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A case study of Chilean mitigation actions
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The Bali Action Plan established that the design of a future international agreement must consider enhancing the developing countries' participation in greenhouse gas mitigation activities in order to achieve the ultimate objective of the United Nations Framework Convention on Climate Change. Such participation should be appropriate to national circumstances and supported technologically and financially by the industrialized nations. This decision has generated particular interest because it implies a change in the way developing countries have until now faced their differentiated responsibility, with qualitative commitments to mitigation but not quantified obligations. In 2010, Chile communicated that it will achieve a 20% reduction below the “business as usual” emissions growth trajectory in 2020. This paper first describes the progressive involvement of Chile in mitigation actions tasks with a periodization that shows the evolution of taking on obligations and opportunities within the framework of the Convention. In its final part, the paper elaborates on the last stage of this process and briefly presents progress as of mid-2012 on identifying Chile’s (potential) Nationally Appropriate Mitigation Actions in the transport, agriculture and energy sectors. The assessment of the proposals of the more advanced cases analyzed concludes that the feasibility of realizing and achieving their objectives not only will depend on the availability of financial resources, but also, and primarily, on the political will of the Government.

Keywords: Mitigation actions; NAMAs; energy efficiency; renewable energy; climate change policy in Chile

1. Introduction

One of the fundamental principles underpinning the United Nations Framework Convention on Climate Change (UNFCCC) in 1992 is that of ‘common but differentiated responsibilities and respective capabilities’ (UNFCCC, 1992). This meant at the time that, inter alia, developed countries were exclusively responsible for taking mitigation actions to address the problem of climate change. Developing countries could voluntarily contribute to these efforts, to the extent that they were supported financially by developed countries.

Therefore that for many years the participation by the developing world in climate change mitigation actions has been mainly limited to implementation of mitigation activities financed by the Global Environment Facility (GEF) and later to actions implemented by private bodies and facilitated by the Clean Development Mechanism (CDM) of the Kyoto Protocol.

A significant change was made at the Conference of the Parties of the UNFCCC at its 13th gathering (COP13), which took place in Bali, Indonesia in 2007. The situation for developing nations shifted at these negotiations on the necessary elements for reaching an agreement on long-term international co-operation towards achieving the goals of the convention. Developing countries agreed ‘to consider, inter alia, nationally appropriate mitigation actions in the context of sustainable development, supported and enabled by technology, financing and capacity-building, in a measurable, reportable and verifiable manner’ (UNFCCC, 2007).

So, at the 2007 conference, the principle of common but differentiated responsibilities and respective responsibilities was ‘reunderstood’, and since then there has been a considerable increase in the number of proposals for mitigation actions in the developing world that seek internationally pledged support for quantifiable mitigation actions that reduce emissions growth. In 2010, Chile communicated that it will pursue a 20% reduction below the ‘business as usual’ emissions growth trajectory in 2020, with projections starting from the year 2007 (Chile, 2010).

Chile’s climate change policy has not been an exception to the above as is illustrated in the following sections outlining Chile’s participation in mitigation actions in this scenario and its evolution until the Nationally Appropriate Mitigation Actions (NAMA) stage. The focus of this article is not on the overall pledge, but the development of NAMAs informed by this broader context. The focus of this paper is on the evaluation of Chile’s engagement on climate change, across four periods, in meeting its obligations under the Convention and making use of opportunities provided.

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2. Approach to mitigation actions in Chile

Chile’s involvement in addressing the challenge of climate change – a problem caused by current patterns of development – has been no different to those of most developing nations. They have been responses to international agreements signed on this matter: the UNFCCC and the Kyoto Protocol.

The country’s participation in addressing the problem of climate change began upon signing the Framework Convention in 1992 at the summit in Rio, a commitment that was ratified by the Chilean Congress in 1994. Since then, specific phases of development in Chile’s involvement in climate change tasks, and more specifically mitigation action, can be distinguished.

2.1 The first phase (1992–2001)

The first phase extending between the year of signing the convention in 1992 and 2001 and was characterized by: (a) the initial use the GEF, the operating entity of the Convention’s financial mechanism, enabling developing countries to fulfil their commitments, and (b) the development of an institution for creating a country position on the issues discussed at the convention.

