
MRV of Mitigation Activities – Baseline Report Series

This report is an output of the Technical Subgroup on MRV and Climate Change (SGT-MRV) of the Pacific Alliance (PA).

It is a component of the multi-year work plan defined by the SGT-MRV country focal points to deliver on the [Action Plan](#) of the PA formal Working Group on Environment and Green Growth (GTMACV) to achieve the presidential mandate No. 16 of the [Cali Declaration](#) of the Pacific Alliance (*June 2017*).

The MRV of GHG Mitigation Activities allows countries to monitor the progress made on their nationally determined contributions (NDC). This reduces uncertainty, improves transparency, and sparks collaboration and flows of information that significantly reduce the risks of climate and infrastructure finance.

Baseline reports on the MRV of GHG Mitigation Activities in Colombia, Perú, and Chile were prepared by technical experts in each country. The reports contribute to the analysis and strengthening of the Climate MRV priorities in the PA countries.

For more information on any of the individual MRV of GHG Mitigation Activities country reports, please contact the [principal investigator](#) or the [SGT-MRV coordinator](#). Past meeting reports are archived [here](#).

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Baseline Analysis for the MRV of Climate Change Mitigation Actions in Chile

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1. Introduction

After the Kyoto Protocol of 1997, the Paris Agreement (COP 21 2015) is the agreement which establishes the rules for the new climate regime from 2020 and will determine definitively whether the international community will be able to stabilize levels of greenhouse gases (GHGs) in the atmosphere by 2100.

One of the main points established by the Paris Agreement is related to the framework of enhanced transparency. Article 13 states that transparency is key for countries to showcase the efforts made and the financial resources received, which must be informed through the Biennial Transparency Reports (BTR). This is essential to build the international confidence necessary to assess progress in the fulfillment of global emission goals in a collaborative manner, and as cost-efficient as possible. Article 4 and decision 4 / CMA.1 also establish the set of information for clarity, transparency and understanding (ICTU), which countries must report to facilitate the understanding and subsequent monitoring of their National Determined Contributions (NDC) being directly linked to the information to be reported under Article 13. A reliable and efficient monitoring of the NDCs will allow for formation of the global dimensioning of emissions, of the mitigation efforts of each country subscribing to the agreement and the establishment of international cooperation and linking systems. During COP24 (2018) an agreement was reached in the Katowice Rule book, decision 18 / CMA.1, regarding the modalities, procedures and guidelines (MPGs) for this enhanced transparency framework (MRT), which lays the foundation for the rules of the climate regime from 2020.

On the other hand, from the Kyoto protocol, international reduction commitments gave way to the possibility of transferring certified emission reductions between countries, through voluntary markets and binding markets. These cooperative approaches are recognized in Article 6, through the Internationally Transferable Mitigation (ITMOs), whose accounting conditions and rules are still in negotiation. ITMOs also require clear and reliable rules, as well as adequate traceability for NDC accounting and the evaluation of global progress in meeting the objectives of the Paris Agreement.

In this context, Environment and Climate Change Canada has funded this on "MRV of mitigation activities: Baseline Report for Chile" to understand the state of the art of MRV in Chile and gaps for reliable accounting. This review is part of a collaborative process between the countries of the Alliance to contribute to a collaborative learning among peers in the region. Thus, the results will not only be of great benefit to countries of the Alliance, but also for the rest of the region, and developing countries worldwide.

2. Scope

The aim of this report is to survey personnel in Chile who are working on efforts towards Monitoring, Reporting and Verification (MRV) of public and private mitigation initiatives. The study focused on reviewing gaps in understanding systems for compliance with accounting rules, based on the Paris Agreement (Article 13).

The specific objectives of the work are as follows:

- Analyze how Chile is reporting the MRV of mitigation activities in the biennial reports (BURs).
- Develop interviews and consultations with stakeholders on the MRV of mitigation activities Chile.
- Conduct a comprehensive survey of mitigation activities (active and planned) in Chile based on the presented BUR and other existing sectoral surveys.
- Analyze gaps regarding MRV capacities necessary to comply with the new reporting obligations under the framework of enhanced transparency, based on experience in the preparation and presentation of IBA, analyzing flexibility options requiring the country.

To fulfill these objectives, the work development is presented below. In the first section, the accounting rules are reviewed to understand the new reporting obligations under the transparency framework. Then, the international mitigation commitments of Chile, the mitigation initiatives and their respective MRVs are presented. In this last part, the gaps are identified with respect to the MRV capacities necessary for the fulfillment of the new reporting obligations.

3. International Context: MRV and Reduction Accounting Rules

Within the framework of comparability and transparency between countries, for the mitigation of climate change to be effective and equitable, reliable information is required on both emissions and reductions associated with mitigation actions, programs and/or policies. This reliable accounting is necessary for the accounting of reductions for the fulfillment of the NDCs of the country parties to the Convention, as well as for the accounting of the reductions associated with the ITMOs, commonly called as the carbon market.

Since the beginning of the international climate regime, the Convention and other actors of the international community have been providing guidelines and guidelines for the accounting of reductions, whose monitoring of progress has been established around MRV. Below is a brief review of the scope of these guidelines and their reduction accounting rules.

3.1. Guidelines

The guidelines developed under the Framework Convention on Climate United Nations (hereinafter the Convention or UNFCCC) are briefly identified below, with its scope and main gaps (Universidad de Chile, 2016):

1. **Methodological Guide for the preparation of national communications from countries listed in Annex I of the UNFCCC** defines the content and format of results of National Communications held every four years to the UNFCCC. This document does not define "accounting rules" to quantify the reduction of GHG emissions, however, some information requirements related to potential conflicts of accounting are identified; and the requirement to quantify differentially individual and aggregate impact mitigation measures is also highlighted. In particular it stands out:
 - Report allows reductions associated with emissions policies and measures, regardless of whether the primary objective was one other than reducing emissions; It lets

consider those policies or measures that are in any stage of development (planned, in deployment or executed).

- Emission reductions of policies and measures should be disaggregated by type of GHG and sector. They should use the following sectors: energy, transport, industry, agriculture, forestry and waste management.
 - In addition, it should be included a quantitative assessment of the impact of policies, measures or group of measures. This includes estimates on changes in activity levels and / or reduction of GHG emissions implemented or adopted measures. It also should report a brief description of the methodologies used. The reduction should be reported for specific years. No methodological guide for quantifying reductions proposed, but for purposes of transparency is required to present and justify the assumptions and methodologies used for quantification.
 - It is necessary to project the emissions for the “scenario with measures”. This scenario includes the policies and measures implemented and adopted. Additionally, countries could report emissions for the “scenario with additional measures” (including planned measures) and the “scenario without measures”. The aggregate impact of the policies and measures included in “the scenario with measures” must be quantified.
 - Countries can use any model to estimate the reduction of CO2 emissions or captures of policies and measures. In the post of transparency, countries must explain the assumptions and description of the models used.
 - There are no guidelines regarding the projection of emissions.
2. **Clean Development Mechanism (CDM) of the Convention, with its methodologies to quantify and report emissions reduction projects.** They are limited to the report of historical GHG reductions at the project scale. It does not consider projection of emissions or reductions, nor does it address interrelation with different sectors. The detailed MRV system that they have stands out, in order to verify the reductions that would eventually obtain an emission reduction certificate (CER) to be arranged in the carbon market.
 3. **Methodological guidelines for biennial reports of developed and developing countries to the UNFCCC guidelines.** Similar to content methodological guide for the preparation of national communications from countries listed in Annex I of the UNFCCC.
 4. **Handbook on Measurement, Reporting, and Verification for Developing Country Parties (UNFCCC, 2014).** This guide provides a review of the key elements and institutional arrangements that should be present in a MRV system is made; but accounting rules are defined.

Another interesting guide to mention is the OCDE, **GHGs or not GHGs: Accounting for Diverse Mitigation Contributions in the Post-2020 Climate Framework (OCDE, 2014)**, where accounting rules are examined to analyze proposals for contributions from different countries under different metrics.

Finally, we should mention the set of rules associated with accounting and reporting of mitigation actions for the voluntary market. Among others, they include methodologies and systems of the following volunteer standards (Forest Trends, 2018):

- American Carbon Registry (ACR)
- Climate Action Reserve (CAR),
- Gold Standard,

- Plan Vivo,
- Verra's Verified Carbon Standard (VCS).
- Join Crediting Mechanism (JCM)
- Carbon Offsetting and Reduction Scheme for International Aviation (CORSA)
- Clean Development Mechanism (CDM).

During the early stages of the voluntary carbon markets, many project developers own methodologies used to calculate emission reductions from the project. Today, most projects adhere to established methodologies for one or more voluntary standards. These standards include validation and verification procedures to ensure that third-party projects have reached their emission reductions (Forest Trends, 2018). Standards may differ depending on the types of permitted activities and projects, location of projects, and regulations must comply. However, all require that compensation be:

- Real: there will be evidence that the project really eliminates or avoids emissions;
- Additional: the emission reductions would not occur without the project activities;
- Measurable: the volume of emission reductions can be measured accurately; and
- Verifiable: an external auditor, has verified emission reductions.

It is important to mention that this market was born prior to the Paris Agreement. For the purpose of the Convention, to limit CO₂ emissions, the Paris Agreement recognizes the cooperative approaches in its Article 6 ITMOs. However, its accounting conditions and rules remain in negotiation, to be accounted for as part of the NDC of a country, avoiding double counting.

3.2. Report under the Framework for Enhanced Transparency

At COP 24 in Katowice, Poland, progress was made in writing Modalities, Procedures and Guidelines (MPGs) referred to Article 13 of the Paris Agreement, being stamped in Decision 18 / CMA.1. The MPGs indicate that the purpose of the framework of enhanced transparency is to provide a clear understanding of the actions against climate change in light of the objective of the Convention as stated in its Article 2, including the clarity and monitoring progress in the compliance with NDC country Parties.

