



## Brazil: Curbing forests emissions and anticipating energy issues

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### **A STRONG IMPLICATION IN THE FIGHT AGAINST CLIMATE CHANGE**

Brazil has traditionally been playing an active role in the international climate change arena. It was the first country to sign the United Nations Framework Convention on Climate Change (UNFCCC), in 1992. And during Copenhagen's COP15 run-up, it announced its voluntary pledge of a -36 to -39% reduction in GHG emissions by 2020 compared to a business as usual scenario. This ambitious mitigation scenario found its political form in the National Plan on Climate Change (NPCC) adopted in late 2008, which aims to promote actions on both mitigation and adaptation measures to face climate change, involving federal, regional and local governments, and all segments of the national society.

### **BRAZIL'S CLIMATE POLICY PRIORITY: LAND USE AND FORESTS**

The National Climate Change Policy Law adopted in December 2009 includes the national pledge as well as the voluntary goals related to the first national appropriated mitigation actions (NAMAs) for the country. As deforestation, particularly in the Amazon and *Cerrado* (savannahs) regions, is the most important source of GHG emissions in Brazil, mitigation actions concentrate on reducing deforestation rates in the Amazon and other biomes, as well as increasing reforestation activities and recovery of degraded pasture land. The sectoral approach to mitigation actions related to Brazil's inventory of GHG emissions also include plans for the industry, agriculture and transport sectors.

### **CHALLENGES AHEAD: FROM LAND USE AND FORESTS TO ENERGY-RELATED EMISSIONS**

But as fossil energy use –driven by economic growth, rising urbanization and dominance of road transportation– is the fastest growing source of GHG emissions in the country (68% increase in the 1990-2005 period, to 2005, and an expected rise of 140% by 2020 compared to 2005), the focus of future climate policies will necessarily shift from land use change to the energy system. The perspective of a huge intensification of oil & gas production from the pre-salt offshore fields is also a major issue that should be taken in a mid to long-term perspective. Those challenges will be increasingly important after 2020.

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## LIST OF ACRONYMS

<b>AFOLU</b>	Agriculture, Forestry and Land Use	<b>IPCC</b>	International Panel on Climate Change
<b>ANEEL</b>	National Agency for Electricity Energy	<b>MAPA</b>	Ministry of Agriculture
<b>AR4</b>	Fourth Assessment Report	<b>MBRE</b>	Brazilian Market for Emission Reduction
<b>BM&amp;F-Bovespa</b>	Bolsa de Valores, Mercadorias e Futuros	<b>MCid</b>	Ministry of Cities
<b>BNDES</b>	National Economic and Social Development Bank	<b>MCTI</b>	Ministry of Science and Technology
<b>BRT</b>	Bus Rapid Transport	<b>MDIC</b>	Ministry of Industry, Trade and Development
<b>Casa Civil</b>	Civil Desk of Presidency	<b>MF</b>	Ministry of Economy
<b>CCC</b>	Fuel Consumption Account	<b>MMA</b>	Ministry of Environment
<b>CDE</b>	Energy Development Account	<b>MME</b>	Ministry of Energy
<b>CDM</b>	Clean Development Mechanism	<b>MPOG</b>	Ministry of Planning, Budget and Management
<b>CEBDS</b>	Brazilian Business Council for Sustainable Development	<b>MRE</b>	Ministry of Foreign Affairs
<b>CER</b>	Certified Emission Reductions	<b>MRV</b>	Monitoring, Reporting and Verification
<b>CGMGC</b>	General Coordination on Global Climate Change	<b>MT</b>	Ministry of Transport
<b>CIMC</b>	Interministerial Committee on Climate Change	<b>NAMAs</b>	Nationally Appropriate Mitigation Actions
<b>CIMGC</b>	Interministerial Commission on Global Climate Change	<b>NGOs</b>	Non-Governmental Organisations
<b>CNA</b>	National Agriculture Confederation	<b>NPCC</b>	National Plan on Climate Change
<b>CNI</b>	National Industry Confederation	<b>PBMC</b>	Brazilian Panel on Climate Change
<b>COP</b>	Conference of Parties	<b>PDD</b>	Project Developing Document
<b>DNA</b>	Designated National Authority	<b>PDE</b>	Ten-year Energy Plan
<b>EPE</b>	Energy Planning Agency	<b>Plano ABC</b>	ActionPlan for the Consolidation of a Low-Carbon Economy in Agriculture
<b>ERPAs</b>	Emission Reduction Purchase Agreements	<b>PNE</b>	Long-term Energy Plan
<b>FBMC</b>	Brazilian Climate Change Forum	<b>PNMC</b>	National Climate Change Policy Law
<b>FBMSONG</b>	Brazilian Forum of Social Movements and NGOs	<b>PPCDAm</b>	ActionPlan for the Prevention and Control of Deforestation in the Amazon
<b>FCO</b>	Constitutional Financing Fund of the Center-West Region	<b>PPCerrado</b>	ActionPlan for the Prevention and Control of Deforestation in the Cerrado Region
<b>FNE</b>	Constitutional Financing Fund of the Northeastern Region	<b>Procel</b>	Electricity Conservation Program
<b>FNMC</b>	National Climate Change Fund	<b>REDD</b>	Reducing Emissions from Deforestation and Forest Degradation
<b>FNO</b>	Constitutional Financing Fund of the Northern Region	<b>RedeClima</b>	Brazilian Research and Development Network on Climate Change
<b>GEx</b>	Executive Group	<b>RGR</b>	Global Reversion Reserve
<b>IBAMA</b>	Federal Environmental Agency	<b>SAE</b>	Secretariat for Strategic Affairs
<b>IBrX50</b>	BrazilIndex 50	<b>UNFCCC</b>	United Framework Convention on Climate Change
<b>ICO<sub>2</sub></b>	Carbon Efficiency Indicator		
<b>IDDR</b>	Institute for Sustainable Development and International Relations		
<b>INCT-Clima</b>	National Science and Technology Institute for Climate Change		

## 1. INSTITUTIONAL AND REGULATORY FRAMEWORK

Brazil has traditionally been playing an active role in the international climate change arena, often making important contributions to the negotiations, and was the first country to sign the United Nations Framework Convention on Climate Change (UNFCCC), during the United Nations Conference on Environment and Development, “Rio 92”, hosted by Brazil. The Convention was ratified by the Brazilian Congress on February 28, 1994, and entered into force ninety days later, on May 29.

### 1.1. Early steps

#### 1.1.1. The General Coordination on Global Climate Change – CGMGC

The responsibility for coordinating the implementation of commitments under the UN Framework Convention on Climate Change was given to the Ministry of Science and Technology (MCTI) by Presidential Decree n° 1160/94. In response, the General Coordination on Global Climate Change (CGMGC) was created within MCTI in August 1994.

