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MINISTRY OF SUSTAINABLE DEVELOPMENT AND PLANNING

VICEMINISTER OF ENVIRONMENT, NATURAL RESOURCES AND FORESTRY DEVELOPMENT

NATIONAL CLIMATE CHANGE PROGRAM

WORLD BANK – NATIONAL STRATEGY STUDIES PROGRAM

National Strategy Study for the Participation of Bolivia in the CDM

Executive Summary

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Introduction

Action against global warming is most urgently needed. The Third Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) published at the beginning of this year, supports more than ever before the conclusion that global climate is changing due to human action and that the costs of climate change will be very large indeed. In response to the challenge of global warming and due to the need of international co-operation to address this challenge, taking into account the common but differentiated responsibilities among Parties of the UNFCCC, the Government of Switzerland, in a joint effort with the World Bank, has supported a number of studies which analyze the options and opportunities associated with the implementation of greenhouse gas (GHG) emission mitigation projects in developing countries and countries with economies in transition. The Bolivian study is the second Swiss-funded study to be carried out under the National Strategy Studies (NSS) Program of the World Bank in Latin America.

The objective of the study is to provide the relevant Bolivian authorities with a conceptual reference framework and analytical instruments to evaluate proposed options, and enhance understanding of issues, problems and opportunities presented by potential international markets for certified GHG emission reductions (CERs) through the Clean Development Mechanism (CDM).

The study has consolidated and built up completed and ongoing efforts in Bolivia, addressed to climate change issues and developed by the Climate Change National Program, including the First National Communication to the UNFCCC and other related activities. In this sense, the study was focused on improvement of the mitigation options analyses for the energy and non-energy sectors at macro and sectoral levels, 1994 GHG inventories and its projections and to analyze and recommend the appropriate design or redesign of domestic institutions that would allow and facilitate the participation of Bolivia in the GHG emission reduction markets.

The study is addressed to policy makers in Bolivia and beyond, as well as to CDM project developers in the country and other developing countries, the academia, the growing climate change community and - perhaps most importantly - representatives of the international private business community who are considering to venture into the emerging market of greenhouse gas mitigation.

Policy makers will find critically important suggestions on how to design institutions and rules to develop the climate change market, in a manner favorable to the interests of the people of developing countries, to the environment, and to international trade and co-operation.

The document provides a wide range of information for CDM *project developers* and *other individuals and organizations in the GHG reduction* market. The study gives an introduction to the international rules of the GHG market, provides a sound guidance on how to formulate CDM projects, how to assess project impacts and how to present the information thereof.

Academics interested in climate change issues will find interesting primary data on GHG mitigation possibilities in Bolivia and are provided with challenging material for discussing political, economic and institutional issues.

Private sector representatives from industrialized countries will benefit from this document, in the sense that it will assist them in the decision-making process, when considering CDM investments in Bolivia. For this same reason, this analysis thereby not only gives an overview on the scope of mitigation options, but also includes project suggestions, information on institutional arrangements and, additionally, an overview on the background and risks for private investment.

The study has produced *three main results* to support the policy-making level. Firstly, the Bolivian negotiation positions on a) the inclusion of Land-Use, Land-Use Change and Forestry (LULUCF) activities into the CDM and b) the support to the unilateral financing model for the CDM. Secondly, CDM host governments are encouraged hereby to ensure that part of the CDM surplus is effectively retained in their countries. For this reason, it is analyzed the possibility to establish a taxing regime that has major advantages to both host countries and investors, as an alternative to credit sharing arrangements. Thirdly, the criteria proposed for approval of CDM projects is very simple and straightforward, and it is based on existing laws and regulations in Bolivia.

As a *starting point*, the document provides a brief, competent and up-to-date introduction on climate change, the Kyoto Protocol and the emerging international market on emission credits. Additionally, the first chapter gives an overview on Bolivian data relevant to climate change issues.

The study identifies *Bolivia's GHG mitigation potential,* which could be realized under competitive conditions via the CDM. The study gives an overview on quantities and potential costs of emission mitigation in different sectors of the economy (Chapter 2). Additionally, a number of potential CDM projects have been hereby developed up to the pre-feasibility level. The key features of these projects are outlined in Chapter 6 of the study. These pre-feasibility studies may now serve as a CDM marketing tool for the Bolivian Government and will allow investors to get a profile of potential projects and widespread options among economic sectors.

If the *international markets for emission reduction credits* are to reach a significant magnitude, it will be crucial for Bolivia to have an overview on prices and price expectations on this market. Information about prices will allow the Bolivian Government to make a sound judgment on the competitiveness of mitigation projects in Bolivia, and to formulate national policies to attract investment in CDM projects, and, at the same time, to ensure that the surplus generated in CDM projects is shared with Bolivia in an equitable manner. Private actors in the market will be able to use market information available in Bolivia to negotiate favorable conditions to participating in CDM activities.

Chapter 3 provides an appraisal on the most recent *expectations on the potential market price* of Certified Emission Reductions (CERs). The involvement of Bolivian experts in this work may well be a starting point for a more institutionalized market analysis to be carried out in Bolivia.

CDM investment decisions are determined by marginal mitigation costs in every country and by international prices for emission reduction credits. Several factors are relevant to define the *investment climate* in the host countries. Institutional and political risks and uncertainties, infrastructure, tax regimes and availability of human resources are only a few examples. The Chapter 3 of this study includes an analysis on the perception of investors about Bolivia and indicates the comparative advantages of the country on this issue, but also its disadvantages and problems

Chapter 4 provides insightful suggestions on how to design an *institutional framework, which is most promising for international investors* in the newly developing CDM market, and how to avoid these difficulties and problems.

On the basis of the work described above, Chapter 5 presents a strategy for Bolivia that will allow the country to maximize the benefits from this newly emerging market. Thereby, some of the recommendations will be of interest to the Bolivian Government and stakeholders in the different levels of the society, but also to governments in other Latin American countries and, indeed, to all CDM host countries, as well as to the growing "climate community".

Main Results of the Study

Three Main Results

Forestry and Unilaterality: This study strongly supports the Bolivian negotiation position in the following issues: a) demanding Land Use, Land Use Change and Forestry projects (LULUCF projects) to be included in the CDM and b) requesting unilateral financing of CDM projects to be accepted (see Chapters 2, 5 and 6).

CDM Surplus Sharing: An innovative approach on CDM surplus sharing is presented: CDM host governments are encouraged to ensure that part of the CDM surplus is retained in the host country. For this reason, as complementary way to credit-sharing arrangements, a taxing regime analysis, which could offer major advantages to both host countries and investors, is presented instead. The proposal is based on existing fiscal legislation and can be easily implemented (see Chapter 5).

Approval for CDM activities: A straightforward procedure for CDM project approval is hereby outlined, based on existing legislation - an aspect that greatly facilitates the fast implementation of the suggestions of this study (see Chapters 4 and 5).

Key Chapter Results

Mitigation Potentials in the sectors of Land Use, Land Use Change and Forestry, Energy, Industry and Transport

- Bolivia will benefit from the Clean Development Mechanism (CDM) in a meaningful way only if forest protection and reforestation projects are eligible under the CDM. Activities related to land-use change and forestry are responsible for 82.8 % of CO_2 emissions in Bolivia, and 97.7% of Bolivia's CO_2 abatement potential is in this sector, potential that is equivalent to 903 million tons of CO_2. The study identifies a mitigation potential in the LULUCF sector of 73.5 million tons of CO_2 per year in average, while the average potential in the energy sector is 1.8 million tons CO_2 per year, taking into account conservative assumptions for these estimations.

- The study gives a number of examples of potential CDM projects in the forestry sector (presenting an assortment of mitigation options), and whose CO_2 mitigation effect is demonstrated as being measurable and sustainable in the long-term. These projects would not only reduce emissions at very competitive costs, but also produce numerous collateral benefits for the environment, local communities and biodiversity itself.

- Examples for projects of this sort are: introduction of sustainable agroforestry production methods, to allow rural population to shift away from traditional slash-and-burn agriculture,

which is a primary cause of deforestation in Bolivia; introduction of low-impact logging; more efficient protection of national parks, whereby economic alternatives such as agroforestry are offered to the local population; natural regeneration of forests; and finally reforestation and afforestation.

- Apart from its great potential in the forestry sector, Bolivia can also offer a variety of mitigation options in the energy sector (for residential, commercial, industrial, and transportation sectors). Even considering that gas fired plants and hydropower produce a major part of electricity in Bolivia, a potential for GHG emissions reductions also exists in the power generation sector.

- Mitigation options exist as well in rural areas, and emissions reduction effects can be achieved. In these areas, dispersed population is not connected to the grid and electricity is usually produced by diesel power generators, which can be replaced by small hydropower plants, as there exists an interesting hydroelectric potential not yet developed in the country, as well as wind and solar energy (the latter having significantly higher costs).

- Finally, switching from diesel and gasoline to compressed natural gas is a very interesting mitigation option in the Bolivian transport sector, with great potential of GHG emissions reductions.

The International CER Market

- The study analyses the results of the most recent GHG market models. In the case of an unrestricted international GHG market, these models show a CER price range between 4 and 18 US$/ton CO_2 by 2010. The potential market size of the CDM could achieve from 1,312 Mton CO_2 to 2,651 Mton CO_2 in 2010.

- Inclusion of "*hot air*" (non-cost reductions, generated particularly in countries with economies in transition) is one of determinants of price and market size of CDM. In a scenario that considers exclusion of "*hot air* ", achieving higher prices for CERs, the participation of Bolivia in the CDM market increases.

- As important determinants of the CO_2 price, restrictions in both demand and supply are analyzed. Restrictions in demand might be caused by an agreement to limit GHG trading to a certain percentage of the overall Annex I emission reduction commitment, but also by national legislations in Annex I countries. Such demand restrictions could cause a fall in CER price below 1 US$/t CO_2.