For the first time, the MGPs create a unique system based on common principles for all Parties of the Paris Agreement. These principles are:

- Build and improve transparency mechanisms under the special circumstances of least developed countries (LDCs) and the Small Island Developing States (SIDS); implementing the framework of transparency facilitative, non-invasive, non-punitive, respecting national sovereignty and avoid imposing an undue burden on country Parties;
- Facilitate improved reporting and transparency over time;
- Provide flexibility to developing country Parties, according to their abilities;
- Promote transparency, accuracy, completeness, consistency and comparability;
- Avoiding duplication of work and undue burden to Parties and the secretariat;
- Ensure that the Parties maintain at least the frequency and quality of reports in accordance with their respective obligations under the Convention;
- Avoid double counting;
- Ensuring the integrity of the environment.

Each country defines whether it applies a provision of MPGs that incorporates **flexibility**. The use of them will not be questioned in the review process defined in the MPGs. It is established that **each developing country must define its flexibility requirements**, depending on their capabilities. These can address provisions such as: **the scope, frequency and level of detail of what is reported**; as well as the **scope of the review** of the reports. Flexibilities should be clearly indicated, indicating the capacity limitations that give rise to this requirement. Thus, each country must plan and define the period within which the missing capacity will be built, and the use of flexibility will cease.

To increase the efficiency of the activities undertaken as part of the Convention, **the new reports** will have:

- Biennial Transparency Report (BTR) that will replace some existing reports (BR, BUR); and Report of National Inventory of GHG emissions. All countries must report the first BTR no later than 12/31/2024.
- Technical Review Report, which will replace the current data review systems (TER, ICA, IAR).

As for the features and information to facilitate transparency, accuracy, completeness, consistency and comparability of the BTR information and inventory; the MPGs establish that:

- All Parties use the same methodology for calculating the emissions inventory and GHG sequestration, based on the 2006 IPCC Guidelines.
- The new system will provide access to regular information on emissions and sequestration, as well as the financial support provided and received. In addition, countries publish regular reports on progress in implementing their contributions.
- As for mitigation, Parties "should" describe the methodologies and assumptions used to estimate GHG reductions or kidnappings of actions, measures and policies.
- It contains detailed requirements for communication and monitoring the progress of the NDC that will apply to all Parties. Commitments are conditioned by the type of NDC and not the level of development of the country. Creating a common platform for communication and monitoring the progress of NDC will allow a better understanding and aggregation of the NDC.
- It should present a balance of emissions that reflect the level of anthropogenic emissions by sources and sinks covered by the NDC, adjusted using ITMOs. Considering an addition to the ITMOs transferred to other countries; and a subtraction for ITMOs used / acquired for local accounting, consistent with the guidance related to Article 6, which is still in negotiation.

In this chapter MPGs were identified as a key attribute that should be considered when reviewing national MRV gaps. Since they will be the transparency framework that the country must meet to report GHG reductions and kidnappings, as well as progress in compliance with its NDC. To understand the requirements that these accounting rules impose or require in the design of the country's MRV systems, both for compliance with the NDC and to avoid double counting due to ITMOs, Chile's commitments are described below, and the state of the art of the MRV of public and/or private actions that must comply with these requirements.

4. National Policy on Climate Change

4.1. Institutional and Regulatory Framework

National institutions on climate change calls virtually the entire state apparatus, in summary:

- The Council of Ministers for Sustainability (CMS), which is the highest governing body,
- The Ministry of Environment (MMA), which is responsible for proposing policies, programs and action plans on climate change and to collaborate with the different bodies of the State at national, regional and local level to establish the necessary adaptation and mitigation measures. MMA also plays the role of technical focal point to the UNFCCC, through the Department of Climate Change.
- The Ministry of Foreign Affairs (MINREL), which has the role of focal point for the UNFCCC and before any other international body -Multi or bilaterally - linked to the issue of climate change; its action in this area is exercised through the Department of Environment and Ocean Affairs (DIMA)
- An instance of inter-ministerial coordination for the Interministerial Task Force on Climate Change (ETICC), and other specifically related to MRV Technical Team (ETMRV).
- And a number of units belonging to various ministries, who have taken direct action in this matter.

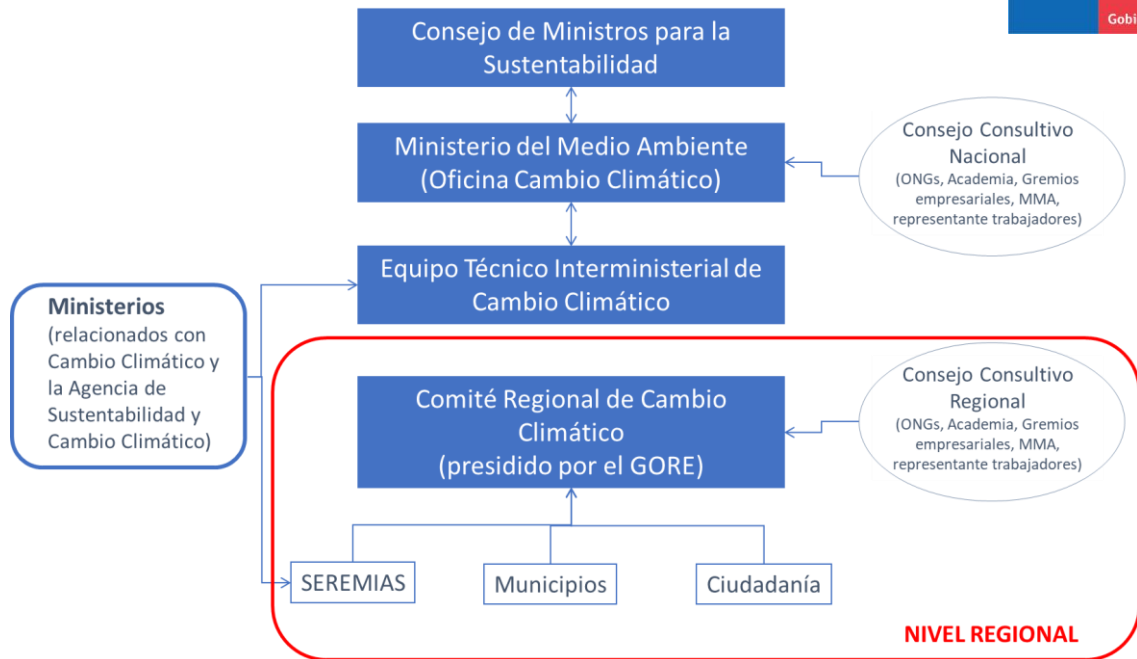
The CMS is the agency's highest deliberating public policy and general regulation on environmental regulations, chaired by the MMA and composed of their peers of Agriculture, Finance, Health, Economy, Development and Reconstruction, Energy, Public Works, Housing and Urban Development , Transport and Telecommunications, Mining and finally, Social Development. This Council has been operational since 2014, approving in this period the National Adaptation Plan (PNA, 2014); the National Strategy for Climate Change and Plant Resources of CONAF (ENCCRV, 2017); the National Strategic Plan for Disaster Risk Management (Government of Chile, 2017); the National Action Plan on Climate Change (PANCC 2017-2022); Adaptation sector plans; The Energy Mitigation Plan (2018); biennial reports; the Third National Communication; and INGEI 1990-2010.

4.2. Sub-national Institutional

The National Climate Change Adaptation Plan, presents the structure of the climate change institutionality, proposing the operational architecture for the implementation of the plan, which has an intersectoral and territorial approach, headed by the CMS, incorporating the ETICC, and the Regional Committees of Climate Change (CORECC), according to the scheme indicated in the following figure. (PANCC 2017-2022). The institutional framework is framed in red in Figure 1 below.

Figure 1: Climate Institutional and Operational Structure

¹ Chile Third National Communication to the UNFCCC, Ministry of Environment (MMA, 2016)



Source: *Participatory Process Climate Change Act in Chile, 2018.*

The CORECC are chaired by the Regional Intendant and consist of representatives of the Regional Government (GORE), the Regional Council (CORE), the Provincial Governments, the Focal Point Climate Change SEREMI of MMA, delegates SEREMI of public services from other Member ETICC Ministries and Agency Sustainability and Climate Change, representatives of municipalities and representatives of the Regional Advisory Council and other participatory bodies to decide each CORECC.

The CORECC aims to "promote and facilitate regional development low carbon emissions and resilient to climate change, through the development and implementation of policies, plans and actions on climate change, integrating different sectors and levels management. " With this mandate, CORECC should promote the integration of the issue of climate change in regional public policies seeking coherence and possible synergies with national policies, regional development strategies and policies and regional sectoral activities. They must also encourage the search for regional resources for development of measures and actions and for quantifying impacts and mitigation, adaptation and capacity building at regional level (AdaptChile, 2018).

The CORECC have been formed since 2017, inching role in the appropriation of their network. In addition to this there are a number of gaps that have been identified to date (AdaptChile, 2018).