The main task of the CGMGC has been to coordinate the preparation of the National Communication, in accordance with the commitments assumed in the Convention. The elaboration of the National Communication is a multidisciplinary effort usually involving around 150 institutions and 600 experts from all regions of the country. This elaboration is a great challenge, due to the need to develop technical capacity in the area of GHG inventories, as in many cases it involves pioneer and complex work, particularly regarding GHG emissions from agriculture, forestry and land use (AFOLU) due to the importance of deforestation, particularly in the Amazon region. The first National Communication was delivered during

COP10, in Buenos Aires (2004), and the second one during COP15, in Copenhagen (2009).

#### 1.1.2. The Interministerial Commission on Global Climate Change – CIMGC

The prospects of the Kyoto Protocol entering into force and of developing the rules for the Clean Development Mechanism (CDM) highlighted the importance of formalizing an entity within the Brazilian government that could direct this potential towards national development priorities. Thus, the Interministerial Commission on Global Climate Change (CIMGC) was created in July 7, 1999, for the purpose of coordinating government actions in this area.

Given that the Ministry of Science and Technology had already been carrying out national activities related to complying with Brazil’s commitments related to the UNFCCC, it was chosen to chair the Commission and the CGMGC above mentioned to serve as the Commission’s Executive Secretariat. The Ministry of the Environment (MMA) was designated to serve as the Vice Presidency of the CIMGC.

This Commission is also the Designated National Authority (DNA), under the UNFCCC, as defined in Article 2 of CIMGC Resolution n° 1, dated September 11, 2003. Resolution 01/2003 adopted the decisions of the CDM Executive Board with respect to the standards and procedures for elaborating the project developing document (PDD) (Annex II of Resolution 01/2003), and provides guidance for Brazilian stakeholders in the procedures required to register the project. Despite its exceptionally clean energy mix (around 48% of renewables), Brazil ranks 3<sup>rd</sup> country among all CDM registered projects.

The Commission is made up of representatives of the following Ministries:

- Foreign Affairs (MRE);
- Agriculture (MAPA);

- Transport (MT);
- Energy (MME);
- Planning, Budget and Management (MPOG);
- Environment (MMA);
- Science Technology and Innovation (MCTI);
- Industry, Trade and Development (MDIC);
- Cities (MCid);
- Economy (MF);
- Civil Desk of the Presidency (Casa Civil).

The responsibilities of the Commission are:

- Issuing opinions, when requested, about proposals for sectoral policies, legal instruments and regulations that contain a component relevant to the mitigation of global climate change and to the adaptation of the country to its effects;
- Provide support to the positions of the government in the negotiations under the auspices of the UNFCCC and subsidiary instruments to which Brazil is a Party;
- Define eligibility criteria additional to those considered by the Convention bodies responsible for the CDM, as called for in Article 12 of the Kyoto Protocol to the UNFCCC, according to national sustainable development strategies;
- Consider opinions about projects that result in reduction of emissions and that are considered eligible under the CDM, discussed in the above paragraph, and approve them, where appropriate; and
- Coordinate activities with representative civil society organisations, in order to facilitate activities of governmental and private bodies aimed at complying with the obligations assumed by Brazil under the UNFCCC and the subsidiary instruments to which Brazil is a Party.

#### 1.1.3. The Brazilian Climate Change Forum – FBMC

Given the need to expand the debate on climate change issues and increase the participation of the country's various stakeholders, the Brazilian Climate Change Forum was created in 2000, through a decision made by President Fernando Henrique Cardoso, after environmentalist non-governmental organisations (NGOs) questioned him about the lack of representatives from civil society in CIMGC.

This Forum, which is headed by the President of the Republic, gathers all stakeholders in the climate change field, including government institutions, the private sector, the scientific community and NGOs. FBMC members are:

- The President of the Republic;
- An Executive Secretary (initially Fabio Feldmann, parliamentarian of the Green Party from the state of São Paulo, up to 2003, replaced by

Prof. Luiz Pinguelli Rosa, director of COPPE/ UFRJ, up to now);

- All the 11 ministers heads of the ministries belonging to CIMGC;
- The governors of the 27 states of the country;
- The mayors of the 27 state capital cities;
- Representatives of several business sector organisations;
- Representatives of the scientific community involved in the climate change field; and
- Representatives of environmentalist NGOs.

Although not invested with decision-making powers, FBMC has played a key role in the run-up to Copenhagen and later, providing the setting for a series of meetings that have helped to build the consensus on the country's voluntary pledge presented at COP15.

Following the Federal initiative, several states and cities have created local climate change forums, forming a network that promotes a wide coverage of this theme throughout Brazilian society.

#### 1.1.4. Other key stakeholders

Given the increasing awareness about climate change issues in the country, especially after IPCC's AR4 publication and Nobel Award in 2007, a number of other players are worth mentioning in the country's climate change arena.

#### *The Environment Department (DMA) of the Ministry of Foreign Affairs*

The DMA/MRE has been playing a key role in leading Brazilian delegations in the COPs and in elaborating Brazilian strategy in the international negotiations related to climate change, not only within the UNFCCC but also in other international forums, such as the UN institutions and the G-20. After Copenhagen, a new forum of informal negotiations has emerged, gathering the ministers of environment with diplomats acting as international negotiators and with technical experts of the four BASIC countries (Brazil, South Africa, India and China).

#### *The Brazilian federal environmental agency (IBAMA)*

Until the end of the 1990's, the Ministry of Environment's action in the climate change field was only indirect, through the combat against Amazon deforestation by IBAMA, the federal environmental agency under MMA. IBAMA's forest police has been struggling to enforce laws and regulations that forbid deforestation of more than 20% of total surface of each privately owned land in the Amazon. Government efforts towards this goal have limited effectiveness, due to powerful driving forces of the deforestation process in the Amazon.

Therefore, GHG emissions from AFOLU have been the main source of GHG emissions in Brazil. Only in the last years MMA and IBAMA have achieved substantial success in these efforts and were able to sharply decrease the deforested area per year and the corresponding CO<sub>2</sub> emissions.

#### ***The Energy Planning Agency (EPE)***

The Ministry of Energy is responsible for approving and implementing the country's energy policy. The technical inputs to MME are provided by the EPE, which formulates the studies leading to the two main energy policy tools: a ten-year energy plan (PDE), detailing the energy programs and projects to be implemented in this time frame (the listed power plants are then offered to the private sector in several rounds of call for tenders to build and operate them, and a similar process is run for oil & gas fields); and a 25-year indicative long term energy plan (PNE), which provides several scenarios for the long-term time horizon. The most recent PDE, covering the 2011-2020 period, is considered by the government as a mitigation scenario, as it integrates a number of efforts to foster renewable and energy efficiency, contributing to a significant amount of avoided GHG emissions.

#### ***The National Economic and Social Development Bank – BNDES***

BNDES has traditionally been the most important source of soft governmental loans to Brazilian industry, and in the last four years has substantially increased the amount of resources channeled to building the country's infrastructures. BNDES has recently increased the support to the energy sector, not only in the traditional funding of large hydropower plants but also of energy efficiency and renewable projects (mainly wind, small hydro and biopower plants). Moreover, BNDES has started a new role as the key Brazilian player in REDD+, handling the Amazon Fund. This Fund was initially established in 2009 through a pioneer US\$1 billion grant from the Norwegian government, and will also benefit from other grants from international donors (the German government and several NGOs have announced their support to the Fund). In this first year of operation the Fund has already received 45 proposals and has started supporting 5 projects implemented by NGOs in the Brazilian Amazon. BNDES is preparing to extend the coverage of the Fund to support projects in neighboring countries in the Amazon region. Other initiatives were undertaken more recently.