- Much less attention has been given in the literature to potential supply restrictions. It is, however, not unrealistic to suggest that the CER production could significantly fall short of the theoretical mitigation potential in developing countries. In this case the CERs may reach prices of 20 US$/t CO_2 and more.

- The study identifies financial products and services that are expected within the CER market. Thereby, it is suggested that within a developed GHG market, all major finance products such as futures, options, swaps, funds and insurance will be available. Products that are currently being introduced in the market at this point in time were identified as well.

- The most important market option in the CDM for Bolivia is the inclusion of LULUCF activities; nevertheless, the projects in the energy sector represent a real alternative. If LULUCF activities do not become a part of the activities accepted under the CDM, participation of Bolivia and other non-Annex I countries will be relatively small in the global market of GHG.

Foreign Direct Investment and Climate for Investment in Bolivia

- CDM projects are foreign direct investments. For this reason the study explores in detail the climate investment in Bolivia. Bolivia has experienced an impressive increase in FDI flows to the country during the 1990s. While annual FDI inflows amounted to 53 million US$ a year on average during 1987-1992, inflows rapidly and steadily increased to 872 million US$ in 1998.

- The main obstacles for international investments in Bolivia are inadequate infrastructure, deficient tax regulations and corruption. National investors find that the main investment disincentive is the lack of funding.

- On the positive side, terrorism, price controls, foreign currency regulations, crime, and inflation practically are not present in Bolivia.

Institutions to promote CDM Investment

- A key issue for attracting CDM investment is to offer a speedy, transparent and straightforward approval procedure for CDM projects.

- The study suggests that the existing Bolivian legislation for investments is sufficient to ensure that CDM investments contribute to sustainable development -a condition for projects to be approved and accepted as CDM projects. The only exception is perhaps "social sustainability", and thus project developers should encompass the project targets in accordance with local development expectations. In this field some additional guidance may be sought in the “Agenda 21” and "The World Bank Environmental and Social Safeguard Policies”, and more specifically in the “Operational Directive OD 4.20, Indigenous Peoples”.

- The document furthermore summarize how an efficient office for the CDM could be established at the national level, based on existing institutions and taking into account existing legislation.

- The analysis suggests that the CDM office’s tasks should be restricted to a minimum of activities, which, in turn, will be determined by the requirements lined out in the current post-Kyoto negotiation texts.

Bolivia's Strategy to Maximize Benefits from CDM

- Bolivia advocates for the inclusion of forestry activities in the CDM. The study supports the findings that CDM forestry projects are of foremost importance to Bolivia, and that such projects can produce measurable and long-term GHG mitigation effects.

- The analysis suggests that Bolivia should enter as soon as possible the GHG market, in order to gain experience in the activities and services associated with the CDM, and to ascertain that Bolivia is an attractive destination for CDM investment. The arguments that suggest waiting for better CER prices are hereby discussed and refuted. However, the proposition for an early market entry has to be considered in association with the suggestion of establishing a CDM tax regime, allowing Bolivia to participate in the surplus generation of CDM activities (see next bullet).

- The study suggests the Bolivian Government to ensure that part of the surplus generated in CDM projects is retained in Bolivia. At the same time, it makes relative undertaking of case-by-case CER credit sharing agreements, because it is considered that transaction costs for such agreements could be quite high, and the agreements could show themselves unfavorable to investors. However, previous experiences of Bolivia, on the subject of Activities Implemented Jointly (AIJ), did not show major problems.

- It is suggested to analyze in depth the establishment of a CDM tax regime, which is similar to the tax regime in the Bolivian mining sector. Such a regime would be stable in the long term, considering that the taxes are compatible with international double taxing agreements, and would allow firms to deduct losses from the taxable income, which reduces the risk for the investor.

Projects

- Chapter 6 of the NSS introduces a number of potential Bolivian CDM projects. The projects are developed up to a pre-feasibility stage and the data is presented in a Uniform Reporting Format, which is based on the international standard format accepted by UNFCCC for present AIJ projects.

- The information provided will allow potential investors to have an overview of CDM investment opportunities in Bolivia and provide a basis for deciding whether to further develop a project, with the aim of finally investing in one or several projects.

- Calculations of the expected GHG effects of the projects and the associated costs were carried out taking into account the most recent methodologies for the evaluation of CDM projects. GHG project effects are calculated by a strict comparison between a baseline scenario and the project scenario.

- To guarantee maximum consistency of the calculation of project effects, a standardized Bolivian NSS Excel Sheet has been used to calculate incremental costs, GHG effects and costs per ton of CO_2 equivalent.

- A comprehensive *Guideline for CDM Projects* has been devised and has been provided to project developers, explaining in detail how to develop a CDM project idea, and how to use the Excel File provided.

- Projects include GHG mitigation options in the land use change & forestry, energy, and transportation sectors.

The Negotiation Position of the Bolivia and COP-6

The Bolivia NSS has reviewed the Bolivian legislation and regulations, and has designed an appropriate institutional framework to promote the inclusion of the widest range of projects that can effectively mitigate GHG concentrations. Assuming strict additionality rules and effective monitoring, Bolivia should be free to develop its own projects, and Annex I countries should be allowed to invest in the most cost-effective options at the international level. In order to promote sustainable development, the CDM should channel investment flows towards all sectors: energy, transport, industry and LULUCF. Bolivia has prioritized its interests in the employment, income and environmental benefits that may be derived from new major forestry projects. In order to promote the objectives of the Kyoto Protocol and maximize the potential benefits of the CDM for Bolivia, the national negotiating position for COP-6 is based on the following principles:

- The inclusion of project activities in forests and other terrestrial ecosystems in the CDM, based on reasons of environmental and climatic coherence, sustainable development, competitiveness, and legal interpretation of Kyoto Protocol as part of the same legal framework which involves Agenda 21 and other Multilateral Environmental Agreements.

- The possibility of financing CDM projects not only by Annex I countries, but also by international organizations and host countries (unilateral and multilateral model, in addition to the supposedly conventional bilateral model).

- The possibility that CERs generated by a CDM project could be transferred from one Annex I country to another Annex I country to comply with its emission reduction commitments.

- The financing of the adaptation fund for countries that are highly vulnerable to climate change should come from the three Kyoto flexibility mechanisms, and not only from CDM. To promote an equitable treatment among the three mechanisms, including the use of equivalent rules for all mechanisms, and the assignment of equivalent administrative and adaptation charges to all of them.

- Ensure that qualifying CDM projects are creditable from January 1 of 2000 onward, or as soon as possible, depending on COP-6 decisions. This will enable to open the opportunities for participating countries to immediately formulate and develop eligible projects, and therefore immediately ensure benefits from these investments.

- Given the sectoral and regional differences, the definition of the project baseline should be defined project-by-project, according to the characteristics of each project.

- Minimize international transaction costs, risks and barriers. Minimize all international transaction costs and potential barriers to the use of the CDM, including search, negotiation, legal, approval, monitoring and certification costs, both at the international and domestic levels.

- Tradability and fungibility of CERs should not be constrained. Annex B nations should be free to seek and invest in the most cost effective emissions mitigation projects throughout the world, in order to meet the objectives of Article 12. This will enable the efficient use of the unilateral model and prevent the slowing down of the growth of the market.

- Sustainable development criteria for approval of CDM projects must be defined by each developing nation. Each country has different priorities and conditions for sustainable development and these should not be defined externally, but they should be also consistent with the objectives of other Multilateral Environmental Agreements, with the principles agreed in the Agenda 21 and the work developed by the U.N. Commission on Sustainable Development.

Chapter 1 - The Climate Change Challenge: Bolivia's Activities in the Light of the International Initiatives

Chapter 1 of this study provides a unique introduction to climate change, the Kyoto Protocol and the so-called Kyoto Mechanisms. In this summary, only some key points are summarized, with the aim of providing a brief introduction to the history, terminology and the rules of the Kyoto Mechanisms to the reader who is not familiarized with those issues.

Climate Change and the Road to Kyoto

In the 1980s, it became apparent that anthropogenic emissions of CO_2 and other greenhouse gases affecting the world climate, with potentially catastrophic results for both nature and man. The increased concentration of this gases ultimately caused a global increase in the temperature of the atmosphere, leading to an increase of the sea level, changing precipitation patterns, biodiversity loss, and increased tendency for extreme climatic events (storms, droughts, floods, etc.).

At the Rio Earth Summit, in 1992, climate change was one of the key topics and the industrialized countries (Annex I) considered adopting emission reductions. At this time, the UN Framework Convention on Climate Change was opened for signature. However, only in 1997, at the Conference of the Parties to this Convention held in Kyoto, a binding commitment for these reductions was agreed. The Protocol commits developed countries and the countries with “economies in transition to a market economy”, to reduce their emissions on average by 5.2% below 1990 levels by the Protocol's commitment period from 2008 to 2012.

At the same time, the Kyoto Protocol provides the fundamentals to establish an international market of emission credits. As the greenhouse gas abatement costs differ among countries, economic benefits can be achieved by an international trading system of emission rights, allowing countries and firms to reduce emissions in the most cost-effective way around the world. The Kyoto Protocol thereby institutes three different mechanisms for trading emissions: Joint Implementation, the Clean Development Mechanism and Emissions Trading, and opens the possibility to the formation of international “emission bubbles”. Thereby, only the CDM opens the way for developing countries to participate in this international effort to reduce emissions.

During the recent past years, interest in the emerging GHG reduction marked has steadily mounted. By the year 2010, a global market in emission rights worth several billion dollars is expected to be established, providing both business opportunities and the option to find funds for projects contributing to sustainable development.

IET, JI and CDM - what is what in the Kyoto World

International Emissions Trading (IET): The Article 17 of the Kyoto Protocol provides the possibility of trading emissions between developed countries (countries listed in Annex B of the Protocol). Based on 1990 emissions from Annex B countries, and their individual quantified emission limitation and reduction commitments, the "Assigned Amount" of each and every Annex B country can be calculated. In that sense, "Parts of Assigned Amounts" *(PAA)* of the individual countries can be traded by the stipulations related to Article 17. Trading will principally be undertaken by public entities. Private sector participation is expected, but no decisions on this matter have been negotiated yet.