Table 1: Environmental and climate change regulation and political framework

Type Gap	Gap
Information	Need to develop information management systems (MRV systems of emissions mitigation, climate finance, databases, monitoring systems, GIS, etc.), especially in regions. Adequacy of indicators and / or methodologies used to monitor the implementation of measures in multi-level plans (annual, biannual), especially multisectoral climate change plans.
	Need to create a technology platform that contains all information related to climate change (PANCC II).
	Need to develop a framework of rules for accounting for emissions to avoid double counting.
Capacity	Need to keep the community informed about the objectives and monitoring plans and local-provincial measures.
	Need to strengthen capacities at the institutional level and public policy and legal framework. This strengthening is crucial to incorporate citizen participation.
	Need to strengthen the sectors most vulnerable to the impacts of climate change, especially with technology transfer.
Financing	Need to hire qualified personnel subnational level, because in most cases due to lack of resources hiring, there is a high staff turnover and low wages locally.
	Financial need for a National Strategy on Climate Change and Roadmap on Climate Change (PANCC II).
	Need for a financial institution at national level (with permanent funds, with detailed specific budgets in a portfolio of projects (short and medium term) and aligned with national objectives and goals with subnational).
	Need to plan financing multiscale level, assessing needs, defining priorities and identifying barriers to investment (coordination mechanisms) (UNDP, 2012).
	Need for project formulation systems to access financing.
Politics	Need to strengthen compliance with financing, because it is the key to ensuring effective and transformative actions, either from the implementation and execution of activities; offering local expertise and skills; or project management system (UNDP, 2012).
	Need for effective public investment at all levels of government.
	Need for a law to strengthen the institutions and processes of climate governance in Chile, especially focused on the sub-national level, from CORECCs to local implementation, as well as the mandatory inclusion of climate change in territorial planning instruments.
Administrative	Need for governance under common principles and a high level of coordination to achieve multisectoral actions (MMA and MINVU, 2018).
	Representatives need political will and/or leadership on issues related to climate action.
	Need for creating an office or department responsible for climate change within the governorates and municipalities, which have a constant interaction with other areas, whose function is to identify, implement and monitor measures and local actions, according to the project portfolio and regional goals.
Goals	Need to create measurable objectives at local-provincial level (proposed in different time scales), as well as cross-sectorally. These objectives must be aligned and approved by the CORECCs.
	Need to assess the effectiveness of action measures of different plans (eg sectoral exchange
Definition of responsibilities	Need to define clearly the role and the responsibilities of each of the actors. There are many functions that overlap each other.
	Need to expand social participation in various decision-making processes for effective and early participation, rather than remaining (as happens in most cases) in the space of public consultation.

Source: AdaptChile, 2018

Chile is currently in the process of initiating the public consultation of the Climate Change Law, after a year of a strong participatory process throughout the country. This instrument is expected to strengthen the role of CORECC, clarifying responsibilities in order to advance climate action at the subnational level.

4.3. Climate Policy in Chile

4.3.1. International Commitments on Climate Change

Chile is committed through various actions to address climate change and to support the common goal of the countries parties to the UNFCCC to reduce GHG emissions. Particularly in the COP15 2009, Chile assumed a non-binding voluntary commitment on mitigation, as follows: " Chile will carry out nationally appropriate mitigation actions in order to achieve a reduction of 20% below its growing trajectory of business-as-usual emissions in 2020, projected since 2007. To meet this objective Chile will need significant international support . The main focus of nationally appropriate mitigation actions will be measures on energy efficiency, renewable energy, land use, and land use change and afforestation". (Hereinafter commitment 20/20)

Then in January 2017 Chile ratified the Paris Agreement (COP21), which seeks for the first time a binding agreement between the Parties. In this context Chile reaffirms its NDC structured in five pillars: (i) mitigation; (ii) adaptation; (iii) construction and capacity; (iv) development and technology transfer; and (v) funding.

In the mitigation pillar Chile decided to commit its contribution in the form of emission intensity (tons of CO₂e per gross domestic product (GDP) in millions of Chilean pesos of 2011); this goal separating the LULUCF sector. The goal is to reduce CO₂ emissions per unit of GDP by 2030 by 30% over the level achieved in 2007; expandable to a reduction of 35% to 45%, subject to obtaining international financing. Both sections consider future economic growth that allows implement appropriate measures to achieve this commitment.

Meanwhile, the countrys LULUCF commitment is to sustainably manage and recovery 100,000 hectares of native forest and afforest an equal area by 2035. Both commitments are subject to the first to the modification of the law on Recovery of Native Forest and Forest Development, and the second to the extension of Decree Law No. 701 and the approval of a new Law on Forest Development

On the other hand, Chile is part of Organization for Economic Co-operation and Development (OECD) since 2010, leading an ongoing challenge to meet the required standards. The second OECD environmental performance evaluation report on Chile (OECD, 2016), recognizes a series of advances in the areas that had been required, however, there are still gaps in which work must be done. Chile's high vulnerability to climate change and the growing trend in GHG emissions is recognized. The report makes 54 recommendations to promote a greener economy and improve environmental governance, with emphasis on climate change, biodiversity and water resources. Within the climate field, some recommendations can relate to mitigation. In particular it is recommended to clarify institutional responsibilities on the implementation of policies to mitigate climate change and adapt to its effects and adopt a funding strategy. This is

consistent with public policy and institutional arrangements that have been implemented in the country.

Finally, the UN Agenda 2030 established the "Sustainable Development Goals" (SDGs), to emphasize that companies must move forward on the path of sustainable development and low carbon. In its Objective 13 it explicitly establishes the purpose of "adopting urgent measures to combat climate change and its effects". However, the 17 SDGs are related in one way or another to climate change, since their instrumentation will be conditioned by the new climate conditions and the need to adapt or move forward in a development low in GHG emissions. Mention should also be made of the commitment to report to the OECD on the progress made in Green Growth, with climate change being one of the chapters chosen by the country to report on the environmental performance assessment. **Thus, the international agreements that the country has taken reflect the growing commitment to move towards a resilient, sustainable and low carbon path.**

4.3.2. Climate Policy Instruments at National and Sub-national Levels

The main instruments of national policy on climate change are framed in the National Action Plan on Climate Change 2017-2022 (PANCC II), adopted on 19 June 2017 by CMS (MMA, 2017th), that replaces or continues with the process that the country had been executing as of PANCC 2008-2012. Its preparation considered coherence with existing national policies and international commitments, both coordinated by the MMA and other related sectors.

The international commitments that Chile has acquired in the area of climate change are an important part of the PANCC II guidelines, since it defines the effort that the country must make to comply with both commitments (20/20 and NDC). This challenge is accentuated by the new scenario facing Chile as it leaves the list of eligible countries of the Development Assistance Committee (DAC) of the OECD, reducing its access to international funds for these purposes. This requires strengthening the capacity of the State to design, implement and evaluate public policies on climate change.

In Adaptation, Chile currently has a National Plan for Adaptation to Climate Change, approved by the Council of Ministers for Sustainability in December 2014, which provides guidelines for adaptation in the country and provides an operating structure for coordination and implementation, both the sector approach as transverse approaches, on different local administrative levels. Under this plan the mandate to generate nine sector plans was defined: silvoagropecuaria (forestry, farming and livestock development), biodiversity, fisheries and aquaculture, health, energy, infrastructure, cities, water resources and tourism (MMA, 2015a). Additionally, the country is working on the Adaptation Plans of the tourism and water resources sector, while the adaptation plans that are currently published are:

- Plan for Adaptation to Climate Change Agroforestry, 2013 Sector.
- National Plan for Adaptation to Climate Change, 2014.
- Plan for Adaptation to Climate Change Biodiversity Sector, 2014.
- Plan for Adaptation to Climate Change for Fisheries and Aquaculture, 2015.

- Plan for Adaptation to Climate Change Health Sector 2016.
- Adaptation and Mitigation Plan Services Infrastructure to Climate Change 2017-2022.
- Plan for Adaptation to Climate Change Cities 2018-2022
- Plan for Adaptation to Climate Change Energy, 2018 sector.

In the context of mitigation, Chile is making great efforts to institutionalize the National Inventory System of Greenhouse Gas (INGEI), in a collaborative work with various public institutions in the country, it has been able to establish a process and a clear responsibility to advance a reliable estimate of INGEI (see Annex I). Additionally, it should be mentioned that under PANCC II, the Energy Sector Mitigation Plan has been prepared, being one of the sectors that contribute the most to the national GHG emissions inventory at national level (about 75% of INGEI is the responsibility of this sector).

In other transverse and risk prevention matters, the following stand out:

- National Strategy on Climate Change and Plant Resources of CONAF (ENCCRV 2017-2025); and,
- National Strategic Plan for Disaster Risk Management (MMA, 2017).

At the subnational level, under the strategic axis # 4 PANCC II, on managing climate change at regional and community level, the country has just begun the effort for the development of regional climate change plans in four regions: Atacama, Coquimbo, Los Rios and Los Lagos. Another important effort at the subnational level led by the Chilean Network of Municipalities on Climate Change which is a community of practice open to all municipalities in Chile who wish to make an explicit commitment to plan and manage their territory, considering climate change as the scenario is determining the challenges of the 21st century. Born in 2014, promoted by Adapt Chile. This initiative adds up to 59 municipalities in the country, and has already advanced in the development of 39 climate profiles (diagnostics) and 25 Local Climate Change Plans.

It is appreciated that Chile has been in a constant and progressive effort in the definition of instruments, policies and programs to deal with climate change. Within the framework of transparency and reporting, required by the Convention, Chile has presented three National Communications (2000, 2011, 2016) and three BURs (2014, 2016 and 2018). In the third BUR recently presented to the Convention, the state of the art is appreciated in terms of actions, policies and measures to reduce / sequester emissions from the country. Within the framework of this report, the main MRVs identified in said BUR are collected, and in a bibliographic review added to the interviews with the developers of said MRVs, the progress status in their implementation and the main gaps to meet the requirements are identified. Accounting rules in a reinforced transparency framework as discussed in the previous section.

It is worth mentioning that in 2015 the MMA published the Guidelines for a Generic MRV Framework in Chile for Nationally Appropriate Mitigation Actions (NAMAs), which provides the minimum requirements that the country's MRV should consider. However, some Mitigation Actions have used it, while others have focused on building an ad hoc MRV to their system and objectives, as reviewed below.