#### ***Subnational governments***

The main states and capital cities of the country have started to engage in climate change policies

and measures. The states of Rio de Janeiro, Minas Gerais and São Paulo, and the cities of Rio de Janeiro and São Paulo have published GHG emission inventories. The state of Espírito Santo is also undertaking a GHG emission inventory. Most of these GHG emission inventories were elaborated by Centro Clima, supported by the MMA, which has developed a methodology to adapt IPCC guidelines to the state and city levels. These studies have also included the elaboration of baseline and mitigation scenarios giving inputs to the discussion of subnational mitigation goals and leading to the elaboration of municipal climate change policies. However, the State of São Paulo produced in 2010 a GHG emission inventory based upon the replies to questionnaires distributed in a survey of the main emitting sectors. The State of São Paulo has also approved a law limiting the level of the state GHG emissions in 2020 to 80% of the state emissions in 2005. Besides, the city of Rio de Janeiro announced before COP15 in 2009 voluntary goals to achieve increasing levels of avoided GHG emissions by 2012 (8% of the city's emissions in 2005), 2016 (16% of 2005 emissions) and 2020 (20% of 2005 emissions). These goals were included in the Municipal Law n°5248 that establishes the Municipal Climate Change Policy, approved by the mayor on January 27, 2011.

#### ***Business sector***

Some huge Brazilian enterprises have been following the climate change negotiations at the COPs and adopted internal guidelines to deal with climate change issues, going from corporate GHG emission inventories to mitigation policies and measures. Among them, Petrobras (oil & gas, biofuels, energy), Eletrobrás (power, energy) and Vale (mining, coal, energy) can be mentioned. Business associations such as the National Industry Confederation (CNI), the National Agriculture Confederation (CNA) and the Brazilian Business Council for Sustainable Development (CEBDS) are also active players in this field, producing statements of the corporate viewpoints on climate change issues and presenting side events at the COPs.

#### ***Non-governmental organizations (NGOs)***

Brazilian social and environmentalist NGOs gather under the umbrella of the Brazilian forum of social movements and NGOs (FBMSONG), established in the preparation of Rio 92. FBMSONG regularly receives from CIMGC all the CDM project proposals for comments, but has shown a limited capacity for reviewing them. Many NGOs are active in the field research of climate change related themes, such as REDD+, subject of a number of projects sponsored by the Amazon Fund.

### *Scientific community*

Up until a few years ago, the number of Brazilian scientists working on climate change was quite small. On the occasion of the Nobel Award granted to IPCC in 2007, a survey was able to identify 60 Brazilians who had contributed to IPCC work, but most of them in punctual activities such as attending workshops and/or sending comments to early drafts of IPCC reports. The actual number of scientists heavily involved as authors of IPCC reports is around a dozen. Nevertheless, several universities and scientific and technology institutions are concerned by climate change and develop studies related both to mitigation issues and vulnerability, impact and adaptation (as GHG inventories, carbon footprint and life-cycle analysis). Most of them are part of the Brazilian Research and Development Network on Climate Change (Rede Clima) or take part in the (virtual) National Science and Technology Institute for Climate Change (INCT-Clima), both recent initiatives launched by the MCTI.

### *Brazilian Panel on Climate Change – PBMC*

More recently, in 2010, MMA started an effort to increase these numbers, establishing a Brazilian Panel on Climate Change (PBMC). This initiative was welcomed by the scientific community, attracting around 200 scientists to work on the production of a Brazilian Climate Change Assessment Report, to be released in June 2012 during the Rio+20 conference. The structure of this report mirrors the IPCC, with three working groups dealing with atmospheric science, impacts, adaptation and vulnerability, and mitigation.

## **1.2. Recent carbon policy and market developments**

In December 2007, by the means of a Presidential Decree, the Interministerial Committee on Climate Change (CIMC) and its Executive Group (GEx) were created, with the main assignment to elaborate and to implement the climate change policy and plan. The Committee is led by the Presidency's Civil Desk (Casa Civil) and the GEx is formed by eight ministries and the Forum (FBMC), and is coordinated by the Ministry of Environment.

The National Plan on Climate Change (NPCC), presented at the end 2008, aims to promote actions on both mitigation and adaptation measures to face climate change, involving federal, regional and local governments, and all segments of the national society. It is structured in four axes: (i) opportunities for mitigation actions contributing to the global effort for reducing GHG emissions; (ii) needs to better understand vulnerabilities,

possible impacts and adaptation strategies; (iii) requirements on research, development and innovation; (iv) and requirements for education, capacity building and communication. It includes objectives aimed at reducing deforestation rates in the Amazon and other biomes, increasing reforestation activities, promoting energy efficiency and renewable energy, fostering the use of bioethanol for transport fuel, and recycling effluents and residues.

The National Climate Change Policy (PNMC) Law approved by the Congress and sanctioned by the President on 29 December 2009 (Federal Law n° 12187) included the voluntary goals to limit the country's GHG emissions presented the month before at COP15 in Copenhagen. The voluntary goals related to national appropriated mitigation actions (NAMAs) were established as a reduction in between 36.1 and 38.9% of the country's GHG emissions projected to 2020.

At the same time, the National Climate Change Fund (FNMC - Federal Law n°12114) was created, under the responsibility of the Ministry of Environment and managed by BNDES. This Fund provides financial resources to implement the country's climate change policy and plans. It may be used as loans or as grants for projects and studies. The Fund can potentially disburse some €100 million per year on climate change mitigation and adaptation actions, excluding other potential funding sources, such as grants and loans from national and international financial institutions.

The Brazilian Market for Emission Reduction (MBRE) is mentioned in the text of the Law which institutes the PNMC. Despite the existence of the BM&F-Bovespa (Bolsa de Valores, Mercadorias e Futuros) electronic auction system for purchase and sale of Certified Emission Reductions (CER), up to now, the MBRE was not really implemented because of the lack of a better legal definition and regulations. Nowadays, in the so far insubstantial Brazilian carbon market, private transactions are carried out involving future purchase and sale contracts of CER, usually through the execution of emission reduction purchase agreements (ERPAs). This form of trading prevails for small and medium sized national companies. As they are private transactions, there are no standards to the commercial terms under which they are carried out (besides a certain standardization of the legal terms contained in the ERPAs). The future purchase and sale model, however, is no longer so frequently applied by large Brazilian companies, which have been replacing the operations carried out through ERPA by spot operations, seeking a better price for the CER.

