations, decision makers in Brazil face multiple difficulties in the process of searching for adequate and reliable solutions for the mitigation of GHG emissions (Melo et al. 2013).

In Brazil, buildings were responsible for 48 % of the total electricity consumed in the country in 2010 (Brasil 2011); this important share of electricity consumption could obviously benefit from energy efficiency and conservation strategies aimed at the reduction of energy-related GHG emissions. It is expected that the demand for electricity will increase in Brazil in the next years—there is little wiggle room for hydroelectric power plants to produce more, and therefore thermoelectric power plants based on coal and natural gas will have to increase their contributions to the energy mix. This will lead to higher environmental loads associated with the consumption of electricity, and more overall environmental loads being disposed of into the atmosphere—this figure will definitively be higher than what was predicted in the Brazilian Energy Plan 2030 (Melo et al. 2013). Therefore any decrease in environmental loads will be the result of dissemination efforts of energy efficiency technologies, most probably through public policy mechanisms.

According to Lucon et al. (2014), energy efficiency technologies have been developed at the same time as existing energy efficiency opportunities have been taken up, and therefore the potential for cost-effective energy efficiency improvement is increasing. However, there are barriers to the market uptake of these opportunities, and large potentials will remain untapped without appropriate policies (Lucon et al. 2014): in addition to technologies and architecture, behavior, lifestyle, and culture have a major effect on energy use.

A very promising energy efficiency scenario is linked to the establishment of public policies that highlight well-defined priorities, goals and action plans. A sensitive point involves the education for the development of a collective conscience towards the preservation of the environment. The responsible agencies should widen the education, research and development actions for new technologies and establish partnerships with the private and public sectors. Changes in energy consumers' behavior and practices can lead to considerable reductions in energy demands, which present positives effects on climate-change issues (e.g., reduction of carbon emissions). Conscious energy behavior can be achieved through educational interventions, and by combining interventions with incentives, substantial reductions in energy use can be produced (Kirby et al. 2015).

There is growing acknowledgement on the importance of changing the energy-related behavior of people. Multiple research efforts have been directed to the subject of pro-environmental behavior change (of which energy-related behavior is a component) (Energy Saving Trust 2007). If more consumers agree to a shift towards a more energy-savvy behavior, important reductions in environmental loads will be achieved. Energy-education could help change current and future

common routines to save energy, and also encourage consumers to promote similar behavior. One of the main incentives that propel energy users to adopt energy-savvy behaviors and practices is the reduction in consumption, accompanied by the reduction in costs.

## Final Remarks

The main conclusion of La Rovere et al. (2014) is that Brazil is in a good position to meet its mitigation goals until 2020. However, after 2020, Brazil will be challenged to combine economic development with low carbon energy-related emissions.

The creation of a system for trading GHG emissions in Brazil would encourage Brazilian companies to reduce their emissions and trade these in a regulated market, achieving double benefits: reduction of emissions (less consumption of resources, lower costs) and benefits realized through the trade of emissions. This model is similar to the model established by the Kyoto Protocol and reproduced internally in many countries.

New environmental policies combined with financial incentives lead company managers to promote the reduction of GHG emissions through innovation/adaptation of processes and products. This action would foster economic development that focuses on environmental preservation, promoting the development of a new culture, where people would vigorously demand the implementation of green policies by companies. Brazil has the potential to maintain sustainable economic growth through the implementation of existing policies and the creation of new mechanisms, permitting the creation of an internal carbon market, which can also be connected to other markets already consolidated in the world.

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