Article 4 provides the possibility for Annex I countries to form "bubbles" – meaning that a number of countries could agree to reach their emission commitments in a joint manner. The European Union (EU) has formed such a bubble. As a result, some countries within the EU bubble have agreed to reduce their emissions beyond their Kyoto targets, while others are allowed to emit more than they would have been allowed under their Kyoto commitment.

Joint Implementation (JI): In Article 6, JI is envisaged as project-based mechanism between Annex I countries. The proposed instrument considers an investment made with the aim of reducing GHG emissions, and the investor receives emission credits as a return for his investment. The emission reduction effect is calculated by comparing actual emissions of the project with an artifact emissions *baseline*. The emissions reduction achieved in JI projects results in "Emission Reduction Units" (ERUs).

Clean Development Mechanism (CDM): Article 12 of the Kyoto protocol establishes the CDM, with the purpose to assist developing countries in achieving sustainable development and in contributing to objective of the Convention, and to assist Annex I countries in achieving compliance with their quantified emission limitation and reduction commitments. CDM projects are in fact very similar to JI, only that the investment is executed in a non-Annex I country. Non-Annex I countries will benefit from project activities resulting in "Certified Emission Reductions" (CERs).

Additionality: CDM projects are required to result in *additional* emission reductions, i.e. in emission reductions that would not have taken place otherwise.

Baselines: The calculation of the emission reduction effect of a GHG mitigation project is done by comparing the potential GHG flows of the project with the situation that would have taken place if the project was not to be implemented. This "would be" scenario is labeled baseline.

Leakage: If a CDM project causes an increase in emissions or reduced GHG abatement outside the project boundaries, for example due to displacement of people in the case of forest protection, this indirect negative GHG effect is labeled as a leakage.

Activities in Bolivia to Address Climate Change Issues and Existing Studies and Sources of Data at the National Level

Bolivia has carried out a number of studies on climate change issues, and the present study was in fact possible to develop from a significant database. The following studies can be obtained from the Climate Change National Program of Bolivia (PNCC) dependent on the Viceminister of Environment, Natural Resources and Forestry Development (to get the address, see the end of this document):

- National Anthropogenic GHG Emissions Inventory for the years 1990 and 1994. (Inventario Nacional de Emisiones de GEI de Origen Antropogénico para los Años 1990 y 1994. MDSP-VMARNDF-PNCC, 1997 and 2000).

- Studies for the Assessment of Vulnerability and Adaptation Measures for the Agriculture, Livestock, Forestry, Water Resources and Human Health of Bolivia to Climate Change (Estudios de Evaluación de Vulnerabilidad y Adaptación de los sectores Agricultura, Ganadería, Bosques, Recursos Hídricos y Salud Humana al Cambio Climático. MDSP-VMARNDF-PNCC, 1997 and 2000).

- Analysis of the options and strategies for mitigation of GHG emissions for the main economic sectors in Bolivia. (Análisis de opciones y estrategias de Mitigación de las emisiones de GEI en los principales sectores económicos de la nación. MDSP-VMARNDF-PNCC, 1997 and 2000).

- First National Communication to the UNFCCC. (Comunicación Inicial de Bolivia a la Convención Marco de las Naciones Unidas sobre el Cambio Climático. MDSP-VMARNDF-PNCC, 2000).

- National Climate Change Action Plan (Plan Nacional de Acción sobre el Cambio Climático para los principales sectores económicos de la nación. MDSP-VMARNDF-PNCC, 1999).

- National Strategy to implement the United Nations Climate Change Convention in Bolivia. (Estrategia Nacional de Implementación de la Convención Marco de las Naciones Unidas sobre el Cambio Climático en Bolivia. MDSP-VMARNDF-PNCC, 2000).

At the same time, the Government of Bolivia carries out various important activities addressed to climate change:

- Monitoring, Verification and Certification of GHG emissions reductions, conservation and sequestration within the context of Activities Implemented Jointly.

- Capacity Building and dissemination of information related to climate change to public, academic and private organizations and institutions.

- Negotiating skill development.

Chapter 2 - Options to Reduce GHG Emissions in Bolivia: Quantities and Costs

Sectoral Mitigation Potential

Bolivia could provide up to 903 million ton of CO_2 for emissions mitigation in the period up to 2012. This figure provides a first indication on the extensive GHG mitigation options available in Bolivia. Thereby, 882 million ton of CO_2 could be mitigated through activities in the LULUCF sector, and 21 million ton of CO_2 in the energy sector, considering conservative assumptions for estimations. This could represent revenues of up to 9,030 million US$ (assuming a price of 10 US$/ton CO_2).

Of course, not the total *potential* for mitigation can be achieved immediately and at competitive costs, as will be discussed below. However, it is useful to start the analysis with this *theoretical* mitigation potential. In contrast to previous studies carried out in Bolivia, the present study does not begin by producing *mitigation scenarios*, the results of which are always subject to a number of critical underlying assumptions.

The calculations on the mitigation potential start out from the baseline emissions. In the baseline scenario, Bolivia could emit a total of 842 million ton of CO_2 in the period 2001 - 2012, which translates into an annual average net emission of 70 million ton of CO_2, where 22.27% of the total emissions will come from the energy sector and 77.73% will come from changes in land use (see Chapter 2, Points 4.1 and 4.2).

On the basis of expected emission levels, and taking into account a number of relatively well-known options to reduce those emissions (energy and forestry sectors), and to capture CO_2 by means of afforestation, reforestation, forest rehabilitation, and other forestry measures, a total of 75.3 million ton of CO_2 could be reduced and sequestered in Bolivia annually, as an average in the period 2001 - 2012. Thereby, mitigation of 73.5 million ton of CO_2 annually in average could be achieved in the forestry and land use sector, and 1.8 million ton of CO_2 of reduction, in average, in the energy sector. Figure 1 gives the annual mitigation potential for different economic sectors in Bolivia (see Chapter 2, Point 8).

Figure 1: Theoretical Annual Mitigation Potential in the years 2001 – 2012, (ton of CO_2).

Sector	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
Land-use Change and Forestry	47,475,000	51,273,000	55,302,000	59,579,000	64,125,000	68,963,000	74,123,000	79,625,000	85,504,000	91,793,000	98,528,000	105,749,000	882,039,000
Energy (non-biogenic CO_2)	107,440	214,890	322,320	429,750	537,200	644,640	752,080	859,530	966,960	1,074,400	1,146,830	1,219,270	8,275,310
Energy (biogenic CO_2)	170,923	341,846	512,759	683,682	854,595	1,025,518	1,196,431	1,367,354	1,538,276	1,709,200	1,715,727	1,722,255	12,838,565
Total	47,582,440	51,487,890	55,624,320	60,008,750	64,662,200	69,607,640	74,875,080	80,484,530	86,470,960	92,867,400	99,674,830	106,968,270	903,152,875

Source: Self-generated calculations based on results of COPATH3 and LEAP models.

The major mitigation option within the Land-Use Change Sector and Forestry is the prevention of deforestation. The means to achieve a reduced rate of deforestation is to offer the local population, who currently engages in activities leading to deforestation, alternatives to shift from the current land-use

patterns. Examples of these alternatives include the introduction of agroforestry techniques in order to replace non-sustainable slash-and-burn practices or silvopastoral systems replacing non-sustainable cattle ranching. Furthermore, CO_2 abatement can be achieved by improving forest management techniques, strengthening of protected areas, natural regeneration of forests and by reforestation and afforestation activities.

Bolivia can offer a variety of mitigation options in the energy sector (for residential, commercial, industrial, and transportation sectors), that the present study deeply explores. The comparative small potential to reduce emissions in the energy sector is due to the fact that (i) per capita electricity consumption is still relatively small, (ii) most electricity is produced by hydropower and natural gas fired plants, and (iii) energy demand is concentrated in the residential, industrial and transportation sectors. As a result, there is little potential to reduce CO_2 emissions by switching to less carbon-intensive energy sources in centralized power generation. Some reductions may be achieved by installing more efficient equipment (combined cycle instead of the currently prevailing single cycle) in gas-fired plants, but this potential could not be investigated in this study due to data restrictions.

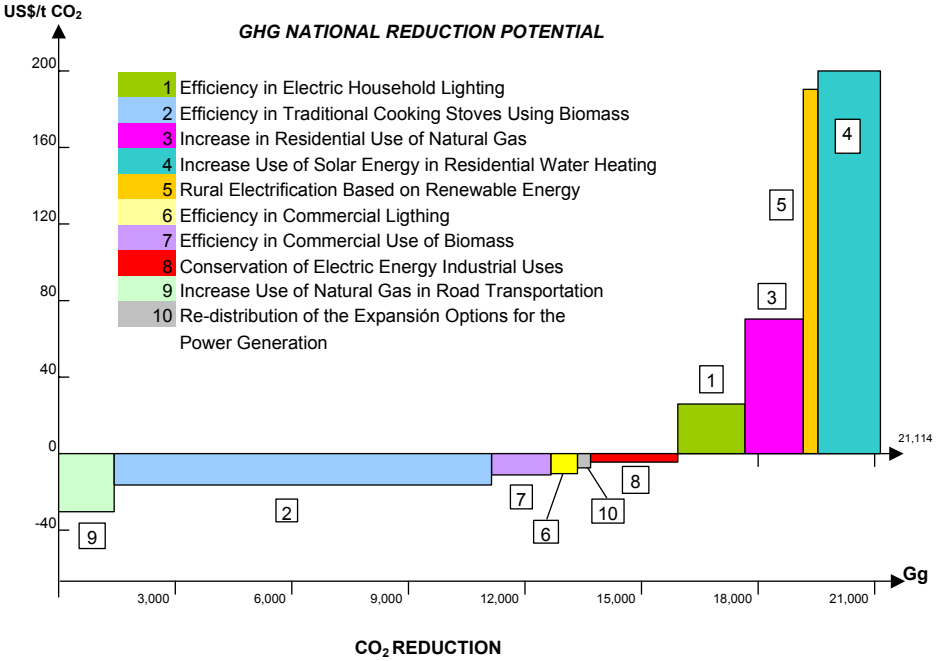
Mitigation options exist in the energy sector for rural areas, and emissions reduction effects can be achieved. In these areas, dispersed population is not connected to the grid, and electricity is usually generated by diesel power generators. If small hydropower plants can replace these generators, since there is an interesting hydroelectric potential not yet developed in the country, or wind or solar energy (more prohibitive due to their costs), emission reduction effects can also be achieved in this area. In addition, potential for small-scale biomass-based generation of grid electricity (co-generation) is available in the food processing industry (e.g., sugar cane processing).