Also, as in other countries, the Brazilian legislation does not establish specific rules with respect

**Table 1.** GHG emissions in Brazil, 1990-2005

GHG Emissions (Mt CO <sub>2</sub> eq/ year)	1990	1994	2000	2005	Var % 90/05	Part % 1990	Part % 2005
Agriculture/Husbandry	347	378	401	487	41%	25.4%	22.1%
Energy	215	256	328	362	68%	15.8%	16.4%
Industrial processes	27	29	35	37	39%	2.0%	1.7%
Wastes	28	32	41	49	77%	2.0%	2.2%
Land use change	746	790	1247	1268	70%	54.8%	57.5%
TOTAL	1362	1485	2052	2203	62%	100 %	100 %

Source: MCTI, 2009

**Table 2.** Preliminary estimates of Brazil's GHG emissions and mitigation actions in 2020

Emissions / Mitigation actions (Mt CO <sub>2</sub> eq / year)	2005 Inventory data	2020 BAU scenario	2020 Mitigation scenario	2020 Emission reduction	2020 Reduction / BAU total (%)
Land use change	1268	1084	415	669	24.7
Agriculture / Husbandry	487	627	461 - 494	133 - 166	4.9 - 6.1
Energy	362	901	694 - 735	166 - 207	6.1 - 7.7
Energy efficiency				12 - 15	0.4 - 0.6
Biofuels increase				48 - 60	1.8 - 2.2
Hydropower increase				79 - 99	2.9 - 3.7
Small Hydro, Biomass, Wind				26 - 33	1.0 - 1.2
Others	86	92	82 - 84	8 - 10	0.3 - 0.4
TOTAL	2203	2703	1652 - 1728	975 - 1052	36.1 - 38.9

Note: Mt CO<sub>2</sub>eq = million tons of CO<sub>2</sub>eq

Source: Brazilian Ministries of Environment and Science and Technology, in La Rovere, 2009

to taxation and accounting of generation and trading of carbon credits. Thus, the treatment applicable to such operations derives from the general rules in force. And there are no specific directions coming from the competent Brazilian authorities, nor by the bodies responsible for the uniformity of the national accounting practices. From this point of view, the main issues consist in knowing how the carbon credits should be recorded in the companies that generate them, what cost should be attributed to them and when the referenced resources should be accounted for. It is still necessary to clarify the legal nature of the CER.

Another new issue (which influence could not be evaluated yet) concerns the joint BNDES and BM&F-Bovespa initiative to launch a new market indicator: the Carbon Efficient Indicator (ICO<sub>2</sub>). This indicator is composed of the shares of the companies integrating the 50 companies presenting greatest liquidity in the stock market (IBrX-50) that have accepted to take part in the initiative, adopting transparent practices related to their

GHG emissions. To balance the shares of each company, the indicator takes in account their GHG emissions degree of efficiency and the shares free-float of each company.

## 2. BRAZIL'S GHG EMISSIONS: INVENTORY AND MITIGATION PLANS

### 2.1. Historical GHG emissions

Brazilian first and second national communications to the UNFCCC provide GHG emission inventories for the 1990-2005 period, presented in Table 1.

The main source of GHG emissions in Brazil is deforestation caused by the expansion of agricultural frontiers, mainly in the Amazon region. Good estimates of deforested land surface are available from satellite image recovery. However, the corresponding CO<sub>2</sub> emissions are very hard to quantify due to lack of reliable data concerning the biomass

**Table 3.** Final figures of Brazil's GHG emissions and mitigation actions in 2020

Emissions (Mt CO <sub>2</sub> eq / year)	1990 Inventory data	2005 Inventory data	Variation 1990 – 2005 (%)	2020 BAU scenario	Variation 2005 – 2020 BAU (%)	Mitigation actions / Avoided emissions in 2020
Land use change	746	1268	70%	1404	11%	
Amazon				948		
Savannahs				323		
Others				133		
Agriculture /Husbandry	347	487	41%	730	50%	
Energy	215	362	68%	868	140%	234
Industrial processes + wastes	55	86	39%	234	172%	
<b>TOTAL</b>	<b>1362</b>	<b>2203</b>	<b>62%</b>	<b>3236</b>	<b>47%</b>	<b>1168 to 1259</b>

Source: Ministry of Science and Technology - MCTI, 2010

densities of the different kinds of forests and savannahs affected.

Agriculture and husbandry are key sectors of Brazilian economy, which explains why they rank second as main GHG emission sources. Because of the country's vast agricultural and grazing lands, it is one of the largest agricultural producers in the world, and ranks second in soybean production, with 18% of the global total. It also has the second largest bovine herd in the world, with 12% of the global total. In this sector, CH<sub>4</sub> emissions are dominant, as a result of the phenomenon of enteric fermentation of ruminant herbivores, which include the huge cattle herd.

The energy sector comes in third position only as GHG emitter, thanks to the role played by hydropower and renewable biomass (bioethanol from sugarcane, wood and charcoal from forest plantations, and biodiesel from vegetable oils cultivation) which account for around 48% share of renewables in the country's total energy supply.

## 2.2. Voluntary GHG emissions reduction goals

Brazil has already been making a lot of efforts to limit its GHG emissions, including the curbing of Amazon deforestation and the important investment on renewables. Preliminary estimates of a business as usual (BAU) and of a mitigation scenario of the country's GHG emissions in 2020 were made by several government bodies in the run-up to Copenhagen, discussed in FBMC and constituted the basis of this pledge. These preliminary estimates are presented in Table 2.

However, the final figures had to wait the completion of the Second National Communication, in 2010. Therefore, it was only on December 9, 2010, during COP16 in Cancun, that Brazilian government published a decree (Federal Decree n° 7390) regulating the articles of the

Federal Law n° 12187 regarding the final figures of the voluntary goals of avoided GHG emissions in 2020 (see Table 3 and Figure 1).

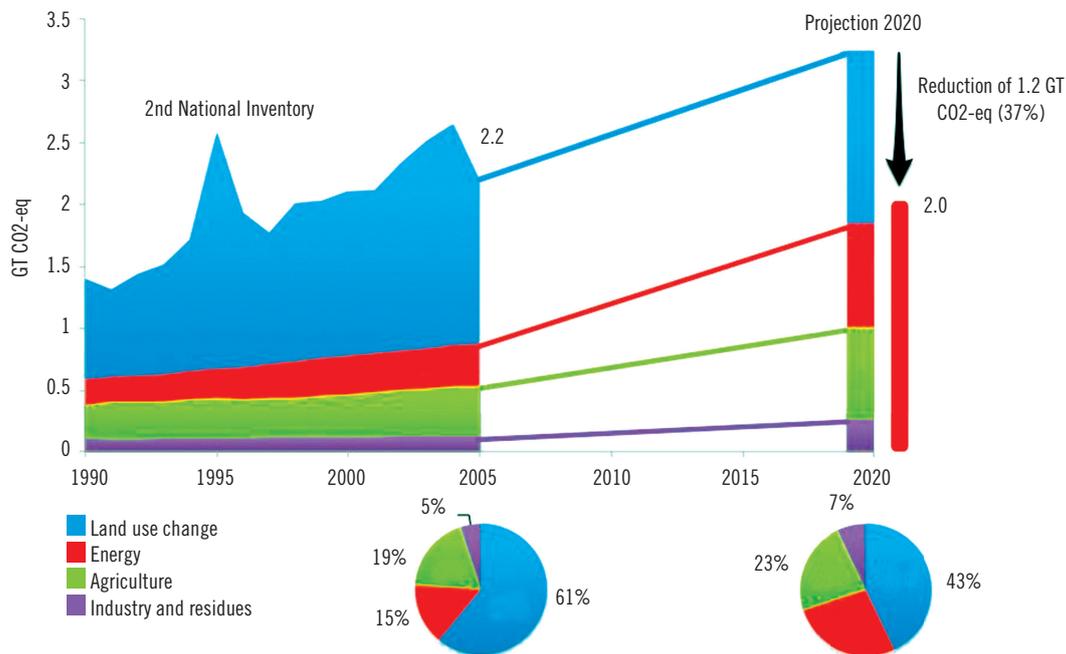
## 2.3. The implementation issues related to Brazil's mitigation actions