In 1992, only a few months after signing the convention and during the pilot phase of the Facility, Chile received funding from the GEF for two projects. The first project dealt with promoting installation of services supporting efficient use of energy, using Energy Service Companies, through pilot projects in the copper mining sector in the country. The second project consisted of a study of the economic feasibility of producing methanol from lignocellulosic material, which is abundant in Chile, and which could have a great impact on CO₂ emissions originating in the transport sector (Global Environmental Facility, 1992).

Unfortunately, a lack of integration of these projects into national policy or programmes resulted in their isolation, administrative difficulties with their implementation could not be overcome, being implemented by international consultants resulted in lack of local ownership, and the projects were not able to reach their goals.

A second proposal for mitigation actions to the GEF in 1999 was more successful. The project was titled ‘Removal of obstacles to electrification of rural areas using renewable energies’ (Global Environmental Facility, 1999). This project proposed aligning goals of the Convention with a successful policy of rural electrification, which the government had already been implementing in the 1990s and applied for funding from the fund to cover the incremental costs of the policy using renewable energy sources. The Project was implemented in the first part of 2000 and most of the goals were reached.

In 1996, the country applied to the GEF for resources in order to fulfil its commitment to preparing its First National Communication for the convention (Global Environmental Facility, 1996). In this, the country presented an inventory of greenhouse gas (GHG) emissions in Chile in 1994, a first GHG emission forecast for 2020, and possible scenarios, with some mitigation actions, which could curb the current emission growth trend.

It must be mentioned that in the framework of this communication, a calculation of national emissions of GHG was also made, from both the energy sector and non-energy sector, for the period between 1984 and 1998. This historic information is very valuable for mapping out trends and has been periodically updated since.

Considering that the issue of climate change was becoming increasingly relevant to the country, both in terms of international negotiation processes and initiation of cooperative projects, Chile decided to set up an institutional authority to facilitate debate and government consultation in decision-making., A National Advisory Committee on Global Change was set up in 1996, with representatives from the National Environmental Commission, the Ministry of Foreign Affairs, the Ministry of Agriculture, the National Energy Commission, the General Directorate of Maritime Territory and Merchant Marine, the Meteorological Directorate of Chile, the Hydrographic and Oceanographic Service of the Chilean Navy, the National Commission for Scientific and Technological Research and the Chilean Academy of Sciences.

The committee only began to operate on a regular basis from the beginnings of 1998, and in a short time opened spaces for more active participation within the country in discussions concerning modalities and procedures of the Kyoto Protocol, particularly in that of the CDM (UNFCCC, 1997), that consequently allowed for a more active participation in the international negotiations on these issues.

Focussing on the medium-term, another central task of the Advisory Committee was to develop strategic guidelines for climate change in Chile, with the aim of establishing a framework for government action in order to realize the commitments under the Convention. These guidelines were approved by the Board of the National Environment Commission in 1998.


The second distinguishable phase of actions dealing with climate change dates between 2002 and 2005 and is characterized by extensive use of the CDM. This period began with a study on a strategic use of this market-based instrument (Sanhueza Flores, 2003), followed by the establishment of the Designated National Authority (DNA) for the CDM in Chile and an intense campaign promoting opportunities for implementing CDM projects. The national agency which promotes national products in international markets (PROCHILE) participated actively in this campaign. Also, campaigning was done at the Carbon Fairs.
These efforts were successful in that Chile, in those years, was ranked the country with the most registered CDM projects. In addition, important human and institutional capacity was developed to support preparation of CDM projects, according to CDM modalities and procedures which were broadly agreed in Marrakech in 2001.

It is important to note that a number of conditions contributed to this situation. First investors in the emerging carbon market had confidence in Chile because of its political stability, the security offered for its legislation on foreign investment and the simplicity of the procedures set out by the DNA for endorsing CDM proposals. The latter was reduced to providing proof of an environmental permit issued for the project, which is already required by national legislation before implementation begins.

Attempts were made by Chilean leadership to integrate these developments into national policies, mainly in the energy sector. This was done, for example, by issuing subsidies for studies such as a technical feasibility study of renewable energy initiatives and a pilot project to promote the use of the instrument in both small and medium national industry. Yet despite these efforts, progress in integrating CDM projects into national policy was marginal.