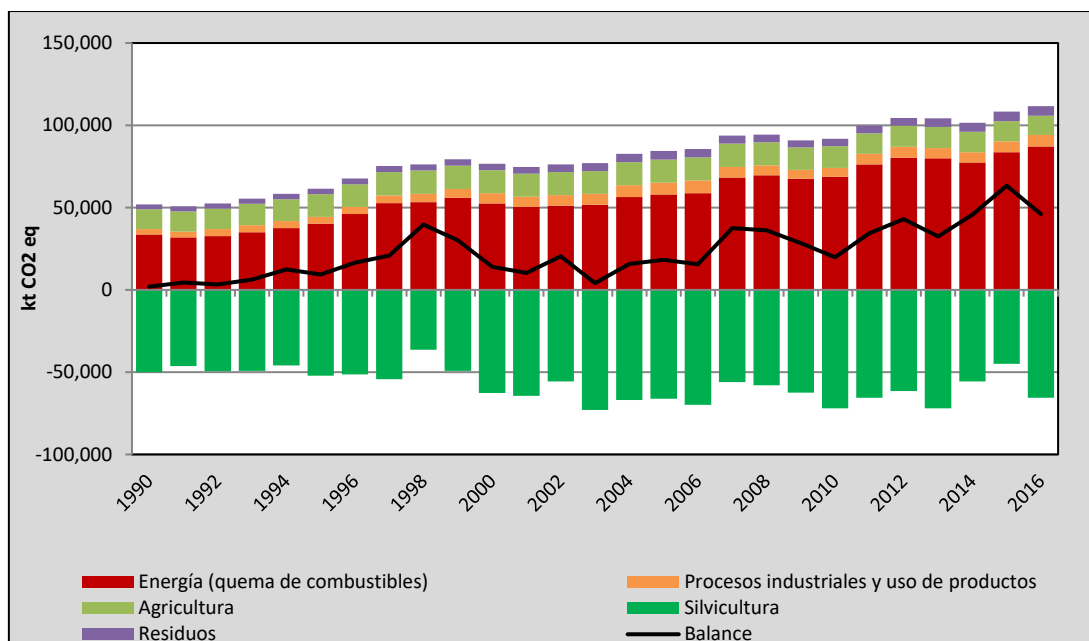
5. MRV Policies, Actions and Mitigation Measures in the Country

Before advancing the review of national MRV, it is interesting to analyze the recently updated national GHG inventory (INGEI) (Figure 2). This allows us to appreciate that the 2016 total emissions (excluding LULUCF) were 111.678 kt CO₂e which is an increase of 114.7% since 1990 and by 7.1% since 2013.

In 2016 the Energy sector, which mainly reflects the burning of fossil fuels, accounted for 78.0%; followed by Agriculture (10.6%) which includes, among others, livestock and fertilizer use; then with Industrial Processes and use of Products (6.2%) generally includes physicochemical processes, and gas leaks, and finally waste (5.2%) that includes emissions by degradation of organic matter sector. (MMA, 2019).

The LULUCF sector considers emissions and removals reduction and growth of forest biomass. This sector remains a sink throughout, in 2016 reaching 65.492 kt absorb CO₂e. Adding the total emissions and removals accounted for in 2016 a balance of 46.185 kt CO₂e, which increased by 2.3% since 1990 and by 42.5% since 2013 (Figure 2 2). The general trend of the balance has been dominated by the Energy and LULUCF sectors highlighting values that escape the trend that are the consequence of mainly of forest fires.. (MMA, 2019).

Figure 2. INGEI Chile: GHG balance (kt CO₂ eq) per sector, 1990-2016 series



Source: Team Technical Coordinator of MMA. (MMA, 2019).

In short, it is seen that the emitting sectors nationwide are the energy and agriculture sector, followed distantly by waste and industrial processes. Keeping this in view, and in accordance with the focal point of MMA, they have been revising seven MRV initiatives relevant to the country, covering the public and private sectors both. For each identified below MRV system, the institution in charge of its design and / or implementation, and actor interviewed.

Table 2. List of actors and MRV systems relevant country.

MRV related	Institution in charge	Interviewed
MRV Footprint Chile	Ministry of Environment (MMA).	Sebastian Garin
MRV of the National Strategy for Climate Change and Plant Resources (ENCCRV).	Forestry Development Corporation (CONAF), Unit Climate and Environmental Sustainability (UCCSA) Change.	Georgina Trujillo
MRV of energy policies.	Ministry of Energy (MoE).	Francisco Dall'Orso
MRV power autosupply.	Ministry of Energy (MoE)	Anna Almonacid (GTZ)
MRV green taxes generating boilers and other types.	Ministry of Environment, ministerial focal point for policy PMR green taxes.	Francisco Pinto
Waste MRV (Composte, Biodigestion, Capture Landfill).	Ministry of Environment.	Norma Square
NAMA Clean Production Agreements of the Association of Sustainability and Climate Change (ASCC).	Clean Production Agreements, Deputy Director of Operations of ASCC.	Ambrosio Yobanolo Charge Business Intelligence Unit
CBITs, national MRV system platform.	Onuma project coordinator for the construction of the national platform.	Soledad Palma

Source: Author.

For each of the MRV identified the sections below summarize the main findings from both the literature review and interviews themselves. The MRV energy policy of the country, contains the MRV supply of green taxes, among others in the same section.

5.1. MRV HuellaChile²

HuellaChile is the first reporting system of corporate carbon footprint in the country. It is a free, voluntary online program, through which both public and private organizations can quantify, report and manage their corporate GHG emissions. In addition, organizations may qualify for a system of recognition for their participation and action. Thus, the program allows for collecting information on mitigation actions implemented by public and private organizations in Chile. This program is led by the Department of Mitigation and Climate Pollutant Inventory of Climate Change Office of the Ministry of Environment.

It should be noted that there is a binding agreement for the creation and implementation of the program HuellaChile legal instrument. The benefits for participants are:

- In the field of internal management: access to the online tool for quantifying GHG emissions; access to the guides and guidelines for the management of GHGs; and technical assistance to participating organizations and standardization of the footprint for participants.
- Other benefits associated are the dissemination and increased competitiveness as it gives recognition to participating organizations through a Logo recognition system and improves access to information and feedback with stakeholder organizations, improving and promoting the country's competitiveness.

² www.huellachile.cl

In addition, the program seeks to:

- Disseminate and train organizations and the public on the effects of climate change and the importance they have as agents of change.
- Recognize the effort and commitment to the environment of the participating organizations.
- Technical support GHG management, creating, providing and transferring technical skills for continuous improvement.
- Standardize accounting, quantification and reporting of GHGs.
- Establish distribution channels for voluntary GHG reporting and public.
- Promoting the carbon market at a national level, by encouraging the purchase of carbon credits from projects to obtain national recognition neutralization
- Systematise and record information on GHG nationwide.

The GHG quantification system has been developed based on the NCh-ISO 14064 (Parts 1, 2 and 3), ISO 14065-NCh: 2014; NCH ISO 14066: 2012; NCh-ISO 14069: 2014 NCh 3300: 2014, which increases the credibility, consistency and transparency of GHG accounting. It is compatible with the IPCC Guidelines 2006, used for the preparation of national GHG inventory of Chile and it uses a common reporting format for the preparation of GHG inventory report, reduction, neutralization and excellence in GHG management.

Program participants have access through the Single Window System (VU) Registry Release and Transfer (PRTR) of the Ministry of Environment, which is a national initiative and supported by the Government of Chile for recording releases and transfers of pollutants, considering local and global pollutants. This program has a high potential for cooperation between public and private sectors for low carbon development.

Some interesting developments and improvements of the system are:

- Chile the Footprint Program encourages estimation and management of corporate footprint, both the private sector and the public sector.
- The program allows capacity building, since becomes the advisor to companies or institutions that want to enter the system and measure their footprint.
- The program certifies the reductions, granting recognition seals. In this context, it has the ability and potential to seek synergies with other certification programs. For example, they are currently managing:
 - Synergies with the Certification System of Municipalities (SCAM) or RedMuniCC to promote the implementation of the footprint by municipalities, achieving a finer territorial scope.
 - Under the private sector, synergies with Clean Production Agreements (APL), and Pharmaceutical Laboratories Certification.

Some needs and gaps that can be seen in the MRV of the program are:

- It has not managed to convey the value given to footprint estimation and management.
- Dissemination should be strengthened in the private sector. Public institutions should be the example for the private sector, implementing the program and managing their mark.
- Institutional arrangements with other public and / or private organizations should be strengthened, to avoid double counting and take advantage of synergies.
-

- The reliability of the baselines by project should be strengthened. The input data depends on the private or institution that is estimating its footprint, the problem of reliability of the input data, or the traceability schemes has not been solved.
- A data infrastructure must be built, with information technology support to maintain and exchange data.
- Official standards must be defined by the government (standards, methodologies, procedures, etc.). ISOs are currently applied with very generic guidelines.
- Specific methodological approaches must be developed to monitor mitigation initiatives: baseline definition; business as usual; accounting rules and appropriation of reductions.
- Report protocols must be designed and implemented for the actors in the sector.
- A verification alternative should be sought, since in Chile there are no accredited entities to validate and verify (ISO 1065 and 1066).

5.2. MRV of Climate Change & CONAF Vegetation Resources

The National Forestry Corporation (CONAF), through the Unit for Climate Change and Environmental Services (UCCSA), currently coordinated the development and implementation of the National Strategy for Climate Change and Vegetation Resources (ENCCR) (2017-2025)³ which integrates broadly the UNFCCC requirements to reduce emissions from deforestation, forest degradation and increase carbon stocks through sustainable management and REDD+. In addition, it considers the guidelines emanating from the United Nations Convention to Combat Desertification (UNCCD), integrating activities to mitigate and adapt to climate change, as well as to combat desertification, land degradation and drought. The Strategy in this way, after national and international validations, is constituted as a relevant public policy so that the forestry goals set in the NDC of Chile are achieved, which becomes even more relevant after the global adoption of the Paris Climate Agreement in 2015 at COP22.