### 2.3.1. Legal instrument: Federal Decree n° 7390, 2010

Unlike the preliminary estimates made in 2009, the Decree does not establish a full mitigation scenario with voluntary goals for each main source of emissions. The only exception is the energy sector, because the government considers the current 10-year energy plan to be a mitigation scenario, as it includes a number of efforts to increase the role of renewables, nuclear and energy efficiency in the energy policy.

The main contribution to curbing the country's GHG emissions will come from the efforts to reduce deforestation in the Amazon, following the successful record of recent years. The goal set for the agriculture sector is very ambitious, considering the recent growth of the country's grains and meat exports. However, economically feasible mitigation alternatives already exist and have a great potential: recovery of degraded pasture land, agroforestry schemes, more intensive cattle raising activities (given the current low average ratio of 0.5 heads per hectare), biologic nitrogen fixation and low tillage techniques, which cover more than 20 million hectares in the country and are rapidly spreading.

In the case of the emissions of industrial processes and waste disposal, grouped under "other sectors" due to its minor contribution to the total, the business as usual scenario already shows a low growth trend, and the voluntary commitments aim to keep roughly constant GHG emissions in these sectors. Again, there are feasible mitigation

**Figure 1.** Expected evolution of Brazilian GHG emissions up to 2020

Source: Suassuna, K., MMA, 2011

options in these sectors, such as the capture, burning and/or energy use of biogas in sanitary landfills that make it possible to achieve this objective.

The case of the energy sector deserves special attention. The emissions due to the use of fossil energy have been increasing significantly in the country in the form of oil products, natural gas and coal. These fuels play a basic role to run the modern part of Brazilian economy, such as industry and transports, as well as agribusiness and the residential, commercial and service sectors. Its share in power generation has also been increasing, starting from a low departure level, to complement the use of the huge Brazilian hydropower potential, which is by far the dominant energy source for generating electricity in the country. Thus, the emission of GHG due to the use of energy, especially the carbon dioxide (CO<sub>2</sub>) resulting from burning fossil fuels, showed a high growth rate (68%) over the 1990-2005 period. Indeed, economic growth, rising urbanization and the dominance of road transportation are the driving forces contributing to the increase of fossil energy consumption and the associated CO<sub>2</sub> emissions.

Thus, unlike other sectors, the BAU scenario projected by the government shows a significant increase in the emissions due to the consumption of fossil fuels by 2020, fostered by an average GDP growth projected at 5% per year: a rise of 140% compared to 2005, that is, 2.4 times the level of 2005 emissions in this sector.

As far as mitigation is concerned, the levels of hydropower generation, energy efficiency and bioethanol production were those included in the 10-Year Energy Expansion Plan (PDE) for 2020 (EPE, 2009). Other mitigation actions included were the production and use of biodiesel in a 5% blend with diesel oil for 2020 (B5) and the increase in power generation from other renewable sources: small hydropower plants, biomass (especially sugarcane bagasse) and wind energy. Even so, GHG emissions due to the use of fossil fuels in the country will be 75% higher in the mitigation scenario compared to 2005 emissions. The achievement of the mitigation scenario goals will require the implementation of public policy tools capable of stimulating the substitution of renewable energy sources for the use of fossil fuels. This need will be even more acute in the future to drive Brazilian economy towards a low-carbon path, as fossil fuels will become the most important source of GHG emissions in the industrial world.

### 2.3.2. Sectoral plans to achieve the mitigation actions

The Federal Decree n° 7390 is a step towards detailing the voluntary mitigation goals established by the government in Law no 12187, but still leaves a lot of flexibility to the actual way of achieving these goals. Only the energy sector has already established the amount of avoided GHG emissions in 2020, according to the PDE. The decree refers

also to four other sectoral mitigation plans already elaborated:

- Plan of Action for Prevention and Control of Deforestation in the Amazon – PPCDAm
- Plan of Action for Prevention and Control of Deforestation and Fires in the Savannahs – PPCerrado
- Plan for Consolidation of a Low-Carbon Emission Economy in Agriculture– Plano ABC
- Plan of Emission Reduction in the Steel Sector

The decree lists a number of mitigation actions included in the available sectoral plans:

I – Reduction of 80% of the annual deforestation surface in the Amazon, compared to the historical average in the 1996-2005 period; this figure is of 1.95 Mha/year, and together with the average biomass density of 132 tC/ha (484 tCO<sub>2</sub>/ha), it was used to project the BAU emission level of 948 MtCO<sub>2</sub>/y in 2020; assuming a constant biomass density, this decrease in the Amazon deforestation rate would allow for avoided emissions of 758 MtCO<sub>2</sub>/y in 2020.

II – Reduction of 40% of the annual deforestation surface in the savannahs, compared to the historical average in the 1999-2008 period; this figure is of 1.57 Mha/y, and together with the average biomass density of 56 tC/ha (206 tCO<sub>2</sub>/ha), it was used to project the BAU emission level of 323 MtCO<sub>2</sub>/y in 2020; assuming a constant biomass density, this decrease in the savannahs deforestation rate would allow for avoided emissions of 129 MtCO<sub>2</sub>/y in 2020.

III – Increase of renewable power generation through large hydropower, wind, small hydro and bioenergy projects, and of biofuels (ethanol from sugarcane and biodiesel from vegetable oils), and energy efficiency improvements as projected in the PDE; the amount of avoided emissions in 2020 was estimated at 234 MtCO<sub>2</sub>/y considering that this additional renewable energy generation and energy saved would come from fossil fuels.

IV - Recovery of 15 Mha of degraded pasture land.

V - Increase of 4 Mha of the land covered by agroforestry schemes, coupled with more intensive cattle raising activities (integrated agriculture/husbandry/forestry activities).

VI - Increase of 8 Mha of the planted area under low tillage techniques.

VII - Increase of 5.5 Mha of areas cultivated with biologic nitrogen fixation techniques replacing the use of nitrogenous fertilizers.

VIII – Increase of 3 Mha of forest plantations.

IX – Increase of 4.4 Mm<sup>3</sup> of the use of technologies for proper treatment of animal wastes.

X – Increase steel manufacturing using charcoal

from planted forests and improve the efficiency of charcoal kilns.