In the Bolivian transport sector, switching from diesel and gasoline to compressed natural gas is a cost-effective mitigation option, since natural gas is an abundant local resource. Due to the low level of industrialization, the mitigation options in the sector of industrial processes in Bolivia are generally negligible. In this study, considerable efforts were made to quantify mitigation potentials in the cement industry, but the contacted firms were not ready to cooperate.

Marginal Abatement Cost Curve

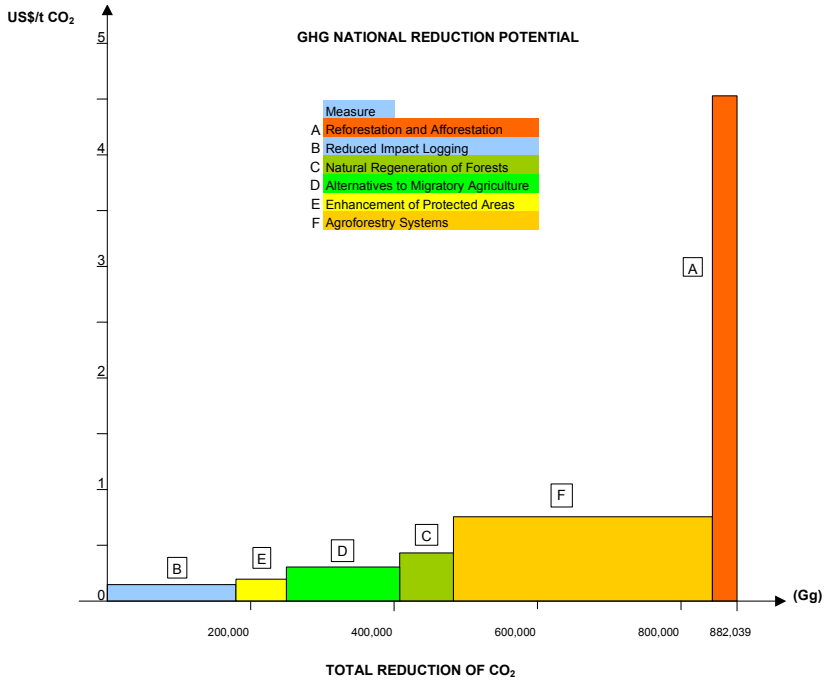
The study introduces two marginal abatement cost curves, one for the energy sector and one for the land-use change and forestry sector. The choice of differentiate between these two curves was done for methodological reasons, but also for illustrative reasons. As for the methodological background: while the results for the energy sector have been produced using the LEAP model, the results in the land use change and forestry sector have been generated with the COPATH3 model. The separation also has the advantage that the potential in the sectors can be deducted separately.

Figure 2: Marginal Abatement Cost Curve - Energy Sector.



Source: Self-generated calculations based on results of LEAP model.

Figure 3: Marginal Abatement Cost Curve - Land Use and Forestry Sector.



Source: Self-generated calculations based on results of COPATH3 model.

The marginal abatement cost curve allows us to make an informed judgement on the levels of mitigation, which could be realized in Bolivia at a given GHG market price. If the market price is set at

10 US$/ton of CO_2, for example, a total of 898 million ton of CO_2 could be reduced in Bolivia, which represents 99.45% of the total potential (882 million ton of CO_2 in the LULUCF sector and 16 million ton of CO_2 in the energy sector) at costs which are below the international price for CO_2, and which could thus constitute themselves in attractive business opportunities.

The most attractive options in the energy sector are: Efficiency in traditional cooking stoves using biomass, Efficiency in commercial lighting, Efficiency in commercial use of biomass, Conservation of energy in industrial uses, Increase of natural gas use in road transportation, and Re-distribution of the expansion options for the electric generation sector, while in the LULUCF sector all options are very attractive, including Reforestation and afforestation, Reduced impact logging, Natural regeneration of forests, Alternatives to migratory agriculture, Strengthening of protected areas, and Agroforestry Systems.

Reasons for the Underestimation of Mitigation Costs

This is, however, still a theoretical potential, and Chapter 3 gives more detail on issues which will determine which percentage of the theoretical potential of mitigation will probably be realized in Bolivia.

One prime reason for an *underestimation* of mitigation costs, causing in turn an *overestimation* of the mitigation potential realized via CDM is the interest rate. To calculate the national marginal abatement cost curve, was used an interest rate of 12 %. This is the social discount rate, which has been politically fixed in Bolivia. This interest rate was used in order to make the calculations compatible with previous studies. However, it has to be emphasized that this discount rate is lower than the commercial rate of interest in Bolivia and also much lower than the rate of return foreign investors would expect from CDM projects carried out in Bolivia. As far as private investors will carry out CDM projects, they will take a higher discount rate when making their calculations. And in fact, in Chapter 6 project costs were calculated with a higher discount rate (30%) to take this into account (see Chapter 2, Points 8 and 9).

The study also assumes that marginal abatement costs are constant within each project category. The study does not take into account that, within the same project category, marginal abatement costs increase with the level of CO_2 mitigation. However, in reality marginal abatement costs are expected to increase within each project category – in particular in the LULUCF sector. Thus, all of the mitigation potential of Bolivia were to be developed, total costs would be higher than those given in the study (see Chapter 2, Point 8).

Chapter 3 - The International GHG Market and Other Determinants Affecting Investment Decisions in Bolivia

GHG Market Architecture

To fulfill the purpose of predicting the future emission credit market prices, some background information on the GHG market structure is indispensable. Thereby, one has to keep in mind that the CDM is only one among a number of instruments that will allow international trading in emission credits. Thus, a market price for emission credits cannot be analyzed solely for the CDM, but has to consider the global market for emission credits.

Countries and corporations committed to an emissions target have various options to address this issue. They may reduce emissions domestically (or within the company), whereby internal trading systems may result in very cost-effective solutions. Countries can negotiate agreements with other countries and create "bubbles" under article 4 of the Kyoto Protocol, or they can choose to obtain emission credits in the form of PAAs, ERUs and CERs (see Chapter 1 above).

In that way, the demand for CERs depends critically on the use of alternative instruments. Thereby, the actors may choose the use of alternative emission reduction instruments, in consideration of their cost efficiency. However, it could also be the case that the agreements reached in the post-Kyoto negotiations restrict demand, by means of the introduction of "ceilings", which require Annex I countries to fulfil a certain percentage of their emission reduction requirements domestically. Additionally, a crucial question is whether the different types of emission credits (CERs, ERUs and PAAs) will be fungible.

The main report of the study discusses these issues in detail, and also analyses carefully other aspects of the market architecture, such as liability issues, details on trading rules and CDM financing models.

In the emerging GHG market, governments, NGOs, private businesses and international organizations will play important roles. To identify the role of potential actors in the GHG market, the value chain of a potential CDM projects was analyzed, and the role that the different actors could or should play in any of these stages was discussed.

The following figure gives an overview on the role of different actors within the CDM market, given the unilateral CDM model.

Figure 4: The Role of Actors in the Case of Unilateral CDM.

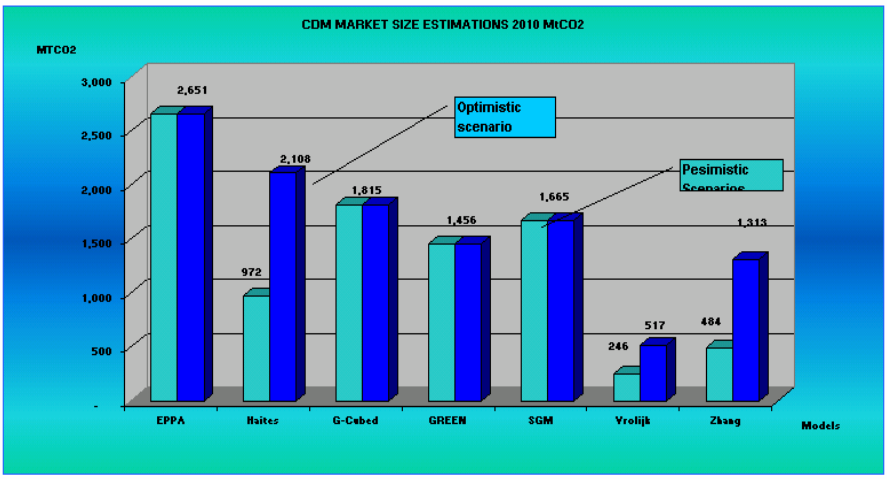
Identification / Project Pipeline	Host Government	Host Country Investors	Host Country Firm / NGO	Annex B Government*	Annex B Investor	CDM Body	Multilateral Agencies / World Bank*	Independent Firm	Financial Sector
Selection	x	x	x	x	x		x	x	
Approval	x			x					
Validation								x	
Development	x	x	x	x	x		x	x	x
Implementation	x	x	x	x	x		x		x
Monitoring	x	x	x	x	x		x	(x)	
Verification	(x)							x	
Certification						x		x	
Registration						x			
Sale of Credits	x	x			x				x

* Where Annex I country governments and multilateral agencies are CDM investors, they will assume the role as described for the Annex I investors.