In 2001, the GEF approved two of the country’s new projects on climate change mitigation. One of them was a small scale project to build capacity for assessing technological needs and promoting integration of climate change concerns into development planning and goal setting (Global Environmental Facility, 2001). The other project consisted of carrying out a series of studies to promote the reduction of GHG emissions in land transport in Santiago, which involved promoting the use of bicycles, modernizing the public bus system and improving traffic (Global Environmental Facility, 2003). These later studies, only a few of many others carried out in Chile on this issue, recently informed the development of a rapid-bus system in the capital, known as the Transantiago, and also the important development of a network of cycle-lanes.

The period ended in international terms with the entry into force of the Kyoto Protocol in 2005. In Montreal, discussions were also launched to broaden participation to include the USA and developing countries.

2.3 Third phase (2006–2009)

The third phase dates between 2006 and 2009, leading up to COP-15 in Copenhagen (2009), which sought to negotiate a new climate treaty. The period was characterized by extensive work on laying the foundations for national awareness on the climate change problem; to providing climate change policy; and to establishing a procedure for structuring and implementing this policy.

The main domestic reasons for readdressing the issue of climate change at these years included (1) a difficult situation due to unreliable supply of energy, exacerbated by periods of pronounced droughts and problems with accessing natural gas from neighbouring countries which highlighted the extreme fragility of Chile’s energy system, (2) publication of a study of climate variability in Chile in the twenty-first century. The study used the PRECIS model, developed by the Meteorological Office in the UK, and illustrated in detail the effects that uncontrolled increase in global temperature could have on the economy and population, and (3) Chile’s intention to become a member of the Organisation for Economic Co-operation and Development (OECD) and the guidelines set out for members of the organization.

The unreliability of energy supply in the country, accompanied by rapid economic growth, saw increased efforts of securing a more efficient energy supply and to using alternative and renewable sources. In order to achieve this, the basis was established in this period for development of two appropriate policies. Firstly, the Country Energy Efficiency Programme was instituted at the beginning of 2005, under the wings of the Ministry of Economy and Development and Reconstruction. However, it only began to operate from the 1 December 2008 when administration was handed over to the Chilean Agency for Energy Efficiency, an implementation body of the Ministry of Energy which integrates the goal of energy efficiency across national productive activities.

The second policy encourages the use of renewable energy sources available in the country. The government has taken a two pronged approach to achieving this; legislative and supportive components.

The new law approved in Chile, promoting non-conventional renewable energies (NCREs) (Law No. 20.257), came into practice in 2010 and states that energy generating companies in the country, with a capacity of 200 MW or more, must ensure that 10% of their energy generation each year originates from NCRE sources. These can be either owned by the company or contracted in.

This legislation will be phased in with the required quota starting at 5% between 2010 and 2014, with an increase of 0.5% in 2015 and the final quota of 10% set for 2024. Electrical energy distributors supplying regular consumers are required to reach the 10% quota by 2010.

Simultaneous to processing and promulgating the legislation, the Government established the Centre for Renewable Energies. The aim is to promote and facilitate the development of the NCRE industry and to coordinate both public and private efforts that optimize the vast potential of NCREs existing in Chile.

In this third period, the country submitted two proposals to the GEF in support of these policies. One proposal was to promote and strengthen the energy efficiency
market in the country’s industrial sector, and was approved in 2010 (Global Environmental Facility, 2010). The second proposal focussed on promoting and developing solar technologies for heating water and generating electricity, and was approved in 2009 (Global Environmental Facility, 2009).

Parallel to these developments, there were also others in this period. The first of them began in 2006, when the Council of Ministers of the National Environment Commission (CONAMA), the environmental institution that existed prior to the current Ministry of Environment, was entrusted with preparing the first ‘National Action Plan on Climate Change’ (Ministry of Environment, 2008). This was completed at the end of 2008, and lays out plans for the period between 2008 and 2012.

This Action Plan is a frame of reference for assessment activities of the impacts of climate change and vulnerability and adaptation to climate change, as well as mitigation of GHG emissions in the country. It was drawn up through a process of consultation with participants such as technical personnel from institutions, part of the CONAMA Council of Ministers and participants from the academic world, national researchers and representatives from non-governmental organizations. It aims to address climate change in the light of the most recent scientific forecasts for the twenty-first century, and to accomplish the commitments under the UNFCCC.