The Decree also established the deadline of 15 December 2011 (later extended to 15 March 2012) for elaboration of additional sectoral mitigation plans for those sectors included in the 2009 law:

- Public urban transportation
- Interstate transport of cargo and passengers
- Transformation industry
- Durable consumer goods industry
- Chemical industry
- Pulp and paper industry
- Mining
- Civil construction
- Health sector

All these sectoral mitigation plans must include:

- Emission reductions in 2020, with milestones for every three-year period
- Mitigation actions to be implemented
- Establishment of indicators for monitoring of performance and assessment of effectiveness
- Proposal of tools and incentives to be adopted in the implementation of the plans; and
- Sectoral studies of cost estimates and implications for competitiveness.

The Decree also requires a wide public consultation process for the discussion of the sectoral mitigation plans, and allows for the possibility of using the sectoral mitigation goals in the establishment of the domestic carbon market (MBRE) authorized by the 2009 law. Other tools to implement the sectoral mitigation plans include CDM and NAMAs, according to the Decree, besides the Climate Change Fund created by the 2009 law.

The institutional responsibility of coordinating the actions of the sectoral mitigation plans, under the umbrella of the National Climate Change Plan, remains with the Interministerial Committee on Climate Change (CIMC), while the Brazilian Climate Change Forum (FBMC) is responsible for the follow-up of the actions' implementation. A working group coordinated by MCTI will be responsible for publishing an annual estimate of the country's GHG emissions.

Besides, the Decree also obliges that all federal government multiyear plans and annual budget laws include the provision for the mitigation programs and actions included in the Decree.

### 2.3.3. Financial incentive mechanisms other than the FNMC

The sale of the certified emission reductions (CERs) issued under the Clean Development Mechanism (CDM) is viewed as an important financing instrument to reach voluntary goals

set by the Brazilian government. Most of the key objectives can benefit from carbon revenues; these include cogeneration and such other renewable energy solutions as hydropower, afforestation and reforestation, energy efficiency, and fuel-switching programs. Most of the 163 CDM projects in Brazil are renewable energy projects, most of which focus on sugarcane bagasse cogeneration. Bagasse cogeneration represents 48% of total projects, followed by biogas (17% of all projects), and solid waste management (30%). Most projects were developed in the states of São Paulo (22%), Minas Gerais (14%) and Rio Grande do Sul (10%). CDM cogeneration projects account up to 2010 for a total of 1,126 MW installed capacity, while small hydropower plants account for 985 MW and wind energy 676 MW. Few reforestation projects are implemented as methodologies were developed slowly and market demand is reduced due to the temporary nature of this asset.

Brazil has existing sources of funding for energy efficiency and renewable energy through government-mandated levies; these are directed towards funds such as the Fuel Consumption Account (CCC) for power off grid generation in the Amazon region, Energy Development Account (CDE), and Global Reversion Reserve (RGR). According to the National Agency for Electric Energy (ANEEL), CDE collections for 2009 are estimated at €1.12 billion. Collections for the RGR Fund had reached nearly €3 billion at the end of fiscal year 2008. Managed by Eletrobrás, RGR is a main source of funding for energy efficiency programs under the Electricity Conservation Program (Procel). With regard to the CCC, collected levies reached approximately €0.5 billion in 2008. Not all of the funds collected are used for renewable energy or energy efficiency projects, but they are significant in size.

Other funds that receive similarly mandated levies but are not limited to energy-related activities include the Constitutional Financing Fund of the Northern, Northeastern, and Center-West Regions (FNO, FNE, and FCO, respectively). These funds receive 3% of overall tax collections, which are then used to finance activities in the respective regions; they are managed by banks such as the Banco da Amazonia, Banco do Nordeste, and Banco do Brasil. In 2009, their budgets were €1.10 billion (FNO), €3 billion (FNE), and €1.15 billion (FCO). Financing programs include support for activities such as decreased deforestation and increased livestock productivity.

As already explained, the Amazon Fund, created in 2008 with a US\$1 billion grant from the Norwegian government, will distribute this amount in grants over an eight-year period; the first parcel, of US\$110 million, was received in the first quarter

of 2009, with the remainder to be received by 2015. Funding sources are exclusively *via* donations (national and foreign), and the Fund is expected to grow to more than US\$21 billion by 2021. Germany has committed €18 million, and other countries are considering additional grants. BNDES, which handles and coordinates the Fund, provides donors non-transferable diplomas and will not generate carbon credits as compensation. Grants distribution will continue as Brazil reduces its emissions associated with deforestation. The Fund will also finance non-reimbursable actions that help prevent, monitor and combat deforestation, and promote sustainable forest use and conservation in the Amazon biome. Up to 20% of resources may be directed to the development of deforestation monitoring and control systems for other biomes located in Brazil and other tropical countries. The Fund's technical committee comprises members of Brazil's federal government, including the Ministry of the Environment and the Secretariat for Strategic Affairs (SAE); governments of Amazon states; and civil society representatives (NGOs, companies, universities, and unions).

### 3. CHALLENGES RELATED TO BRAZIL'S CLIMATE POLICY

The main issues related to the implementation of the country's mitigation actions will be briefly discussed hereafter for each of the main sources of GHG emissions in the country: land use change; agriculture, forestry and animal husbandry; energy; and others (including industrial processes and wastes), considering also the mid-long-term.