The Expected Market Size and GHG Price - Model Results

The study presents the potential size of CDM in 2010, under different scenarios extracted from a number of international studies and models. Data varies from 2,651 Mt CO_2 to 246 Mt CO_2, and defines which of these scenarios are more attractive for the Bolivian position.

Figure 5: CDM Market Size Estimations (2010).



Sources: Edmonds *et al.* (1998); Ellerman and Decaux (1998); Haites (1998b); McKibbin *et al.* (1999); Van der Mensbrugghe (1998); Vrolijk (1999); Zhang (1999).

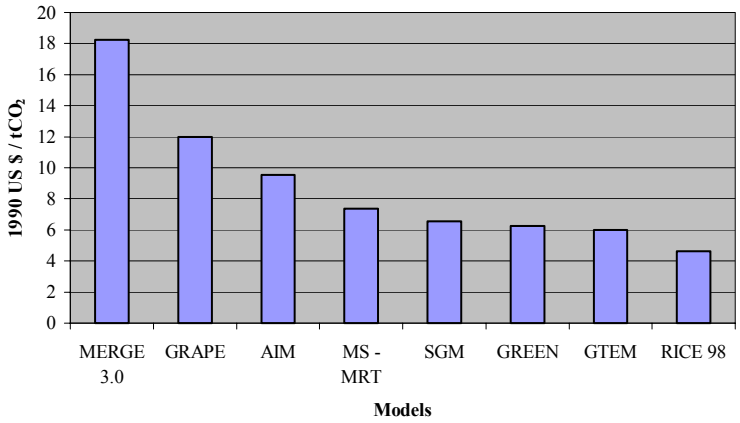
It is expected that between 250 and 2,500 million tons of CO_2 per year will be traded through the CDM. Many analysis suppose that 70% of the global demand for CO_2 credits would be met by projects in the energy sector, there would be a need to generate between 70 to 800 million tons CO_2 per year in the forestry sector. This, compared to a potential Bolivian supply of forestry credits of up to 73.5

million tons CO_2 per year, suggests that Bolivia could theoretically meet between 9 and 100% of the global annual demand for CDM forestry credits.

As for the price of CO_2 credits, the study analyses the most recent published results of all major models intended to predict GHG prices (unpublished results presented at several workshops have been identified but have not been here included, due to the tentative nature of such data).

Figure 6 displays the main results of these models for the "full global trading scenario", which assumes that Annex B countries can make use of the CDM without restriction, in order to reach their emission reduction targets.

Figure 6: Main Model Results for CER prices in 2010.



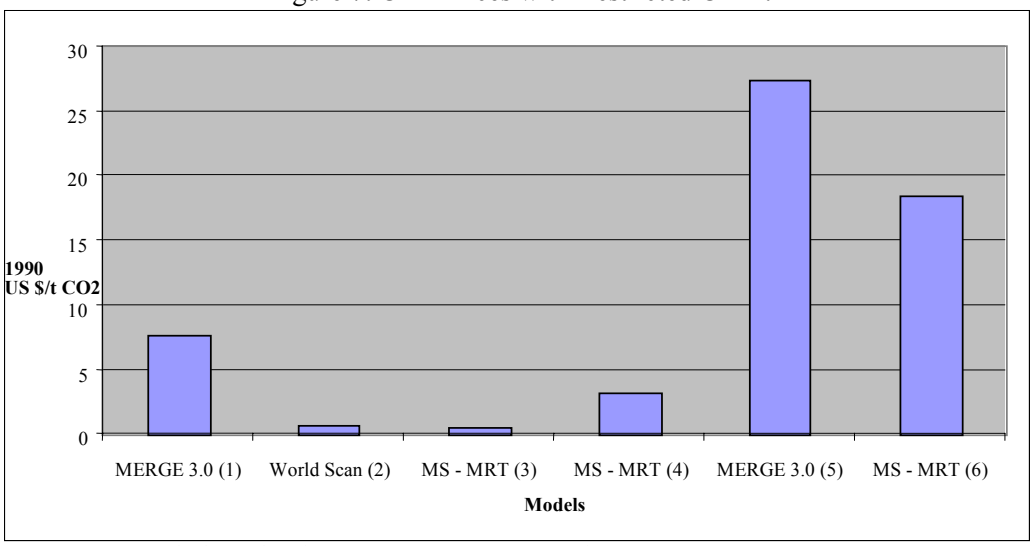
Sources: Weyant (1999) for the models: MERGE 3.0, GRAPE, AIM, MS-MRT, SGM, GTEM, RICE 98; Van der Mensbrugghe (1999) for the GREEN model.

The expected GHG price in this scenario is expected to range between 4 and 18 US$/ton of CO_2 in the year 2010, for the case of full global trading (prices are given in 1990 US$ constant values), which means that nominal prices in 2010 could be considerably higher. As for pre-2010 trading, the prices have to be discounted. In the period before 2010, prices would naturally be lower than the expected 2010 price.

However, as indicated above, the GHG market will not necessarily be unrestricted. Due to ceilings or domestic Annex I countries legislations, demand for CERs might be reduced artificially. In this case, the expected GHG prices will be reduced drastically in comparison to the full trading model. Some models, e.g. the World Scan, predict CER prices below 1 US$/ton of CO_2 for such a scenario.

A less discussed scenario is the one that presents supply restrictions. Due to technological and institutional limitations and to rigidities, Non-Annex B countries might well find difficult to develop their full GHG mitigation potential in the short and medium term. If this is the case, CER prices could easily rise to 20 US$/ton of CO_2 and beyond (prices always at 1990 US$ values). Figure 7 gives model results for both demand and supply restrictions.

Figure 7: CER Prices with Restricted CDM.



Source: Compiled on the different papers presented in Weyant (1999).

Notes:

(1) Limits on the purchase of emission rights ("buyers' market") of 33% of national reduction commitment outside the country / Annex 1.

(2) Limits on the purchase of emission rights ("buyers' market") of 5% of each Annex 1 Assigned Amount as CERs (but no Annex 1 Trading), see Weyant (1999).

(3) Limits on the purchase of emission rights ("buyers' market") of 15% of the CERs that non-Annex 1 countries would have sold under unrestricted CDM (with Annex 1 Trading).

(4) Limits on the purchase of emission rights ("buyers' market") of 50% of national reduction commitment from outside the country (with restricted Annex 1 Trading).

(5) Restrictions (limits or technical restriction) on the selling of emission rights ("sellers' market") of 15 % of the potential CDM sales.

(6) Restrictions (limits or technical restriction) on the selling of emission rights ("sellers' market") of 15 % of the potential CDM sales.

The Bolivian study additionally discusses a number of other possible scenarios affecting the GHG market price. Monopolistic supply structures could increase the GHG price by about 40%. The inclusion of "hot air" (projects implemented before the credits are valid) could cause a 35% price decrease. If sink projects are fully included into the CDM, CER prices could be reduced by up to 68%.

Financial Products

As the GHG market develops, all standard financial products will become available in this market. The operation of these products is explained in great detail in this study. Currently, relatively few companies provide such products. However, the existing products such as the Prototype Carbon Fund and options traded by Natsource are listed in the study. Furthermore, the current lack of adequate insurance for CDM projects in general, and forestry projects in particular, is noted.

Presently, options to buy emission credits at 1 to 3 US$ per ton of CO_2 are traded on international markets. The price for such options is well below 1 US$. For most Bolivian projects these prices are

not attractive, as the marginal abatement cost of most of these projects is higher than 1 to 3 US$. With such relatively low selling price of those options, generated cash revenues will not be sufficient to undertake the necessary up-front investment in many cases, even if the owner of such an option should decide to realize it during the commitment period. In these cases, the income from CER sales would not render the projects profitable. It must also be considered that selling an option now is associated with an obligation to sell the credits at the price agreed in advance. If the project owners are not able to provide the credits at the agreed price, or if they are not able to generate credits at all, they will then face serious problems.

The market analysis of the study suggests that conservative investors will be well advised to wait until the price signals are clearer, and in this way the study explains why there is still very little interest to invest in CDM projects. However, investors willing to take significant risks will currently be able to choose from a wide range of investment options, and perhaps generate very large profits in the future.

From Bolivia's point of view, however, it will in any case be very advantageous to attract CDM investors that are prepared to take the risk, and find that they will be able to generate profits even given current uncertainties and the low market price for CERs. For details on the argument in favor of early entry, see Chapter 5 below.

Attracting Foreign Investment to Bolivia

CDM investments are, in principle, not very different from other FDI (foreign direct investment). There is a large literature on FDI in developing countries. This study ventures into a rather new path within the context of JI / CDM market analysis, while looking at the results of the existing literature on FDI, including various very recent empirical studies which have examined the determinants of foreign investment in least developed countries (LDCs).

The study gives a brief overview on both the theoretical and empirical literature on FDI in LDCs. Here, only the results of empirical studies are summarized: investment flows into developing countries are hindered by political instability, corruption, lack of contract enforcement, high corporate taxes, labor regulations and crime and theft. Investment is stimulated by lack of restrictions to capital flows, absence of regulations on foreign trade, absence of price controls, price stability and low inflation rates.

Bolivia experienced an impressive increase in FDI inflows during the 1990s. While annual FDI inflows amounted to US$ 53 million a year, on average, during 1987-1992, inflows rapidly and steadily increased to US$ 872 million in 1998. In 1999, the FDI reach US$ 881.4 million, which represents 10.5% of the GDP. This percentage has increased constantly in the past years, representing, in 1995,1996,1997 and 1998, 5.6%, 6.4%, 7,5 % and 10.2% of the GDP, respectively. This reflects the increasing attractiveness of the country for foreign investments, not necessarily linked to the

capitalization process. At the same time, FDI offsets the external debt, turning into a genuine financial source for the productive sector and for technology transfer.