Other developments during 2006–2009 were the completion of various studies that illustrated the existing potentials for reducing GHG emissions in the country.

The Research and Studies on Energy Programme at the University of Chile carried out a study titled ‘Estimations of Energy Saving Potentials in the Various Sectors through Improved Energy Efficiency’ (PRIEN, 2008). It developed aggregated and sector-specific indicators of energy efficiency. The aim was to evaluate the development of the use of energy resources in terms of its efficiency and to apply these indicators to the period between 1990 and 2006. In addition, an estimation of the theoretical improvements in energy efficiency was made in each sector and subsector.

Another study was commissioned by the company Endesa Latinoamérica, part of the Environmental Economics Management Programme at the University of Chile (PROGEA). The study was titled ‘Energy Consumption and GHG Emissions in Chile 2007–2030 and Mitigation Options’ (PROGEA, 2009). PROGEA forecast the country’s GHG emissions up to 2030 and evaluated various policy instruments to reduce emissions.

In the study, the major GHG reduction measures were identified and evaluated for the following sectors; transport, commerce, public and residential, industry and mining and electric energy generation. In addition, the economic and regulatory instruments for promoting and implementing the proposed measures were identified. An estimation of the costs of implementation and reduction potentials were based on expert opinion and information from companies and regulatory bodies, using, inter alia, literature collected on the topic from national and international sources. The study was also supported by the scenario simulation tool LEAP, the Long range Energy Alternatives Planning System developed at the Stockholm Environment Institute.

Based on these developments and resulting studies, and with the opportunity provided by COP15 in Copenhagen in December 2009, the country, through the Ministry of Environment, made a national announcement of its goal to counter the trend of growing GHG emissions and achieve a 20% reduction compared to ‘BAU’ by 2020.

2.4 Fourth phase (2010 to present)

The fourth phase of climate change mitigation activities began with the communication of the pledge made in Copenhagen. The present period is characterized by: the formalization of the pledge by registering it in Appendix II of the Copenhagen Accord; an active process of identifying mitigation options in order to accomplish the announced goal, including NAMAs; and important national institutional developments for tackling climate change.

Importantly among these last developments was the enactment of the law that creates the Ministry of Environment (Law 20.417). This replaced the National Commission of the Environment which was the driving force of environmental policy between 1994 and 2009. It increased the level of political significance of environmental issues in the country and, in particular, established as a function of the ministry the proposal of ‘policies and formulation of plans and programmes of action for climate change mitigation’. It stipulated that this should be done in collaboration with the different administrative bodies of the state on national, regional and local levels, in order to ‘establish the effects of, and the necessary measures for, adaptation to and mitigation of, climate change’. The Climate Change Office in the Ministry of Environment is in charge of these functions. Broader oversight is provided by an Inter-Ministerial Climate Change Committee, consisting of the ministries of Environment, Agriculture, Housing, Foreign Affairs and the Presidential General Secretary. The committee was created in mid-2009 as a response to the need to coordinate Chile’s position in international negotiations on Climate Change, particularly in light of the Conference of Parties held that year in Copenhagen, and has during the present period emerged as the highest ranking body dealing with climate change in the country.

Chile’s commitment to act was formally communicated in a letter to the UNFCCC in August 2010 (Chile, 2010). Chile indicated that it will require a significant level of international support to achieve this commitment and that it would focus its actions on measures of energy efficiency, renewable energy, forest and land-use change.
Upon formalization of the commitment, research and studies to indentify plan and implement mitigation measure have been conducted, particularly aimed to the identification of NAMAs that allows for reaching the goal announced. These initiatives are being carried out by the authorities of sectors that are responsible for major GHG emissions and which, therefore, present great potentials for achieving important reductions. These are as follows: the Ministries of Energy, Transport and Agriculture. The Ministry of Environment is playing an active role in promoting these efforts and, correspondingly, the Foreign Affairs Ministry in searching for potential financial supports for the ideas of NAMAs that are emerging from these works.