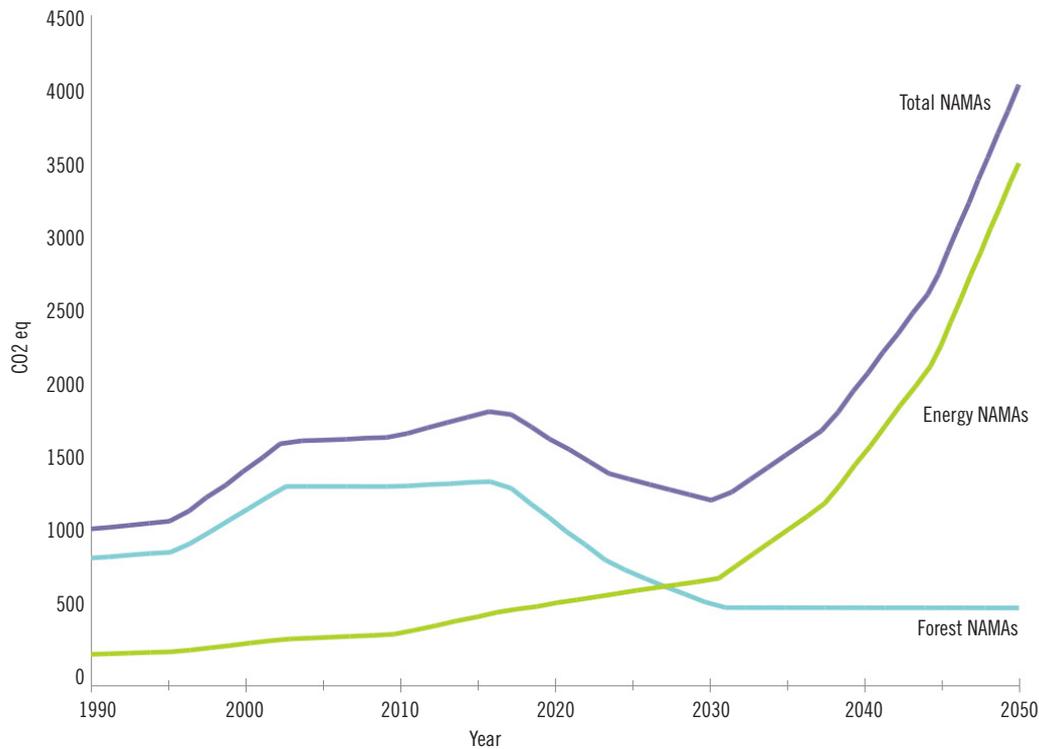
#### 3.1. Land use change

This is the most important source of GHG emissions in Brazil, and successful efforts to reduce deforestation, particularly in the Amazon and *Cerrado* (savannahs) regions will be crucial to the achievement of Brazilian voluntary goals, as explained above. Two plans, one for each key biome, gather the mitigation actions defined to meet the voluntary goals related to this source:

- Plan of Action for Prevention and Control of Deforestation in the Amazon – PPCDam;
- Plan of Action for Prevention and Control of Deforestation and Fires in the Savannahs – PPCerrado.

The mitigation actions developed include the 80% reduction in annual deforestation surface in the Amazon, and 40% in the savannahs, as previously mentioned. MMA takes the lead in the

**Figure 2.** Projected Brazilian GHG emissions to 2030 and extrapolation to 2050



Sources: La Rovere et al, 2011 (up to 2030); La Rovere and Raubenheimer, 2011 (2030 to 2050).

definition and implementation of these mitigation actions, coordinating the action of other ministries, such as MCTI, the Ministry of Defense and the Ministry of Justice, and of subnational governments (states and municipalities). The key target is the enforcement of laws and regulations that prevent illegal deforestation of conservation units and private properties. The Forest Code is the most important piece of legislation in this regard, as it rules that only 20% of the original forest coverage of private properties can be cleared in the Amazon region.

The operational bodies within MMA (The Forest Service and IBAMA) have the technical capacity to design the modalities of implementing these mitigation actions. However, the institutional capacity to actually enforce the laws and regulations, particularly in the Amazon region, is insufficient to cope with the powerful economic driving forces of deforestation (the dynamics of expansion of the agricultural frontier, led by logging, cattle expansion and soybean plantations). A strong political will is required to keep all the governmental institutions mobilized in operations to constantly verify the enforcement of the law. The recent record has shown the viability of

a successful performance in this field, as deforestation in the Amazon was limited to 1.2 Mha in 2007 and 0.7 Mha in 2008, down from an average of 1.95Mha/y in the 1996-2005period. However, this trend was reversed last year, with an increase in the deforestation in the Amazon region. This was partly due to the prospects of approval by the Congress of a new version of the Forest Code, relaxing some constraints on the punishing of responsible for removal of forest cover in private properties. As a result, a ferocious political debate around the Forest Code reform is currently ongoing, and its outcome is still uncertain (the Senate and the President have to approve it yet).

Due to sovereignty concerns, all the financing of these mitigation actions will come from national budgets at the federal, state and municipal levels. The main MRV issue related to these two Plans is the estimate of the biomass density of the forest cover in the deforested surface, as satellite imagery provides a reasonable guess of the affected area (still, some small scale deforested areas may be difficult to spot). As a forest inventory is not available for the whole Amazon, a special methodology was developed for calculating the GHG emissions inventory of the country, from 1990 to

2005, in Brazil's Second National Communication to the UNFCCC (MCTI, 2010), improving the work done in the First National Communication (MCTI, 2004). This methodology was developed by the National Spatial Research Institute (INPE), belonging to MCTI. An independent monitoring of the deforestation in the Amazon is also carried out by a NGO, the Amazon Research Institute (IPAM). Therefore, MRV of these mitigation actions will have the same credibility than Brazilian National Communications to the UNFCCC.

Besides these two Plans, it is worth mentioning a different kind of effort that might turn out to develop into mitigation actions in the medium or long term future: the Amazon Fund. As previously highlighted, this Fund was initially established in 2009 and resources come from international cooperation, through the pioneer US\$1 billion grant from the Norwegian government, and will also benefit from other grants from international donors (the German government and several NGOs have announced their support to the Fund). However, all the decisions concerning the allocation of funds are solely the responsibility of BNDES, a key condition that had to be met in the setup of the Fund to dismiss any sovereignty concern. Most of the projects are initiatives from NGOs related to innovative approaches to supply economic incentives to keeping the forest cover in the Amazon, including REDD+. From a Brazilian perspective, these are not considered mitigation actions, as GHG avoided emissions are not the main deliverable of these projects, but these experiments might well develop into mitigation actions in the future.

The contrast between the Amazon and *Cerrado* Plans, on the one hand, and the Amazon Fund, on the other hand, illustrates the borderline drawn by the Brazilian government in the delicate issue of sovereignty *vis-à-vis* international support to mitigation actions. The enforcement of laws and regulations remains the sole responsibility of the government, without any financial support from abroad. However, it is acknowledged that driving forces of deforestation are very powerful and demand the establishment of economic incentives to keep the forest cover in the long term, going far beyond the sole command-and-control policies and measures. International cooperation towards this end is most welcome.

### 3.2. Agriculture, forestry and animal husbandry

This is currently the second most important source of GHG emissions in the country, and the Plan for Consolidation of a Low-Carbon Emission Economy

in Agriculture gathers the mitigation actions defined to meet the voluntary goals related to this source, with actions as previously specified:

- Recovery of 15 Mha of degraded pasture land.
- Increase of 4 Mha of the land covered by agroforestry schemes, coupled with more intensive cattle raising activities (integrated agriculture / husbandry / forestry activities).
- Increase of 8 Mha of the planted area under low tillage techniques.
- Increase of 5.5 Mha of areas cultivated with biologic nitrogen fixation techniques replacing the use of nitrogenous fertilizers.
- Increase of 3 Mha of forest plantations.
- Increase of 4.4 Mm<sup>3</sup> of the use of technologies for proper treatment of animal wastes.

The Ministry of Agriculture takes the lead in the definition and implementation of these mitigation actions, coordinating the action of other ministries, such as the Ministry of Planning, Budget and Management and the Ministry of Economy, and of subnational governments (states and municipalities). The key policy tool is the establishment of eligibility requirements for farmers to get credit from governmental development banks, and of economic incentives to access softer loans from these public bodies (mainly from the Banco do Brasil but also from BNDES and others). This is already current practice of these players (e.g. farming requirements from zoning plans must be met to access public funds) that may be extended to integrate mitigation actions.

The financing of these mitigation actions should come from the usual sources of funding to national development banks, including the financial market, besides national budgets at the federal, state and municipal levels. It is thus conceivable that in the future these mitigation actions may become candidates for financial support to NAMAS to be provided through UNFCCC mechanisms. As the targets can be considered very ambitious, this financial support could be valuable to improve the country's institutional capacity to meet them. The Brazilian development banks that are the primary source of credit to agricultural, forestry, and animal husbandry activities would be potential owners of the mitigation actions, under the political coordination of the Ministry of Agriculture (MAPA).