Both the liberalization of the investment regime and the privatization program in the sectors of hydrocarbons, electricity, telecommunications, airlines and railways, are important reasons for this rise in FDI inflows. The privatization led to the mobilization of foreign capital, amounting to more than US$ 1.7 billion, or about 28 percent of GDP in 1996. The reform and privatization of the Bolivian power sector, attracted a large amount of private investment. The World Bank estimates that private investors paid approximately US$ 1.6 billion to gain control of all capitalized public companies involved in the energy sector reform.

Empirical data, compiled in a survey carried out for the World Bank, suggests that the major obstacles for FDI inflow into Bolivia at the time are (starting with the most important ones): inadequate supply of infrastructure, deficient tax regulations, corruption, instability in policies and deficient regulations on foreign trade. National investors find that the lack of funding is the most important barrier to invest.

However, the problems that are considered to be the major impediments for investing in Bolivia are still considered to be less significant than in many other Latin American countries. On the positive side, terrorism, price controls, foreign currency regulations, crime and theft, and inflation are not considered to be problems affecting investment in Bolivia.

Chapter 4 - A Proposal for the Institutional Design in Bolivia

The Role of the Government

Based on the CDM project cycle, the institutional requirements to facilitate the implementation of CDM projects in Bolivia are analyzed here. The study, accordingly, takes into account the current negotiation text on the CDM project cycle, whereby the question whether projects have to be approved by the host government before or after independent validation remains undecided. The study emphasizes that an approval after project validation requires CDM investors to incur significant costs without having certainty on project approval. For this reason, the study recommends a host country governmental approval before the validation process.

Most activities within the CDM project cycle may be carried out by the private sector. The study suggests that the government should not perform those activities that can be carried out efficiently by the private sector. The main responsibility of the host country government is foreseen in the procedures related to the project approval. Additionally, the host country government will provide the necessary data for the baseline calculations and will fulfill his reporting duties.

Apart from those compulsory tasks of the Bolivian Government, there are a number of issues that needs to be carried out by the government, because the provision of certain services is typically not done in sufficient quantities by the private sector, given the character of “public goods” of these services. These potential activities include capacity building and CDM investment promotion. Both activities can facilitate greatly that Bolivia becomes an active partner within the context of the CDM.

Current Institutional Framework in Bolivia

Bolivia started a process of opening of its economy 15 years ago. This process aims to engender competitiveness for Bolivian companies and to increase the attraction for foreign investment. Two lines mark this new process. Firstly, consistent and solid legal framework for investment and social equity was created. Secondly, local decision-making and administration capacities were promoted. The Bolivian State has reduced its participation in productive activities and has assumed the task to provide the proper framework for the development of the private sector.

The UNFCCC focal point in Bolivia is the Ministry of Sustainable Development and Planning (Ministerio de Desarrollo Sostenible y Planificación), which operates through its Viceminister of Environment, Natural Resources and Forestry Development (Viceministro de Medio Ambiente, Recursos Naturales y Desarrollo Forestal, VMARNDF). The National Climate Change Program (Programa Nacional de Cambios Climáticos, PNCC) is the operative institution of the Bolivian Government to comply with the technical commitments under the UNFCCC. Two more institutions deal with climate change issues, the Interinstitutional Council of Climate Change (Consejo

Interinstitucional del Cambio Climático, CICC) and the National Program on Joint Implementation (Programa Nacional de Implementación Conjunta, PRONIC).

The PNCC was created at the time of the ratification of the UNFCCC and has currently prepared various relevant studies and national documents, including the Climate Change National Action Plan and the First National Communication to the UNFCCC (see Chapter 1 above). The PRONIC is an institution with a mixed private-governmental directory, and was created to deal especially with AIJ projects, but also with the CDM and requirements associated with the Kyoto Protocol. However, as to this date the PRONIC remains an entity without budget or personal, and is, therefore, practically non-existent. This institution, however, has been legally established in the framework of the Ministry of Sustainable Development and Planning.

The CICC is a consultative organization, composed by several government institutions, and members of the civil society, the private sector and the academy. This organization provides advice on the national climate change policies.

Proposal for a CDM Institutional Framework for Bolivia

This study develops several scenarios for an institutional framework that executes the tasks required to enable the implementation of CDM projects in Bolivia. Starting off with these scenarios, a proposal for an institutional and regulatory framework is hereby presented.

The existing institutional framework is considered sufficient to carry out all requirements associated with the CDM. In particular, CDM approval can be carried out by the PRONIC. However, the "virtual" PRONIC office needs to be staffed and provided with sufficient financing to perform its role, and furthermore some modification on its regulatory framework is suggested (see Chapter 4, Point 4.4.2), as the current framework was developed with the aim to enable PRONIC to fulfil the requirements of AIJ rather than for CDM.

In addition to the approval of CDM projects, a further key role in the promotion of CDM projects is anticipated for PRONIC. In particular, in the view of the mentioned purpose, a renaming of PRONIC is proposed. An alternative name, "Oficina de Desarrollo Limpio" (Clean Development Office) is suggested, a name that will allow both national and international stakeholders to easily recognize the office. Finally, the PRONIC will be expected to provide information of project approval rules. As these rules are largely identical to the requirements of any other investment (see below), the office will primarily have to inform about these rules to those investors which have not already foreseen other investment projects in Bolivia, but are attracted by CDM opportunities in Bolivia. The office will provide those investors with all the required information to obtain traditional investment licenses in a successful manner.

Project Approval

CDM project approval should be simple and fast, and the approval criteria must be straightforward and transparent; information on the approval criteria must be public and easily accessible. Approval will consist of a review of these simple criteria. The study furthermore proposes the introduction of an appeal process, in case the project proposals are rejected.

The Kyoto Protocol requires CDM projects to contribute to *sustainable development*. However, this study suggests that *no* additional rules and regulations to test whether a potential CDM project does in fact contribute to sustainable development should be developed.

The existing Bolivian legislation is considered to be largely sufficient to guarantee that any investment in Bolivia contributes to sustainable development. An exception is *social sustainability,* which is not addressed in an adequate fashion by national legislation. To ensure *social sustainability* to be clearly considered, projects should be adjusted in accordance with local development expectations. Bolivian legislation has ensured the participation of municipalities in development planning process. Furthermore, project developers should avoid social conflicts to ensure the success of the projects proposed. Bolivia has special regulations for protected areas and indigenous territories, and the study suggests CDM investors to ensure that their investment activities are compatible with the existing international framework (e.g. Agenda 21; "The World Bank Operational Manual, Operational Directive OD 4.20, Indigenous Peoples"; ILO agreements; etc.).

Thus, CDM project proposals will generally be approved if they fulfil the requirements of the national legislation plus the requirements on social sustainability and local development expectations. The study identifies the relevant national legislation and specifies licenses required for potential CDM projects given that they simply have to abide to current rules on investment.

All power generation, transmission and distribution projects should comply with the national Electricity Law and need to comply with administrative requirements (license, concession, etc.) requested by the Electricity Superintendence (Superintendencia de Electricidad), for this purpose, developers should comply with the mandatory technical and legal requirements. Forestry projects should comply with the national Forestry Law and connected laws and regulations, and need to comply with administrative requirements (forest concession, management plan, etc.), requested by the Forestry Superintendence (Superintendencia Forestal). Also in this case, developers should comply with the mandatory technical and legal requirements.

Every activity of prospecting, construction, operation and other human activities with impacts on the environment should comply with the Environment Law and its regulations, and an Environment Impact Assessment is needed to obtain the corresponding Environmental License. In this case, developers should also satisfy mandatory technical and legal requirements.

As for the procedure for CDM project approval, the study identifies two possible paths: firstly, an investor obtains all licenses required for his project first, and asks afterwards for CDM approval; this would be the normal procedure for an investor who is familiar with the national requisites, and finds later that he is interested in undertaking an investment with a CDM component; secondly, an investor is attracted by Bolivia's CDM options, contacts the PRONIC (or the Clean Development Office), obtains a list of licenses required for the project, and after complying with it, he asks for CDM approval.

Figure 8. Governmental approval procedure.

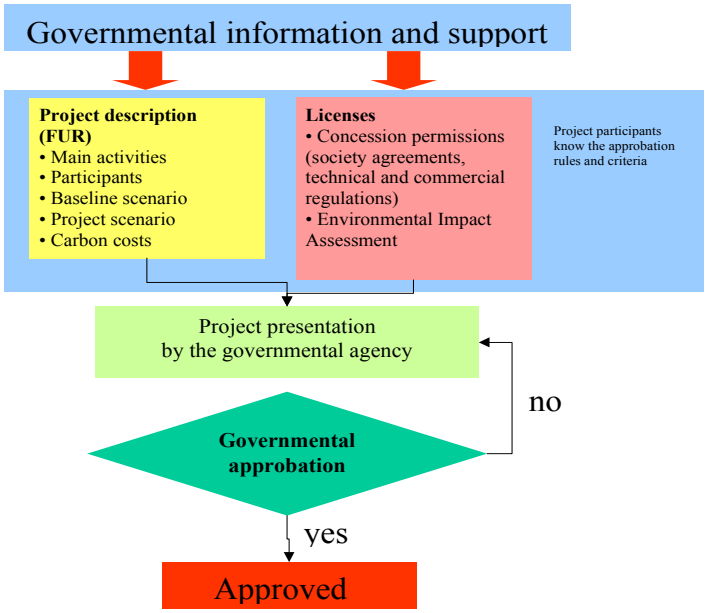


Figure 8 shows requisites that CDM projects should comply to be approved by the Ministry of Sustainable Development and Planning, through its Clean Development Office.

Participation of Other Institutions in the Promotion of GHG Reduction Projects

Different governmental and non-governmental national institutions have been examined, with the aim to identify those who could contribute to promote GHG reduction projects.