The CONAMA conducted a study titled ‘Analysis of Future GHG mitigation options for Chile in the Energy Sector’ (POCH, 2010). Mitigation scenarios for a time-frame of 20 years (2010–2030) were constructed. They considered sectoral energy demands and supply options post-2000. The study defined technological mitigation options, options for generating energy and changing combustibles. The study was strengthened by the use of the scenario simulation tool LEAP. The study defined in detail a reference scenario for the energy sector during this period, taking electricity demand forecasts derived from economic growth into account, and also the current and forecasted capacity of the country’s electricity grids.

However, the country has not conducted a formal discussion to achieve a common approach to NAMAs, nor to establish criteria for prioritization and the various aspects required for their implementation, including issues of measurement, reporting and verification (MRV) of their results. Under these circumstances, the activities that have been carried out so far have depended on the progress made in international negotiations on the matter in the arena of the UNFCCC.

3. Development of NAMAS in transport, agriculture and energy sectors

The current status of these initiatives is discussed in this section. Each initiative in the transport, agriculture and energy sectors is at a different phase of development in terms of formulating NAMAs. All of them have reached a first project phase of formulating clearly defined goals, setting estimates for reducing emissions and drawing up preliminary proposals for achieving them. Only the energy sector has drawn up proposals for other essential aspects concerning implementation. In the following sub-sections, when reporting percentage reductions in emissions, these are relative to a baseline specific to the action.

3.1 Transport sector

One of the NAMAs identified in the transport sector aims to promote energy efficiency in transport as an effective tool for achieving GHG emission reduction, ensuring that a sustainable balance between the system load and passengers is maintained. It comprises measures such as: aerodynamic improvements, with an estimate annual CO₂e reduction of 6% compared to baseline; training in efficient driving, with an estimated annual CO₂e reduction between 9% and 15%; good maintenance practices, with an estimated annual CO₂e reduction between 7% and 10%; and improved fleet (traffic) management, with an estimated annual CO₂e reduction between 5% and 15%. At the level of emission of CO₂e from the transportation sector in Chile at the year 2006, these figures would mean a reduction between 4600 and 6900 M tonnes per year (Salgado, 2011).

A second NAMA identified aims to generate incentives for an increase in zero and low emission vehicles in the vehicle fleet by continuing initiatives such exemptions from payment for circulation permits or implementation of new systems such as the ‘feebates’ system. The estimated annual reduction of these measures are between 2% and 3% per year, or between 340 and 510 M tonnes of CO₂e as compared with the emission from the transportation sector in Chile during the year 2006 (Salgado, 2011).

A third NAMA aims to promote a change in the mode of transport, from private to public transport and from motorized to non-motorized transport. This is to be achieved through measures as: promotion of non-motorized transport, with an estimated annual CO₂e reduction between 0.5% and 1%; design of bicycles bays in strategic places of services, with an estimated annual CO₂e reduction between 0.5% and 1%; and design and construction of underground parking places in the Metro system and intermodal stations, with an estimated annual CO₂e reduction between 1% and 2%. At the level of emission of CO₂e from the transportation sector in Chile at the year 2006, these figures would mean a reduction between 340 and 680 M tonnes per year (Salgado, 2011).

The fourth NAMA identified to date in the transport sector aims to implement measures to manage traffic in the cities, with the goal of optimizing road operation and at the same time mitigating CO₂e emissions. Main measures contemplated in this programme are: Analysis and development of centralized system of transit area, with an estimated annual CO₂e reduction between 5% and 7%; analysis and development of traffic calming area projects, with an estimated annual CO₂e reduction between 0.5% and 1%; and analysis and development of reversible, segregated and exclusive road lanes, with an estimated annual CO₂e reduction between 1% and 2%. At the level of emission of CO₂e from the transportation sector in Chile during the year 2006, these figures would mean a reduction between 1,100 and 1,700 M tonnes per year (Salgado, 2011).

3.2 Agriculture sector

The NAMAs identified in the Agriculture Sector are based on information collected in two completed studies the year
reduce CO₂ emissions in the sector by approximately 3 million tonnes annually by 2020 (CCYD Consultants, 2011).

The third NAMA aims to increase renewable energies in the country’s electricity grid. The sources considered in this programme are competitively priced and have not been developed due to economic or financial restrictions (mini-hydro, biomass and wind energy). The goal is to create an extra 850 MW of NCREs in Chile by 2020. This will result in a reduction of GHG emissions of 2 million tonnes by that year, calculated as if the programme did not exist (CCYD Consultants, 2011).