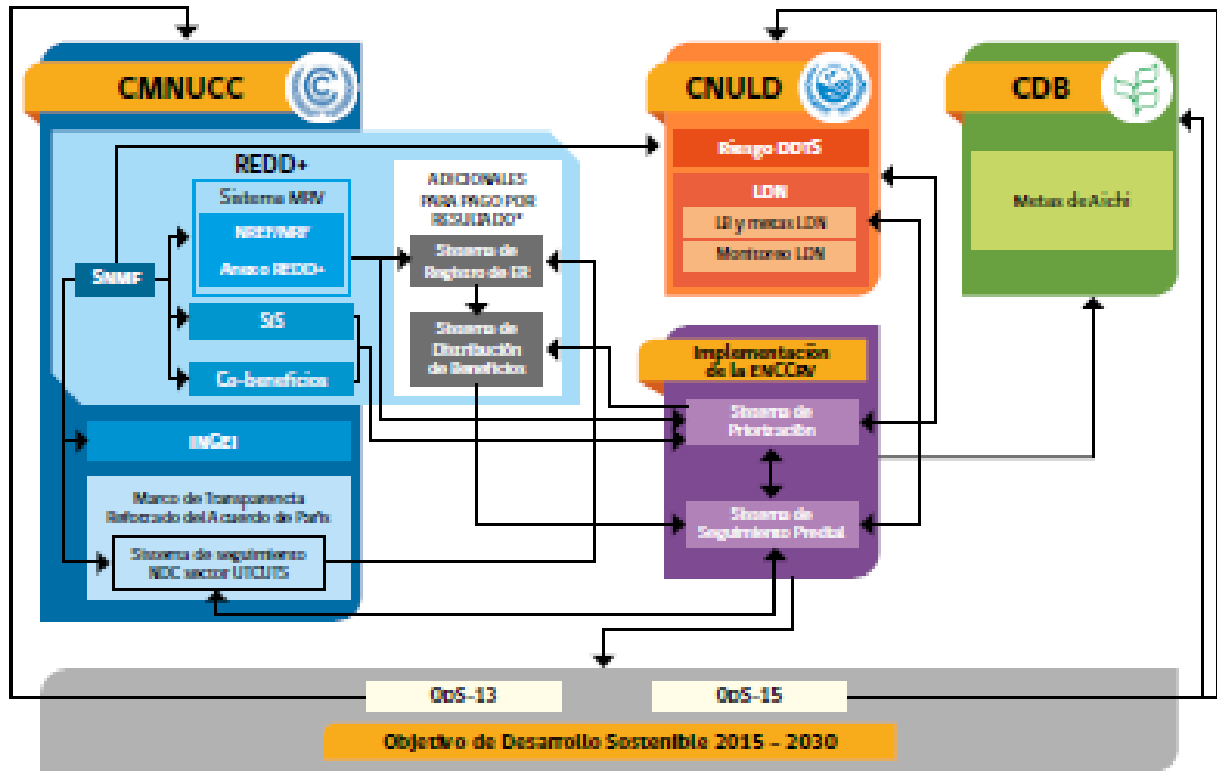
The ENCCR main objective is to reduce the social, environmental and economic vulnerability caused by climate change, desertification, land degradation and drought on vegetation resources and human communities that depend on them, in order to increase resilience ecosystems and help mitigate climate change by encouraging the reduction and capture of emissions of GHGs in Chile. REDD + activities carried out in the country through the 26 measures of action of the ENCCR, seek to generate increases in forest carbon sequestration through reducing deforestation, forest degradation, along with conservation and management sustainable of these. In addition to the above, these actions in the territory have the potential to produce benefits other than carbon. These benefits that go beyond carbon are called co-benefits, multiple benefits or non-carbon benefits in REDD + language.

Currently, the UCCSA of CONAF is developing an Information Management Platform of the ENCCR, which encompasses the different systems linked to the work of the same unit, such as the SIS, the Prioritization System, Reporting Monitoring System and Verification (MRV),

³ https://redd.unfccc.int/files/chile_national_redd_strategy.pdf

Registration System, Benefit Distribution System (SDB), financial strategy and Co-Benefit System (SCB), among others.

Figure 3. General Structure of System Measurement and Monitoring (SMM) of ENCCRV.



Source: National Forestry Corporation (CONAF), 2018. Measurement and Monitoring System of the National Strategy for Climate Change and Plant Resources. Santiago. Chile. 72 pp.

In the context of the UNFCCC, the SMM contains a number of elements that relate to establish greater detail and precision in the approach to REDD + policies, although it has direct links to INGEI and transparency framework reinforced in the Paris Agreement.

Within the REDD + approach, the SMM integrates the National Forest Monitoring System (SNMF) which generates information primarily for MRV, but also for the SIS and Co-benefits System. Furthermore, the information generated by the SNMF, is also highly relevant to the development of INGEI, and to comply with the goals associated with the NDC through its Monitoring System. The above elements, integrated within UNFCCC complement those elements linked to CNLUD, such as information about DDTs and elements associated LDN mechanism. (ENCCRV).

The most direct link is established with the SNMF MRV system, which integrates the generation, submission and verification of NREF / NRF and technical annexes of REDD + results. Results from the MRV system in terms of reduced emissions, are integrated into the System Transaction Log, which would allow for eventual access to payments results should be channeled through the

SDB-oriented environmental and social optimization in implementation of actions in the territory supported by these resources. For this reason, it is linked directly to the prioritization system to define its guidelines, and Predial Monitoring System to monitor the results and at the same time generate feedback. (ENCCRIV).

The Prioritization System must take into account a large number of sources of information, integrating data from the MRV System, the SIS, the Co-benefits Monitoring System, the DDTS information and the LDN mechanism, in addition to the aforementioned Monitoring System Predial. (ENCCRIV).

The latter is linked directly to the NDC Monitoring System of the LULUF sector, with which the SMM is directly associated with the Reinforced Transparency Framework of the Agreement from Paris. In addition, it is linked to LDN Monitoring and monitoring for compliance with the CBD Aichi Targets. This in turn allows the SMM to be able to monitor and report the progress in the SDGs, specifically those that have a special relationship with the UNFCCC, such as SDG-13, and SDG-15 through the UNCCD scope. and of the CBD.

Currently, the SMM platform has some of its parts in the process design and others under construction, however in the 3rd BUR third of the country it has been accompanied by a REDD + Annex, with the details of the estimates and monitoring of the measures. This is currently an estimate that is in Excel format.

The MRV monitoring system is scheduled to report every two years on the BUR. To this end it has:

- Land cover and uses: The land of native forest is updated permanently, but with different update cycles in the territory. There is a definite methodology for this survey and CONAF is responsible for its management. The land is done through consulting.
- Fires: There is a high standard in the monitoring, follow-up and control of fires at the country level, background used to calculate emissions. There is established methodology and clearly defined managers.
- Management plans: it is the only REDD+ activity that is not reported because there is no methodology to estimate the impact on sequestration. This is due to the fact that this information is not spatialized, the procedures and records of request for Management Plans, their approval and their follow-up by CONAF are different and are not interrelated.
- Forest carbon stock: There is a defined methodology to calculate the carbon content of the stable forest. This is done by the Forestry Institute of Chile (INFOR).

MRV platform will be hosted on the servers of the Information Center of Natural Resources (CIREN), who is in charge of the reports. CONAF has no technological capacity to accommodate the system. As verification MRV system, there is currently no mechanism. The World Bank FCPF is on track to implement a mechanism under ERPAs.

The ENCCRIV's 2025 vision is to become an institutionalized public policy instrument that inserts the concept of payments for environmental services associated with vegetative resources and with the consequent benefits. Thus, it lays the foundations for an internal or external market.

First, the commitments of the NDC and the FCPF will be fulfilled, but then they will be linked to transaction records. The Markit registry and the future World Bank platform are currently being considered. A consultancy is being tendered for the design of the corresponding platform.

Some needs and gaps that can be seen in the SMM, specifically in the MRV of ENCCRV are:

- Lack of clarity in the accounting rules, even though progress has been made in the framework of enhanced transparency, in compliance with 7 REDD + safeguards required by the Convention, as well as reports of summary report safeguards and Annex REDD + the BUR. Accounting is still based on calculations.
- Accuracy and completeness. There is a pending work, according to financial and personnel resources, to include categories that are not yet reported in the INGEI sector due to lack of organized and relevant information. There are still lack of reliable input data and traceability schemes. In particular, the MRV associated with Forest Management Plans has not been resolved.
- There is no capacity to host the MRV system in CONAF, because it does not have data infrastructure and information technologies, nor adequate capacities. However, CIREN's capabilities are used, which, like CONAF, is a public-private institution under the eaves of the Ministry of Agriculture.
- There are few professionals properly trained and experienced within the body. In the UCCSA Unit of CONAF, which coordinates the SMM, there are almost no plant professionals, being the professionals with fees financed mainly by international resources.
- Institutional arrangements with other public and / or private agencies at the local level are required, agreeing on a work plan and procedures, with formal government guidelines regarding standards, methodologies, procedures, etc.
- Progress must be made in the design and implementation of reporting protocols for the sector actors that must monitor and report their GHG emissions to the authority. As well as progress in the training of stakeholders in the sector.
- The SMM should be strengthened in order to achieve transparency, avoid double counting and achieve consistency. It should be considered that the ENCCRV measures are met through atomized projects in the country, they occur in different parts of the territory, so an alignment with territorial actors and institutions is required.