National Funds may provide financial support for capacity building; they could also support small projects. The Chambers of Commerce and Industry could create national capacities, in the fields of consulting capacities for the formulation of CDM projects, provide information for its members about the possibilities of the Kyoto Protocol mechanisms, and contact international partners. National and regional foundations and NGOs can contribute preparing regional GHG abatement projects, with the participation of different actors. Universities and research institutes could contribute to provide technical data, for example, on baselines. Finally, state promotion agencies (i.e. CEPROBOL) may support the tasks of dissemination of information of the CDM advantages of Bolivia abroad.

Chapter 5 - Maximizing Benefits from the CDM for Bolivia

Chapter 5 draws together the results from chapters 1 to 4, taking into account the experience from project design (Chapter 6), draws conclusions and finally suggests a strategy for Bolivia that could allow the country to maximize the benefits derived from its participation in the CDM.

Benefits and Risks of CDM Projects

CDM projects will typically not be carried out for the sole purpose of CER generation, but they will often be one component of a rather traditional investment, such as energy production. In consequence, the country will benefit from the main product of the project, for example energy. Also, CDM projects have the potential to deliver financial, social, environmental and technological benefits for the Bolivian economy. Financial benefits could be significant, as capital is scarce in Bolivia, and "CDM money" could help to finance a number of energy, transportation, industrial and forestry projects. Likewise, unemployment in Bolivia is originated mainly by low investment levels, which CDM projects would assist to overcome. Land-use change and energy projects could benefit the local and regional environment due to reductions in SO_x, CO, particulates and to the protection of the biological diversity. Technology transfer due to CDM projects is also expected. Additionally, CDM projects open opportunities for companies and individuals providing services within the context of CDM specific activities, such as GHG monitoring, verification and certification. In this context, it is necessary consider that is needed a basic financing to start the developing process of the CDM projects, which at present is not available in the country.

Bearing in mind that many CDM projects are a component of traditional investments, the risks of such projects are hence also very similar to risks of traditional investments, for example, watershed and biodiversity issues, in the case of hydropower developments. As already explained in Chapter 4, those risks are addressed in the existing Bolivian legislation and therefore, it should be sufficient to apply the existing legislation to CDM investment, in most cases.

As for large-scale forestry and, in particular forest protection projects, it has been argued that such projects might impede the future economic development of the country by prohibiting forest uses in the future. However, this argument is based on two misconceptions: firstly, the proponents of this argument have in mind a very traditional economic development that would necessarily be associated with large-scale deforestation; however, forests themselves can have various economic uses and they may well be the basis of different industries, for example bio-prospecting and tourism; secondly, it makes full economic sense to allocate any economic factor to its most productive use. If land proves to generate highest incomes when forests are preserved for reasons of climate protection -and a suite of other uses that leave forest covers intact-, it makes perfect economic sense to establish CDM projects rather than alternative economic activities.

Entrance to CDM market

The CDM market would be a very competitive market. Moreover, under unrestricted market conditions China and India may together supply around three quarters of the demand, leaving only a quarter for the remaining non-Annex I countries. Thus, competition and a rather small market indicate that first comers are likely to be the most benefited, due to competitive advantages developed from their learning curve. Bolivia must continue, therefore, being proactive about its participation in the CDM, and enter the market as soon as it is instituted.

Development of the Comparative Advantages of Bolivia

For Bolivia to utilize its comparative advantages, external and domestic conditions must be met, as discussed below. Perhaps the most important external condition it is the acceptance of LULUCF projects under the CDM. So far, Bolivia has played a leading role in international negotiations to include LULUCF projects in the CDM. This capacity should be strengthened, in order to achieve this objective. It is also important that the Parties to the Convention create an adequate background to foster these opportunities.

Box 1. The Noel Kempff Mercado Climate Action Project.

The Noel Kempff Mercado Climate Action Project, a forest-based joint implementation pilot project, is located in the Noel Kempff Mercado National Park in the Department of Santa Cruz. The project promotes sustainable management of 632,000 ha of forests and natural ecosystems in the area of the park, expanded as a result of the AIJ up to 1,523,466 ha. The objectives of the project are to achieve local and global environmental benefits, reduce carbon emissions by means of compensation to operating forest concessionaires, execute park management and community development, scientific research, environmental monitoring, eco-tourism, biodiversity conservation, and the improvement of the life conditions of the local population. The Government of Bolivia, Fundación Amigos de la Naturaleza (FAN, a Bolivian conservation NGO), American Electric Power System (AEP), The Nature Conservancy (TNC) and industry investors PacifiCorp and British Petroleum - Amoco, are jointly implementing this project, with an investment of 9.5 million US$. Initially, the project was aimed to reduce 18 million tons of carbon in 30 years, but corrected emissions reduction targets are 5.6 - 7.1 million tons of carbon in 30 years (20.53 – 26.03 million tons of CO_2).

In the framework of the reform of the economy, Bolivia has recently adopted strict regulations to protect its natural resources and environment. If these legal standards are incorporated in the project's baseline, Bolivia will be in a position of disadvantage with respect to countries with more permissive environmental laws. To avoid this situation, minimum international standards for the definition of CDM baselines should be established.

At the domestic level, Bolivia needs to build an institutional and legal framework to minimize transaction costs for CDM projects. To minimize transaction costs, Bolivia should adopt both the unilateral and bilateral approaches, without discarding the multilateral model. The unilateral approach could allow the reduction of transaction costs for small and medium scale projects that would otherwise be left out of the market. Furthermore, it would allow the development of a cluster of

brokerage and intermediary activities around CDM projects. Considering that the Bolivian State has failed in its attempts to reap economies of scale in banking and selling commodities, a bilateral approach would minimize administrative and bureaucratic costs for CDM projects. Moreover, negotiation flexibility between the project host and the investor is crucial in CDM projects, to reach the implementation stage. This, also, does not make mediation of government or multilateral institutions advisable, between the project host and the investor, but as indicated above, the multilateral model should not be discarded completely.

To keep transaction costs at competitive levels, CDM projects should not be burdened by long or complex procedures. Regular procedures authorize an investment project should apply for CDM projects. Because the promotion of sustainable development is mandatory, where CDM projects could impact or affect the quality of life of local and indigenous communities, local consultations and participation are recommended, as a requisite to be complied with by CDM project developers (see Chapter 4 recommendations).

Optimization of Benefits

To optimize positive impacts from CDM projects for Bolivia, project financing, social, environmental and technological benefits are insufficient. As it happens with other economic activities, the state should, in addition, receive some of the surplus generated in CDM activities, if CDM benefits for Bolivia are to be optimized.

If CDM projects are financed by non-Bolivian entities and the CERs are also used outside Bolivia, both consumer and producer surplus accrue to entities outside the country, and Bolivia will be left with collateral benefits alone. A commonly discussed solution of this problem is "credit sharing": the host country receives a certain share of the credits produced, or a cash payment, which is calculated on the basis of the value of the credits produced.

However, credit sharing could have the disadvantage of distorting resource allocation and inducing double taxation, jeopardizing the international competitiveness of the projects. Accordingly, it is suggested to make CDM projects subject to a fiscal regime based on an income tax, with the following main characteristics: First, CER trading is exempted the value-added and transaction taxes. Second, CDM activities are exempted from the withholding tax. Third, CDM projects, in addition to income tax, should pay a modest fee for information and other services provided by the Government and required for CDM project developers. In this way, the fiscal regime strikes a balance in making an attractive offer to the investor, which is internationally competitive, on one hand, and ensures that the host country shares, in an adequate manner, the economic surplus generated, on the other hand.

Government interference in private arrangements or decisions to develop CDM projects could affect the optimization of benefits. However, this type of projects would also generate windfall profits. Therefore, in addition to income tax, it is suggested to apply a surtax on these projects. This would

allow the Bolivian society to partake of the extraordinary profits created by these unique national opportunities derived from the country's natural resources. The proposed CDM surtax will allow Bolivia to approve CDM projects with low CER production costs (*low-hanging fruits*) without forestalling all the benefits derived from those projects. In case the price of CER increases, those projects will yield exceptional benefits. This is explained by the reason that no investor enters a risky market without the option to generate large profits. However, a tax regime properly designed will ensure that the Bolivian Government will receive part of these windfall profits.

It is of vital importance that the revenues coming from the CDM projects will be disposed by Law in projects of environmental protection, an environmental fiduciary fund, the Clean Development Office, the PNCC and to support regional environmental initiatives, according to area of influence of the project. This, with the purpose of avoiding that these benefits will not be assigned to areas related with the CDM activities.

On the other hand, Bolivia should still analyze in depth its experiences of credit sharing carried out with AIJ projects, in the sense that these can become CDM projects. These experiences did not mean additional costs to the investors and established fair and equitable distributions according to the level of investments, which satisfied to the participants of the projects.

Chapter 6 - Project Pipeline

Level of Project Development and Format of Presentation

Chapter 6 of the NSS introduces a number of potential Bolivian CDM projects. The projects are developed up to a pre-feasibility stage and the data is presented in a Uniform Reporting Format, which is based on the international standard format accepted by UNFCCC to present AIJ projects.

The information provided will allow investors to obtain an overview of CDM investment opportunities in Bolivia, and provide a basis to decide whether to further develop a project, with the aim of finally investing into one or several projects.

Stakeholder Participation and the Use of Methodology and Tools

The projects have been developed in cooperation with numerous stakeholders in Bolivia, and provide a wide range of opportunities in various sectors of the economy. Project developers have been instructed on the methodology of CDM project design in various workshops and bilateral work meetings. The data provided was double-checked by both the Bolivian and the Swiss NSS team.

Calculations have been carried out using the latest methodologies for evaluation of the expected GHG effects of CDM projects and their associated costs. GHG effects for every project were calculated by a strict comparison between a baseline scenario and the project scenario.