The aim of the fourth NAMA is to reduce emissions in the cement industry via energy efficiency and the use of alternative energies, reaching a reduction of 0.24 million tonnes of CO₂e from the 2020 forecasts. Measures contemplated are: replacement of fuels in cement ovens and increase of energy efficiency in systems of processing primary materials and in grinding/milling (CCYD Consultants, 2011).

The aim of the fifth NAMA is to incentivize the development of energy generation using geothermal energy through national policy. This to reach a potential capacity for 320 MW additional for the scenario based on 2020. Measures contemplated are: reduce obstacles entering into the national electric grids as far as possible; create temporary financial incentives to promote entry of certain technologies; and develop policies that consider externalities in decision-making in the electricity sector. With the three measures together, the reduction anticipated is approximately 3 million tonnes by 2020 (CCYD Consultants, 2011).

4. Systems to support NAMAs and realize co-benefits

As stated above, the NAMAs listed in Section 3 are all in different stages of development with the agricultural and transport sector NAMAs lagging behind the development of the energy sector NAMAs. None of the sectors, however, have made much progress in creating a dedicated institutional and governance framework that would facilitate rapid development or implementation of NAMAs. Thus, this section will outline the existing institutional and governance framework in the country that might conceivably be adapted and built upon to enhance the opportunities for NAMA development.

4.1 Policies and regulations

In the information available on the NAMAs listed in the previous section – with exception of those in the energy sector – there is no mention of the policies and regulations
that support and sustain them. However, such policies exist but seem not to inform the early phase of development. In terms of the availability of the institutional capacity to design NAMAs, whilst the specific expertise does not appear to exist, Forestry (under Agriculture) has a longstanding technical expertise that may be drawn upon successfully and the Transport Sector may be able to do so with support from the Ministry of Environment.

This is different for NAMAs in the energy sector, as the topic has been given special attention in the preliminary documents and there exists the institutional capacity to design NAMAs within the free market system in the sector. Moreover, the identified NAMAs set major goals, in line with the goals set in governmental policies for achieving increases in the efficient use of energy in the country’s electricity grid, as described in the previous section. Therefore, if these NAMAs are implemented, they will play an integral role in achieving government goals. Regardless, it will be necessary, as noted in the NAMA proposals, to develop additional regulatory frameworks in order to ensure that the goals of each are indeed achieved.

4.2 Measurement reporting and verification and institutions required

To date, only the NAMAs identified by the Ministry of Energy have made proposals for MRV on their progress. Drawing from the proposals, the characteristics of MRV systems for national consideration are as follows.

Since each NAMA is different and consists of a variety of actions, an MRV system needs to be tailored specifically to each. There is an abundance of literature and international experience on constructing national GHG emission inventories. These include inventories of countries, corporations and their production lines. There is also information on implementing systems for entering the Carbon Market and on good practices for using MRV systems. These should be used as guidelines for standards setting and designing NAMAs. It would be both useful to the process in terms of design and in finding international support for them.

It is in the government’s interest to ensure that good practices are applied in monitoring and verifying the NAMAs. The baseline scenario and the plan for monitoring results during implementation need to be verified in terms of their soundness. In the case of verification of mitigation actions specifically, there are no prescribed guidelines, although general guidelines for domestic MRV are still under negotiation. Reporting on implementation of the NAMAs is important in the international system, to aid transparency. Evolution of the impacts that a NAMA has on patterns of GHG emissions in developing countries and annual progress in implementing actions must be tracked. The information must be sufficient for evaluating the effectiveness of a NAMA and in order to be able to assess whether it is wise to allocate resources to that action or not.

The private sector could, however, also initiate NAMAs that need international support. A national institution needs to be set up to process these initiatives. In addition to evaluating their appropriateness for national interests and circumstances, the baseline scenario, the monitoring process and the verification methods must be tested for soundness. A nationally recognized verification body must issue a technical report on these proposals. The national authority must keep a record of recognized verification bodies that can match the standards and capacities of internationally accredited systems, such as those in the Kyoto Protocol for verifying CDM results and the new standards in the ISO system (ISO 14.066).