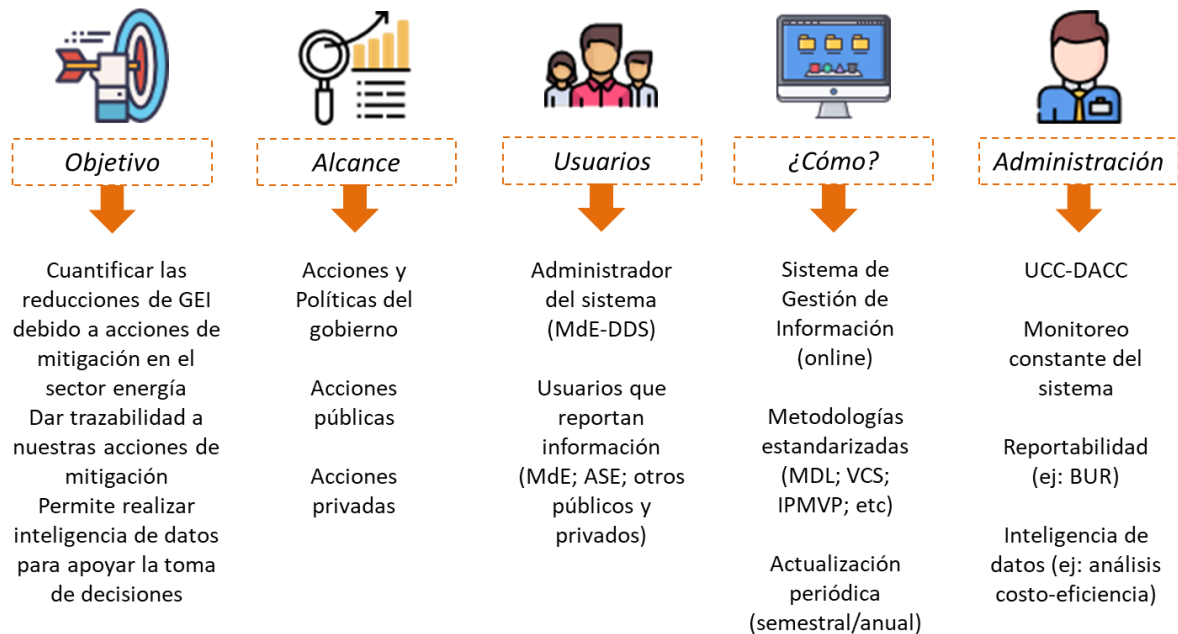
5.3. MRV of Energy Policy

The energy policy MRV system is being addressed under the component 6 of PMR-Chile "carbon pricing" project. This component aims to develop an MRV platform for accounting emission reductions due to mitigation actions in the energy sector, according to the guidelines defined under the Paris Agreement and the UNFCCC for robust accounting. Currently the MRV platform is in its first phase of conceptual model and design.

The platform will identify the impact of interventions such as: projects, programs and mitigation policies within the energy sector. This MRV will facilitate the evaluation of the change in the emissions of the energy sector and will allow monitoring the progress of these actions

throughout its implementation. The following figure summarizes the conceptual model of the system.

Figure 4. MRV conceptualization of the Energy Sector.



Source: Presentation by Ministry of Energy.

The MRV thus conceptualized will be the single window of the sector, considering the following initiatives of the energy sector:

- Energy Project Savings Certification (CAPE), born in the Energy Sustainability Agency (ASE), which together with the Ministry of Energy and Corfo, presented the initiative that emerged from the line of development of Measurement and Verification of efficiency energy of said organization (ASE).
- Energy Communes: Program of the Ministry of Energy that was born in 2015 as a tool aimed at contributing to the energy development of Chile, by analyzing the energy scenario of each commune and raising projects that allow exploiting the potential for energy efficiency and use of renewable energies from the local community.
- NAMA of Self-Supply, referred to small-scale renewable energy projects for self-consumption. That has already supported the methodological definitions and accounting of about 3000 projects.
- Large-scale generation: which includes the full range of generation alternatives.
- Thermal conditioning of homes, born as a benefit for families who own a home and need to improve it, expand it, make it more energy efficient or improve their environment (Family Heritage Protection Program, PPPF). It is a program of the Ministry of Housing and Urban Planning, which in collaboration with the Ministry of Energy, have developed guides and encouraged the transformation of housing. Thermal conditioning allows to reduce the consumption of fuels used for intra-residential requirements,

improving thermal comfort and increasing energy efficiency, thus contributing to decrease GHG emissions, among others.

- Mitigation plan of the sector, which defines the mother strategy and axes of action, but does not define the specific policies or projects to be developed. The vision of the Ministry of Energy is to transform this instrument into an investment plan.
- Energy policies of the country. The system will include all other possible policies of the sector, such as the Energy Route, Energy 2050, etc.

The methodologies used to estimate reductions are mainly used in the CDM. The conceptual design has clearly defined the responsibilities of the system administrator, and users. The conceptual design has clearly defined the responsibilities of the system administrator, and of the users. Among the responsibilities of the administrator, all those that allow validation at the different stages of the process have been defined, namely: definition of the mitigation action; *Ex-ante* evaluation; Periodic updates; Closure of the mitigation action; Support the quantification of GHG reductions; Perform analysis and monitoring of mitigation actions; Report to MMA for national communications and the BUR.

As for the responsibilities of the users, it is considered to: Define the mitigation action; Perform an *ex-ante* evaluation; Perform periodic updates of the implementation results until the end of the mitigation action; Make the corrections that the MRVe Administrator deems appropriate.

The system may explain (approximately) how international commitments have been fulfilled; It will allow to carry out analyzes that have not been carried out, such as cost-effectiveness or mitigation curves of mitigation actions from a climate perspective. Additionally, the system will facilitate climate monitoring of instruments such as the Energy Route, Energy 2050, the Mitigation Plan, among others.

Gaps or challenges:

- Internal monitoring systems for existing actions must be leveled.
- Emissions reduction quantification protocols must be generated that are user friendly and robust enough to be communicated.
- The habit of evaluating *ex-ante* and *ex-post* results of mitigation of actions must be created.
- Some verification system must be defined to ensure robust estimates.
 - Definition of accounting criteria is required, within the framework of Articles 6 and 13 of the AP. The MRV system of the energy sector expects to lay the foundations for quantification of emission reductions for an offset system and an emission reduction transactions. Robust accounting criteria must be defined for these markets.
- There are possible double accounting problems that have not been resolved (for example, CAPE with APL, Huella Chile, etc.).

5.4. MRV of NAMAs of Clean Production Agreements⁴

Clean Production Agreement (APL in Spanish) is an agreement between a business and the bodies of the state administration, which aims to implement clean production through specific goals and actions and contribute to the sustainable development of enterprises. In the early years the APL did not consider actions aimed specifically at reducing GHGs, however, a number of measures that were agreed in the framework of these agreements have the effect of obtaining reductions. Therefore, in 2010, with 54 APLs implemented and certified by the ASCC until that year, a study was contracted to calculate the GHG reductions of 16 APLs in different industrial sectors. The results estimated the GHG emission reductions at 4,050,973 tCO₂e. In 2012, the ASCC registered with the UNFCCC the APL as the first NAMA of Chile and the world, which for the period 2012-2020 expects to achieve a reduction of 18,400,000 tCO₂e.

This NAMA is in operation and has incorporated various actions that have the effect of GHG mitigation as well as indicators to monitor their progress. System Measurement, reporting and verification of NAMAs APL responds to the main need to report estimating the effects on greenhouse gas emissions voluntary commitments adopted between public organizations and / or private and the State of Chile.

Yet every year this system has expanded its scope by incorporating new reporting categories, that although in the context of NAMA are co-benefits, in many cases respond to the main objectives of the agreements. In addition, the system provides operational monitoring of the implementation of the various existing agreements.

The first milestone report is 2016, with estimates up to 2015. They are currently in the process of developing a computer system, which will lay the foundation of transactional support as well as business intelligence phase and will start estimating impacts .

Currently the support of the associated reports is in a series of linked spreadsheets, some public, while the measuring that feeds these spreadsheets is carried out in the field mainly by companies participating in the APL, or consultants hired by the unions to support the implementation who do get this data through forms or reports to the ASCC. The main mechanism for detecting errors in impacts has been to apply Tukey criteria to exclude outliers from the report, and in a few cases validation has been carried out by a third party in the field for detection and correction.

In addition, several practitioners have been used for the detection and correction of typing errors, as well as the detection of missing data and their loading. One of them designed an error detection algorithm in data from Organizations adhered to APL by comparison compared to the SII database using Levenshtein distances. (It could be useful for other members of the MRV technical group)

⁴ Interview on the sidelines of the first meeting of the Task MRV (ETMRV), supplemented with interviews under this report

They are currently in the development phase of the computer system (transactional support) and start the next phase (business intelligence and impact estimation).

In the methodological framework, the methodologies are mainly based on the CDM. The use of scenarios and the estimation of impacts are fundamentally different from INGEI, since INGEI factors are not available for all possible categories of APL. The global warming potentials used are AR5 and not AR4. The collection of primary data for calculation is carried out directly in productive establishments. Issues that correspond to scope 2 and 3 in the context of corporate footprint are not always possible to relate to categories of IPCC guidelines. Some APL data for micro and small businesses may not even be considered in national statistics.

Gaps identified:

- Using CDM methodologies not the 2006 IPCC Guidelines
- Lack of financial resources.
- Lack of reliable input data and traceability schemes.
- Lack of data infrastructure and information technology to maintain and exchange data.
- Lack of a better articulation with other public bodies.
- Lack of formal government guidelines (ie: standards, methodologies, procedures, etc.).
- Lack of trained and experienced professionals into the organization.
- Lack of duly trained and experienced professionals in the external entities with which their body articulates MRV work. (companies and consultants that handle the data collected at source).

5.5. MRV of the Waste Sector

Under the Bilateral Agreement Chile-Canada Environmental Cooperation (1997), during the COP22 (2016) Canada committed with Chile and Mexico to support the implementation of specified contributions to the national level (CDN) under the Paris Agreement through initiatives to significantly reduce emissions of GHGs. In the case of Chile the cooperation⁵ is part of reducing emissions in the sector of municipal waste in Chile, which currently is running through the Recycling and Organics Program⁶(2017-2021). Environment and Climate Change Canada (ECCC) is contributing seven million dollars of funding for capacity building and technical assistance to reduce emissions from existing landfills and to divert organic waste from landfills.

The overall objectives of the program are:

- Extract gas from landfills for the production of clean energy.
- Segregation of organic waste at the source and use them beneficially, either for the generation of energy (through anaerobic digestion) or for the production of compost.
- Develop a social / communications component to raise awareness about the diversion of organic waste from landfills.
-

⁵<https://www.canada.ca/en/services/environment/weather/climatechange/canada-international-action/mexico-chile-support-implementation-respective-nationally-determined-contributions.html>

⁶ <https://www.reciclorganicos.com/es/>

- Design a solid and transparent mechanism of 'Monitoring, Reporting and Verification' of mitigated greenhouse gases as a result of the Program

This program is being implemented through a technical committee between ECCC, the Ministry of Environment of Chile, ARCADIS and ImplementaSur. One of the main objectives of the program is to optimize the processes of collection and management of organic waste, preventing them from being deposited in landfills or sanitary landfills, generating GHG emissions in an uncontrolled manner. By optimizing waste management processes, organic matter can be treated separately through the composting process, which seeks to produce compost and natural fertilizers for agriculture and gardening. Another method of treatment consists of microbiological degradation in anaerobic reactors to produce biogas, which is a fuel that can be used to generate electricity.