For the calculation of the abatement costs per ton of CO_2, *net incremental costs* of the CDM component of the projects have been divided by the *additional* GHG mitigation effect induced by the project. By this means, both opportunity costs and additional revenues of projects have been taken into account, both of which are crucial but not always included in CDM/AIJ project cost calculation. Furthermore, costs, revenues and GHG effects have been discounted (other issue which is not always considered in CDM/AIJ cost calculations) and a commercial rate of interest of 30% has been applied.

To guarantee maximum consistency in the calculation of project effects, a standardized national Excel Sheet has been used to calculate incremental costs, GHG effects and costs per ton of CO_2 equivalent. Additional to the Excel Sheet, a detailed *Guideline for CDM Projects* has been provided to project developers, explaining in detail how to describe their project ideas and how to use the Excel File.

The Projects

The Forestry Sector presents the greatest CO_2 mitigation potential and benefits for Bolivia. To carry out the analysis of the forestry sector, the study developed 6 CDM projects in different regions of the country and in diverse conditions. Studies indicate an excellent capacity for CO_2 sequestration at

competitive costs. Additionally, significant levels of social and environmental benefits were identified in the course of project development.

The proposed pilot projects would need to be further developed and carefully formulated jointly with local social and economic groups, in order to develop control leakages, ensure the additionality, provide permanent CO_2 storage, and generate high levels of social and environmental benefits. The focus on maximization of social and environmental benefits in the project formulation would contribute to improve the quality of life of the rural population, and a more environmentally sustainable model of production. The focus of the projects address a number of activities such as the protection and improved management of natural forest, reduced impact logging, and agro-forestry combinations.

Projects also include GHG mitigation options in the energy and transport sectors. Although the overall volume of reduction in these sectors is much smaller, some of the projects are very attractive in terms of costs per ton CO_2.

In the following chart, the key features of the projects are described. Note that mitigation costs per ton of CO_2 are not displayed here, as this is considered to be private information of the project developers. Interested investors are invited to contact either the National Climate Change Program (NSS experts) or the project developers directly, who will be in a position to provide all the information required.

Project Name	Activity	Expected GHG Effect	Project Period	Cost Range (US$/t CO_2)	Comments, Risks and Sensitivity
Land Use Change and Forestry Projects					
Ixiamas Agroforestry Project	Introduction of agroforestry systems with the aim to combat slash and burn agriculture and associated deforestation	0.71 million tons CO_2	30 years	<3 US$/t CO_2	Critical parameters: speed at which agroforestry systems can be introduced; extent to which local population will actually cooperate is critical
Inquisivi-Ayopaya Afforestation and Reforestation Project	Reforestation and prevention of deforestation by means of forestry plantations managed for small-scale timber producers	4.94 million tons CO_2	25 years	<3 US$/t CO_2	Good risk rating, well tested technology, well adapted tree species, long regional tradition on timber plantations
La Chonta Forestry Sustainable Management Project	Fire protection, forest management and implementation of agroforestry systems	7.26 million tons CO_2	30 years	<4 US$/t CO_2	Project proposed by firm with very good reputation on environmental issues. Critical issue: local population's acceptance of measures, current data insufficiencies

Project Name	Activity	Expected GHG Effect	Project Period	Cost Range (US$/t CO_2)	Comments, Risks and Sensitivity
Madidi National Park Forestry Project	Introduction of agroforestry systems and forestry plantations with the aim to replace agriculture migratory practices and associated deforestation	5.85 million tons CO_2	30 years	<3 US$/t CO_2	Project activities developed in buffer area of the park. Similarity with Noel Kempff Mercado AIJ project. Population growth rate is critical issue on trends of deforestation.
Project of Agroforestry with Communities in Santa Cruz	Introduction of agroforestry systems with the aim to combat slash and burn agriculture and associated deforestation	7.47 million tons CO_2	15 years	<3 US$/t CO_2	Critical parameters: organization of local communities to establish agroforestry systems and its acceptance
Sopachuy, Azurduy, Tarvita Forestry Project	Reforestation and natural forest protection by means of forestry plantations managed by rural communities	0.45 million tons CO_2	20 years	<3 US$/t de CO_2	Good risk rating, well-tested technology. Critical issues: fragile native forests under exploitation, high migration rates of population to other zones
Energy Projects					
Unagro Cogeneration Project	Cogeneration of grid power in sugar cane plant based on bagasse (sugar cane residues)	0.97 million tons CO_2	20 years	<1 US$/t CO_2	Good risk rating: large sugar and alcohol factory (>1 million t/yr of sugar cane processed); standard technology (expansion of current cogeneration). Barriers: lack of capital, lack of incentives for small-scale grid generation and use of biomass
Ixiamas Minihydro Plant Project	Minihydro plant of 0.6 MW to replace current diesel generators	0.02 million tons CO_2	25 years	<4 US$/t CO_2	Experienced project promoters; lack of capital is main barrier; remote area with air infrastructure; project financially very attractive if current high power prices are maintained; strong sustainable development aspect; this kind of project may be implemented in other regions of the country
Transport Sector Projects					
Cochabamba Fuel Switching Vehicle Project	Fuel switching public transport vehicles (taxis, minibuses) from gasoline	0.78 million tons CO_2	15 years	<0 US$/t CO_2	Negative abatement cost due to low natural gas prices (at 30% discount rate). Standard

Project Name	Activity	Expected GHG Effect	Project Period	Cost Range (US$/t CO_2)	Comments, Risks and Sensitivity
	to compressed natural gas. Investment includes information and low interest loans for taxi owners, loans for specialized workshops and gas stations.				technology already in use in small scale. Barrier: lack of information and capital of vehicle owners, and firms

Plan of Action

Finally, the study develops a Plan of Action, which identifies the next necessary key steps, in order to implement the suggestions made in this study, and assure that Bolivia receives the benefits from an established CDM market.

Strengthening of PRONIC (CDM agency in Bolivia)

Chapter 4 of the NSS argues strongly that the current Joint Implementation National Program (PRONIC) needs to be formally established and strengthened in its organizational design. This Action Plan suggests that, within the next months, the national authorities consider these suggestions and that the best ways to implement them are explored.

The Government of Bolivia should assure that this institution works in a stable, transparent and efficient manner in providing national approval for climate change mitigation projects in Bolivia, and in promoting, through this approval, the development of the GEI national mitigation potential.

Essentially, it is necessary to work in developing an institutional image for PRONIC (and in that framework, to discuss its name change), and to consolidate the institutional arrangements with the aim to promote GEI mitigation projects at the public, private and society level.

Accordingly, a number of specific tasks are suggested:

- Strengthening of the operation rules and the financing support for the office (this office should operate with funds coming from CDM activities).
- Formalization of co-operation and collaboration agreements with similar agencies around the world.
- Development of a communication and information strategy on CDM.

Decision to Adopt Fast and Standard Approval Rules for Projects, Based on Existing Legislation

Chapters 4 and 5 of the NSS argue that it is of prime importance to formulate approval rules for CDM projects to be carried out in Bolivia. This Action Plan strongly advises the Bolivian Government to formulate and adopt such rules within the next months, in order to allow Bolivia to approve potential CDM investments swiftly.

With the purpose of finalizing those rules, it is suggested to start from the suggestions made in Chapters 4 and 5. A group of pertinent national decision-makers (authorities), working in the

framework of the Interinstitutional Council of Climate Change, should be formed to draft approval rules, which could be then adopted through the respective government channels.

The suggestions made within NSS to that respect are:

- All socioeconomic activities carried out in Bolivia under the UNFCCC initiatives should comply with the existing sectoral and environmental regulations, as well as the special regulations required. With these procedures, environmental and social impacts of the projects will be evaluated periodically.

The Government of Bolivia, as a Party to the UNFCCC, should know the mitigation goals of individual projects, and should be informed about the results achieved during its implementation, for registry purposes (in relation to this, legal instruments to keep a copy in Bolivia, of the reports presented by the projects to the CDM Executive Board should be adjusted).

Decision on the CDM Tax Regime

It is of major importance to Bolivia to obtain some of the benefits generated by CDM projects. Apart from collateral benefits Bolivia may, subject to adequate legislations, also receive part of the producer surplus generated in these projects. Chapter 5 of this study develops suggestions on a CDM tax regime.

A first task of this Action Plan will be referred to carry out an in-depth analysis at national level of the advantages and disadvantages of the adoption of a CDM tax regime or a system of project-by-project credit sharing agreements. This, considering that in both cases the resources that will be obtained, should be assigned to environmental projects and CDM related activities.

On the base of the analyses results, it is suggested to offer to each one of the investors of CDM projects, the possibility to be able to choose, among the modality of a CDM tax regime or a credit sharing agreement, to apply it later to their project in particular.

Promotion of CDM Opportunities

The following activities are suggested to promote CDM projects in Bolivia:

- Promotion of CDM investment through existing national institutions for investment promotion
- Formation of institutional and CDM promotion capacities inside Bolivia
    - Joint work with the Industry and Commerce Chambers, in particular
    - Joint work and definition of roles with the different National Development Funds

- Governmental support, help and advice to develop CDM projects in the country (at the local, regional and sectoral levels), in particular through the supply of data for baseline studies (results from Chapter 4)
    - Revise and adjust the role of the Climate Change National Program in the generation of strategic and basic information
- Revise the possibility to carry out pre-feasibility studies at very high quality standards, in order to use them to find the necessary project funding at the local, regional and sectoral levels

As for this last point, it is suggested:

- Carry out further and more specialized workshops / seminars for CDM project developers,
- Carry out workshops / seminars for (future) CDM specialists, e.g. for academic and specialized consulting firms,
- Carry out workshops / seminars for government representatives, and in particular for individuals who will work at the Bolivian CDM office (former PRONIC).

The capacity-building program should ideally be implemented by both local experts and international experts. An example of these activities could be a workshop on the standards and requirements for CDM forestry projects to be certified by an international organization, or a course on the design of a carbon monitoring system.

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