The national authority should be also responsible for maintaining an online service, accessible to anybody, which publishes information on advancements and the results of NAMA activities. An additional advantage of this system is that it serves as a means for promoting proposals for NAMAs which seek international support.

4.3 Financing

Information on finance required is the weakest aspect of the NAMAs included in this article. This information is unavailable for the NAMAs in the Transport Sector. Information in the Agriculture and Energy Sectors is derived from previous studies on possible mitigation measures. The estimations made in each sector are subject to fluctuation in the long-term due to the fragility of the predicted scenarios. In addition, the scenarios are changing rapidly on both national and international levels.

Firstly, they are changing in the industrialized world due to new drive to introduce technologies in economies that will reduce dependence on fossils fuels, petrol in particular. Secondly, they are changing nationally due to the major energy policies currently in place in the country.

In addition, the administrative costs of the NAMAs have not been calculated. Nor is there information on what amounts of international aid will be sought. Despite these shortcomings, the NAMA design documents in the Energy Sector include a proposal for management of the financial resources required for implementation.

Additional research is clearly needed on the financing of NAMAs. There as been some preliminary work done on the design of specific financial instruments – revolving funds, concessionary finance, subsides and credits, for instance. The bulk of financial resources required is likely to be used to establish revolving funds for granting soft – loans to finance technological replacements that are in line with the NAMAs. For programmes promoting minor market entry of renewable energies, such as solar energy, part of the funds could be used to create subsidies to generate economic competitiveness of these technologies.
Thus, whilst there is an anticipated role for public–private partnerships, none have yet materialized.

4.4 Socio-economic co-benefits

The socio-economic benefits of NAMAs are often considered the ‘co-benefits’ of mitigation. They could also be called the developmental benefits, and are important in developing countries like Chile.

In the transport sector, measures to improve efficiency in management of transport could have important co-benefits for public health by contributing to a reduction of local air pollution, which is a growing problem in the main cities.

In the energy sector, the methodological approximation used for identifying and prioritizing the NAMAs considers in detail the socio-economic impacts that they may have. Therefore, in the design document, a proposal is made for measuring and reporting a group of indicators which reflect these impacts. A proposal is also made for the inclusion of these in the MRV system that the country is to establish.

The information on the NAMAs identified in the Ministries of Agriculture and Transport do not make mention of the socio-economic co-benefits of NAMAs. However, the implementation of the rigorous plans for afforestation proposed in the NAMAs in the agriculture sector would have significant positive impact on employment in the sector.

5. Conclusions

The purpose of this paper, as indicated in the introduction, is to describe the progressive involvement of the country in mitigation actions being divided into four periods Chile’s evolving efforts to meet its obligations under the Convention and make use of opportunities provided. The assessment does not try to evaluate past behaviour as appropriate or not, but rather assesses whether the present responses by Chile are sufficient in relation to the signals stemming from the Convention.

From the information presented in this article, it is evident that the development of NAMAs is emergent. The identified NAMAs are still in a stage of conceptualization and of making initial estimations on impacts and costs. The article has presented specific NAMAs in the NAMAs in the transport, agriculture and energy sectors.

In a few cases, attempts have been made to develop the NAMAs beyond the initial stage and some institutional development has taken place. Early experiences with institutional regulatory requirements on management and financing and on aspects of MRV have been made. This information can form a base for a more structured approach to NAMAs in Chile.

This article has found that the approach to NAMAs has been based on developments made in the context of the negotiation framework on a new international regime for addressing climate change. The socio-economic co-benefits (or developmental benefits) of NAMAs are likely to be important in further developments.

There is, therefore, an urgent need to reach some consensus around NAMAs in the country so that they can be finalized and integrated into national strategies. National strategies need to clearly affirm the motivation for the NAMAs both nationally and internationally, which is to support the current or future mitigation actions and to the commitment to reducing GHG emissions. There are multiple benefits to this approach: development of communal services; introduction of a framework for aspects of NAMA MRV; clarity on the financial support necessary and of the role played by the country in each case. Most importantly, it expresses political will by the government to move forward with NAMAs. Without strong Governmental commitment to implementing the NAMAs, it will not be possible to overcome the obstacles that threaten innovative programmes.

Note

1. An extensive review of the same can be found in the Country’s recently published Second National Communication to the UNFCCC (Ministry of Environment, 2011).

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