The MRV program will support the monitoring, quantification, reporting and verification of emission reductions to ensure the credibility and soundness of emission reductions achieved through the implementation of technology in Chile.

This program will allow local projects linking with emissions trading in Canada. For this, the Chile-Canada Program is currently in the adaptation of protocols for projects in Chile based on current GHG protocols in Canada and USA. The methodologies considered correspond to those used in the Canadian protocols, which mainly rely on methodologies Clean Development Mechanism, with default emission factors from the IPCC Guidelines (2006).

5.6. CBITs Chilean Project

Within the framework of the Paris Agreement, among the decisions of the COP, it was defined to establish an initiative for Transparency in order to improve institutional and technical capacity, both before and after 2020, to support developing countries to comply with in a timely manner with the reinforced transparency framework, as defined in Article 13 of the Agreement.

This Transparency Capacity Building Initiative (CBIT) aims to: (a) Strengthen national institutions for transparency-related activities, in line with national priorities; (b) Provide relevant tools, training and assistance to comply with the provisions stipulated in Article 13 of the Agreement; and, (c) Assist in the improvement of transparency over time.

CBIT Chile aims to strengthen the transparency framework of the NDC of Chile, considering two main components, over a period of 3 years. The components refer to: (i) Strengthening of the transparency framework for mitigation and adaptation, through the creation of a climate action platform that allows monitoring the mitigation and adaptation actions of the NCD and the country's climate policy , as well as the definition of GHG reduction goals in the long term; and, (ii) institutionalization for the report of public climate spending in the country. Table 3 summarizes the expected products of CBIT-Chile.

Table 3. Expected products CBITs-Chile initiative.

Component	Expected results
Climate Action Platform	<ul style="list-style-type: none"> Platform design report climate information, complementing features SNI Chile. Development of guidelines for use and training users. Policy guidelines for developers to use platform.
Defining GHG reduction targets in the long term	<ul style="list-style-type: none"> Emissions projections at the sectoral level. Discussion of the intersectoral table NDC: Updating, monitoring and evaluation of the NDC. National System of Prospective GHGs.
Monitoring system adaptation indicators	<ul style="list-style-type: none"> Designing monitoring indicators 9 national sectors. Generate application guides indicators and respective training. Apply indicators in three to five projects for piloting. Training for understanding how gender and resilience affect resilience.
Climate spending	<ul style="list-style-type: none"> accounting methodology guidelines climate spending. Training and coordination between teams of climate finance. Form preparation and pilot climate costs application.

Source: Author.

This initiative will allow Chile to implement measures associated with the transparency that have not yet been applied in developing countries; it will allow for a benchmark in the region in terms of improving its transparency framework; It will support work in the future update of the NDC of Chile; and deliver relevant inputs for the design of long-term climate strategy inputs. Additionally, it is a pioneering activity in establishing a monitoring mechanism for adaptation measured to the CC for the National Adaptation Plan, the 6 existing sectoral plans (: fisheries and aquaculture, forestry and agriculture, cities, infrastructure, health, biodiversity) activity and 2 plans in design (water resources and tourism).

Regarding the progress status, CBIT-Chile started 2018, advancing to date in the update of the sector emission projections, as well as contributing in the background analysis for the monitoring and evaluation of the NDC, which will be completed in July. The activities related to the climate action platform, expected to be transformed into an integrated MRV system, are planned for the year 2020. Currently CIBIT-Chile is starting with the activities related to the Climate Expenditure component.

5.7. MRV of the Green Tax⁷

Chile implemented an unprecedented green tax as a new instrument for its environmental policy and management, articulating with the objectives of the Strategy for Atmospheric Decontamination Plans 2014 - 2018 and the National Determined Contribution (NDC) committed under the Paris Agreement. The tax came into effect in 2017 and applies to establishments that operate with boilers and / or turbines that individually or as a whole, add a

⁷ Based on the document "Creation and Implementation of a Measurement, Reporting and Verification (MRV) System for Chile's Green Tax" (Pizarro et al., 2017)

thermal power greater than or equal to 50 MWt (thermal megawatts) of nominal thermal power, considering the upper limit of the energy value of the fuel.

The MRV system is made up of four components: the register of sources, which comprises a prior survey of facilities that may be subject to the tax; the measurement (M) component, regulated under the emissions quantification guidelines; reporting (R), which stipulates guidelines for emissions reporting; and verification (V), covered under regulatory verification guidelines.

Registration

The register's objective is to identify facilities that may be subject to the tax. All individuals and legal bodies that own one or more boilers and/or turbines with a rated thermal power level of 5 MWt or more are obliged to register with the PRTR uniform public service system⁸, although only facilities that have a combined rated thermal power level of 50 MWt or more are subject to the tax. They must also provide relevant information to determine whether or not they are subject to the tax. The register is based on information submitted in a number of sector-based systems that companies are already using for reporting purposes. The Ministry of the Environment uses this information to draw up a list of facilities liable for taxation each year.

Measurement

Facilities must apply emissions quantification methodologies so as to determine the amount payable⁹. The companies are responsible for selecting the quantification method that they use, choosing from a list of available options in line with rules laid out in guidelines issued by the Superintendence of the Environment (SMA). The methodologies may vary within the same establishment. That is, not necessarily all sources of an establishment share the same method.

Quantification may be implemented by means of monitoring and measurement or estimation:

1. Sampling and measurement: This comprises the direct quantification of the outlet emissions concentrations, using measurement equipment installed at the facility. Both sampling and continuous measurement are included amongst quantification options.
 - Discrete sampling: Monitoring equipment is used to take a sample, which is then analyzed in a laboratory or on site. This method is used to determine output concentration and representative flow rate at the time when the measurement is taken.
 - Continuous: Emissions sampling and analysis in real time, using a continuous emissions monitoring system (CEMS). This normally provides hour-by-hour emissions averages over the course of the year.
2. Estimation: This method comprises the indirect quantification of emissions using emission factors (for the specific production process in question) and annual activity

⁸ For more details, see: Manual de registro de calderas y turbinas para el pago de impuestos verdes (Ministerio del Medio Ambiente, octubre 2016).

⁹ For more details, see: Instructivo para la cuantificación de las emisiones de fuentes fijas afectas al impuesto del artículo 8° de la ley n° 20.780.
(https://transparencia.sma.gob.cl/doc/resoluciones/RESOL_EXENTA_SMA_2018/RESOL%20EXENTA%20N%2055%20SMA.PDF)

records (such as operating hours and fuel consumption). Together with this methodology, a number of quantification options are specified in Environmental Regulation Standards (ICAs)¹⁰ that apply to each facility. The Instruction offer 11 + 1 options, However, a further improvement limited the alternatives to 7 + 1 (SMA, 2018)¹¹

Reporting

The emissions reporting process is based on guidelines that determine the conditions and standards that must be met when reporting emissions subject to the tax¹². For these purposes, the SMA prepared emissions reporting guidelines that set out to regulate administrative duties for reporting the data and background information necessary to calculate the tax. This calculation is then performed by the Internal Revenue Service on a case by case basis for each source. The SMA instruction also specifies the rules for submitting an individual report to the National Energy Commission (CNE) and the National Electricity Coordinator, containing the consolidated and hour-by-hour emissions released at all power plants subject to their coordination.

Under the instruction, all facilities subject to the tax must make a report, using the PRTR uniform public service system. However, the emissions reporting mechanism depends on the type of source, and it may be processed either by SICTER¹¹ or by the SIV. These reports are submitted on a quarterly basis.

Verification

Verification is currently implemented through oversight by the Ministry of Health (MINSAL) and the Office of the Superintendent of the Environment (SMA). The Ministry of Health is tasked with compiling the background information submitted by the operators of stationary sources of pollutant atmospheric emissions, for use estimating emissions from each source. These estimates are made using existing domestic or international emission factors, as applicable for each source (Ministry of Health Supreme Decree 138/2005 Article 2). On an annual basis, each source must submit information on its processes, production levels, abatement technologies, and fuel quantities and types used at the sources subject to declaration requirements (Article 3) in order to estimate emissions (Article 4).

¹⁰ Environmental Instruments (ICA) are the Environmental Qualification Resolutions, Prevention Plans and, or Environmental Decontamination, Environmental Quality Standards, Emission Standards, Management Plans, among other control instruments that are under the competence of the SMA.

¹¹ The '+1' option referred to the possibility that the establishment proposed its own measurement alternative.

¹² For more details, see: Instructivo para el Reporte de las emisiones de Fuentes Fijas afectas al Impuesto del Artículo 8° de la ley N° 20.780. Superintendencia del Medio Ambiente (2018). (https://transparencia.sma.gob.cl/doc/resoluciones/RESOL_EXENTA_SMA_2018/RESOL%20EXENTA%20N%2055%20SMA.PDF)

5.8. Summary of MRV Systems in Chile

The main MRV systems in the country are presented in a table format.

Table4: Summary of MRV systems in the country.