The operational body dealing with research, development and innovation within MAPA, the Brazilian Agriculture Research Enterprise (Embrapa), a network of solid research centers, has the technical capacity to design the modalities of implementing these mitigation actions and also to deal with the MRV-related issues.

### 3.3. Energy

The emissions due to the use of fossil energy have been increasing significantly in the country in the form of oil products, natural gas and coal: this is the fastest growing source of GHG emissions (68% increase in the 1990-2005 period).

The most recent ten-year Energy Plan (PDE), covering the 2011-2020 period, is already considered by the government as a sectoral mitigation plan, as it integrates a number of mitigation actions:

- Increase of renewable power generation through large hydropower, wind, small hydro and bio-power projects.
- Expansion of liquid biofuels (bioethanol from sugarcane and biodiesel from vegetable oils).
- Implementing energy efficiency improvements as projected in the PDE.

The amount of avoided emissions in 2020 was estimated at 234 MtCO<sub>2</sub>/y considering that all this additional renewable energy generation and energy saved would come from fossil fuels.

The Ministry of Energy is responsible of approving and implementing the country's energy policy. The technical inputs to MME are provided by the Energy Planning Agency (EPE), which formulates the studies leading to the PDE, detailing the energy programs and projects to be implemented in the next ten-year period. The listed power plants are then offered to the private sector in several rounds of call for tenders to build them, and a similar process is run for oil & gas fields. The actual investment to implement these mitigation actions will thus come from the private sector or state owned enterprises such as Petrobras and Eletrobrás. In the case of biofuels, and particularly of bioethanol production from sugarcane in the Brazilian context, the profitability of these investments in the current oil price scenarios leads to the assumption that there will be no major problems in the flow of private funding to these mitigation actions.

The cases of energy efficiency and of renewable power generation are different due to the well-known barriers that hamper their development. Economic incentives to promote renewables are already supplied from Brazilian federal budget (mainly through BNDES and Eletrobrás), and also strengthened by some punctual initiatives at the state and municipal levels. However, these mitigation actions would be the most natural candidates to Brazilian NAMAs seeking financial support from the UNFCCC funding mechanisms. Other possibilities of international cooperation would be the multilateral financial bodies such as

the World Bank and Inter-America Development Bank (IDB), which may resume the role they had in the past for hydropower development, now under updated standards of environmental and social performance (such as those established by the World Commission on Dams, for example). Again, as PDE targets can be considered ambitious, this financial support could be valuable to improve the country's institutional capacity to meet them.

Public players in this field, such as EPE, ANEEL, Eletrobrás and BNDES, would be potential owners of the mitigation actions, under the political coordination of MME. EPE has the technical capacity to design the modalities of implementing these mitigation actions and also to deal with the MRV-related issues, which are pretty straightforward to solve, being much less complex than for other GHG emission sources.

The key issue will remain the inherent subjectivity associated to the choice of a counterfactual baseline to be compared with the actual energy policy followed by the country. This issue of the baseline's credibility is particularly sensitive in the case of the energy system, as GHG emissions from land use change use a well-established practice in this field of using an historical average as the baseline. There is no scientific approach capable of solving this issue that must be settled within the framework of international negotiations.

### 3.4. Other

For some mitigation actions like energy efficiency, renewable power generation, methane recovery and use from urban solid wastes, CDM methodologies are available and are straightforward to be applied at a program level.

For the bulk of other mitigation actions, which are less significant in terms of total GHG avoided emissions, the sectoral mitigation plans are under development (due on 15 December, 2011, but postponed to 15 March 2012). The sole exception is the already available Plan of Emission Reduction in the Steel Sector, including mitigation actions targeted to increase steel manufacturing using charcoal from planted forests and improving the efficiency of charcoal kilns. This example combines forestry and energy efficiency issues.

The sectoral mitigation plans for the industry and transport sectors are the most important ones, in relationship with their share in the overall GHG emissions, and will need to be consistent with the estimates done by EPE in the 10-year (PDE) and long-term (PNE, 2030) national energy plans. The key challenges for MRV of NAMAs remain within the transport sector, particularly at the subnational level (cities and states).

The estimate of avoided GHG emissions by mitigation actions on urban passenger transportation, such as bus rapid transport (BRT), tramways and subway lines, and improvement of conventional bus system (rerouting, integrated ticketing) is much more complex as it requires the proper accounting of modal shifts. This is data intensive, requires primary data surveys and is very site specific. Moreover, cities do not always have the appropriate institutional setting (public transportation agencies keeping track of transport data with effective performance). The city of Rio de Janeiro alone is building five BRT and extending subway lines, and the only estimates available for the avoided GHG emissions come from rough analogies with the Transmillenium project, from Bogota, Colombia, using its CDM methodology. The same difficulty applies to São Paulo and Brasília transport systems. The sole exception is Belo Horizonte, where a good transportation municipal agency with support from IDB has recently provided a tailor-made estimate of the GHG emissions to be avoided through its Municipal Transportation Plan.

#### 4. FINAL REMARKS

The successful achievement of the country's voluntary GHG emission mitigation goals will depend on the internal capacity to handle a number of issues that arise in the implementation of mitigation actions (MAs), including (La Rovere, 2011):

- Development of these mitigation actions (from the idea to concept note, business plan, and successful implementation);
- Planning and establishing policy and regulatory context (both for individual mitigation actions and broader plans and strategies);
- Setting up institutional capacity to take mitigation actions to implementation;

- Creating technical capacity to design and domestically assure the monitoring, reporting and verification (MRV) of the mitigation actions;
- Scheduling the means to financing these mitigation actions;
- Outlining the ownership of the mitigation actions; and
- Certifying the credibility of MA's MRV.

Moreover, accomplishments on overlaps and gaps regarding the institutional and regulatory framework, as discussed in the first section of the paper, should allow better governance conditions to the country's climate change policy. Furthermore, as presented in the paper, the challenges related to the implementation of the Brazilian NAMAs are actually tough. The specificity of the country's GHG emissions structure and dynamics, the uncertainties related to the Forest Code amendment, the high level of renewables in the internal energy mix, the perspective of a huge intensification of oil & gas production from the pre-salt offshore fields, are major issues that should be taken in account in a mid to long-term perspective of climate change policy. These challenges will be increasingly important after 2020, when the focus of the mitigation actions will necessarily shift from the land use change to the energy system (see Figure 2).

The interaction in the context of the Learning Platform on Climate Policies led by the Institute for Sustainable Development and International Relations (IDDRI) could allow a better understanding of European, Chinese, Indian and more recently South African experience on long-term energy planning, and on options to designing and implementing energy and climate change policies. It could offer a suitable opportunity to well assess the Brazilian NAMAs, to identify barriers, ways to overcome them, detect synergies and co-benefits, and then to provide recommendations to improve their effectiveness. ■

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