MRV system	Subsystems	Methodology	State
footprint Chile	Public and private corporate footprint	NCh-ISO 14064 (Parts 1, 2 and 3)	MyR implemented
		NCh-ISO 14065: 2014 NCH ISO 14066: 2012 NCh-ISO 14069: 2014 NCH 3300: 2014	
Clean Production Agreements	NAMA APL	CDM methodologies	in implementation
Energy Sector	<ul style="list-style-type: none"> Supply Energy communes Energy Project Savings Certification (CAPE) Green taxes on boilers and other generation types. Mitigation Plan of the sector. Energy policies of the country. 	Mainly CDM methodologies.	In design
	National Forest Monitoring System (SNMF)	guidelines 2006	in implementation
ENCCRV – CONAF	Safeguards System (SIS)	UNFCCC – 7 safeguards UNDP safeguards UN-REDD + safeguards	Implemented M and R
	Co-Benefits System (SCB)	To be defined, based on UNFCCC guidelines.	In design.
Waste	Landfill gas capture and destruction.	CDM methodology. With default emission factors IPCC 2006.	Design (development of measurement protocols).
	Composting	CDM methodology. With default emission factors IPCC 2006.	Design (development of measurement protocols).
	Bio-digestion	CDM methodology with default emission factors IPCC 2006.	Design (development of measurement protocols).
CBITs – Integrated MRV	Platform for Climate Action – Integration of all systems.	To define.	At concept level. Scheduled to be addressed in 2020.
Green Tax	Emission (CO ₂ , MP, SO ₂ , NO _x) of establishments that operate with boilers and / or turbines that	Emission Quantification Protocol (SMA, 2018): - Direct method (CEMS)	Implemented

MRV system	Subsystems	Methodology	State
	individually or as a whole, add a thermal power greater than or equal to 50 MWt.	<ul style="list-style-type: none"> - Discrete sampling - Estimation with factors 	

Source: Author

6. *Diagnosis and Identification of Gaps*

Since the Paris Agreement, despite not having the modalities, procedures and guidelines for the implementation of the Reinforced Transparency Framework, Chile has been advancing in a progressive vision on the transparency of climate action, considering their own needs and set priorities in the NDC. Indeed, one should take into consideration that:

- Chile was the first Latin American country to present a BUR in 2014. Followed it has submitted its second and third BUR, 2016 and 2018 respectively.
- The country has continued a process of continuous improvement of national GHG inventory (INGEI), which systematically incorporates the best available information on emission characteristics, sinks and trends. The required institutional arrangements and improving INGEI seek to strengthen an adequate and transparent report on the country's performance.
- In 2009 Chile assumes a voluntary commitment, to be fulfilled through NAMAs. Chile does not have solid information on the progress of this commitment, mainly due to the lack of definition of the official BAU baseline.
- In 2017, Chile ratified its NDC.
- The country has made progress in the institutionalization of climate action at the regional level, creating the CORECC and proposing a multi-level operational structure.

Despite these advances, there are still significant gaps to respond to a framework of enhanced transparency. Then summarizes the main gaps identified in this report.

a) **technical and methodological gaps**

- Lack of accounting criteria. There is a need to develop information and methodological approaches to track mitigation initiatives (accounting rules, baseline and emission sources). MRV is mainly based on CDM methodologies, and not all follow the guidelines of IPCC 2006. There is also no clarity of the compatibility of the CDM methodologies that are being used for similar projects.
- Need for more reliable data entry and traceability schemes.
- In 2014, the MMA developed a National Framework of MRV to set standards and basic procedures for MRV systems in a wide range of mitigation actions towards ensuring consistency and comparability between actions. However, different MRVs do not seem to be considering these guidelines.
- The inventory is not sufficiently developed to assess the actions taken to reduce impacts of climate change. a wider range of mitigation efforts and a strong system to collect information on the implementation of NDC analysis is needed. This would be useful only to transparently inform the efforts made by the country, but also to improve the planning of future climate commitments in Chile, with an increase in ambition as suggested by the OECD and the Convention.

- It is urgently necessary to have the updating of sector projections, to update the projected by MAPS-Chile, regarding scenarios and possible mitigation measures. This has been advanced within the framework of the CBIT-Chile project, and will be finalized in July of this year.
 - There is still no clarity on how to relate the impact of policies and measures in terms of emission reduction, with compliance with the country's NDC.
 - There is a lack of development of consistent methodological approaches to follow up and compare mitigation initiatives originating in Alliance countries.
 - **Gaps to account for the NDC (mitigation):**
 - i. The NDC measurement approach through inventory requires as an urgent measure to strengthen this and its projection. Without a prospective inventory view, with an estimated baseline, it is difficult to compare NDC compliance scenarios.
 - ii. The above is related to the lack of a long-term vision for mitigation in Chile. This failure is considered a barrier to plan mitigation actions towards the long term.
 - iii. Clarity is required regarding the objectives of each MRV system, as some are fully open to the possibility of being platforms for future international transactions (ITMOs), over and above increasing the ambition of future commitments of the country. What undermines the evaluation of an increase in NDC ambition, as well as the OECD recommendation on assessing carbon neutrality for the second half of the century.
- b) institutional and capacity building gaps**
- Lack of clear definition of responsibilities and accountability. It is important to define common guidelines for MRV mitigation systems that can generate accountability and reporting of temporary actions implemented, by category, sector, etc.
 - There are key capacity building needs in government institutions, first considering a number of qualified technical professionals. The rotation of professionals and the low endowment by key units of the public system play a degrading role in the transfer and training actions that can be done. A system that ensures the permanence of know-how in institutions must be built.
 - The reports that the country has made, has been based on a small number of professionals, who do not have the corresponding institutional arrangements, should be depending on the times and wills to build these reports. The prevailing need to define institutional arrangements that clearly define the roles and responsibilities in these matters is raised. That would allow systematizing the collection of data and information to prepare BUR, national communications and to implement MRV systems.
 - The EUROCLIMA project implemented together with the United Nations Environment has identified a set of gaps on adaptation measures and institutional design at regional and local level. It is hoped to address these gaps in part through axis 4 of PANCC 2017-2022, on "Climate change management at the regional and city level.
 - There is a need for more and better articulation between public bodies following up on climate change efforts in the country.
 - It is necessary to strengthen the institutions' institutions in terms of their participation in the ETMRV-Chile and / or institutional arrangements with other public and / or private organizations, in order to strengthen the work of the ETMRV-Chile in terms of transparency, accuracy , completeness, comparability, coherence and avoiding double accounting. Capacity building in MRV ecosystem stakeholders in the country is required.
 - There is a significant gap in data infrastructure and information technology to maintain and exchange data.

In March 2018, the entities involved in the Task Force of MRV in the country were able to answer a survey specially formulated to identify areas for improvement in this instance group work. The results of this survey showed a general opinion on the need to strengthen the work of MRV in the country. These results are consistent with the aforementioned gaps.

7. Final Comments

Climate change is a major challenge globally. The efforts of countries in mitigation are necessary but insufficient to stabilize the concentration of GHG in the atmosphere and limit the increase in the average temperature to a range that does not exceed 2°C. This increases the pressure on the new post-2020 climate regime. Countries should expand their ambition in mitigation and take measures to adapt to the effects of climate change. Careful monitoring of compliance with the NDCs will be required, and each country should make a responsible assessment of a possible increase in ambition for mitigation.

The reinforced transparency framework provides guidelines that remain relatively general for the accounting of reductions. It grants flexibility according to national circumstances, which can take any path. Therefore, the opportunity offered by the Pacific Alliance is valued in this way of jointly defining good practices to contribute to collaborative learning among peers in the region.

Since the Paris Agreement, Chile has made progress in the transparency of its climate action, responding in time with national communications and biennial reports; with the improvement of the national GHG inventory; defining regional institutional structure; and with the allocation of international resources that have allowed progress on different fronts. The work with the academy, NGOs and sector ministries, whose continuity is necessary to incorporate their knowledge and lesson learned, is highlighted.

However, as discussed in the previous section, there are a number of gaps that still persist. Among the most important gaps for the development of MRV in the framework of transparency, three can be highlighted:

- (i) Methodological differences for the estimation of GHG reductions or sequestration and lack of accounting rules;
- (ii) The need to strengthen institutional capacities, there is still a need for more and better institutional arrangements, clearly defining the roles and responsibilities that each of the actors have, and strengthening financial capacity, which allows for continuity of processes and that leaves the installed capacity in public institutions; and,
- (iii) Methodological difficulty in understanding the impact of mitigation policies, plans and actions on compliance with the country's NDC. Additionally, it should be noted that no MRV system of those reviewed has the scope of verification resolved.

It should be mentioned that the Climate Change Law, on the one hand, and the CBIT-Chile initiative, on the other, intend to address an important part of the gaps identified in this report. The results and challenges presented have the merit of delivering the first inputs needed to advance in the operation of a reinforced transparency framework, to ensure transparency,

accuracy, completeness, consistency and comparability between countries and their reduction efforts. To move towards this objective, Chile must close the main gaps mentioned above, based on a solid and consistent climate policy in technical, institutional and fiscal planning terms, a process that requires a modern State and that has technical inputs and resources. for decision making from the subnational levels to the central level.

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9. Annex – National GHG Inventory – INGEI

The INGEI consist of a comprehensive numerical list of the accounting for each of anthropogenic greenhouse gases released or absorbed from the atmosphere in one area and a generally corresponding to a specific period calendar year. The INGEI aim to determine the magnitude of emissions and removals national GHG that are directly attributable to human activity and the specific contribution of the country to the phenomenon of climate change.

So far, international agreements, developing countries such as Chile, must present their INGEI to the UNFCCC as part of national communications (every four years) and biennial update reports (every two years from 2014).

To meet this requirement, the National Inventory System of Greenhouse Gases Chile (SNICHILE), contains the institutional, legal and procedural measures established for the biennial update INGEI of Chile, thus ensuring sustainability preparation of GHG inventories in the country, consistency of reported GHG flows and quality of results. SNICHILE permanent work is divided into five lines of action:

- Operation SNICHILE
- Update INGEI Chile
- Assurance system and quality control
- Creation and maintenance of skills
- Archiving and Communication

The INGEI is prepared following the 2006 IPCC Guidelines for national inventories of greenhouse gases, where the economic sectors of a country are grouped into five sectors that share characteristics relating to the processes that generate GHG emissions or removals. These sectors are Energy; industrial processes and product use (IPPU); Farming; Land use, changes in land use and forestry (LULUCF) and waste.

The INGEI Chile covers the whole national territory and includes emission and removal of carbon dioxide (CO₂) and methane emissions (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulfur hexafluoride (SF₆) in a time series from 1990 to 2016. the results of GHG estimates are presented in kilotons (kt) and refer to 2016,

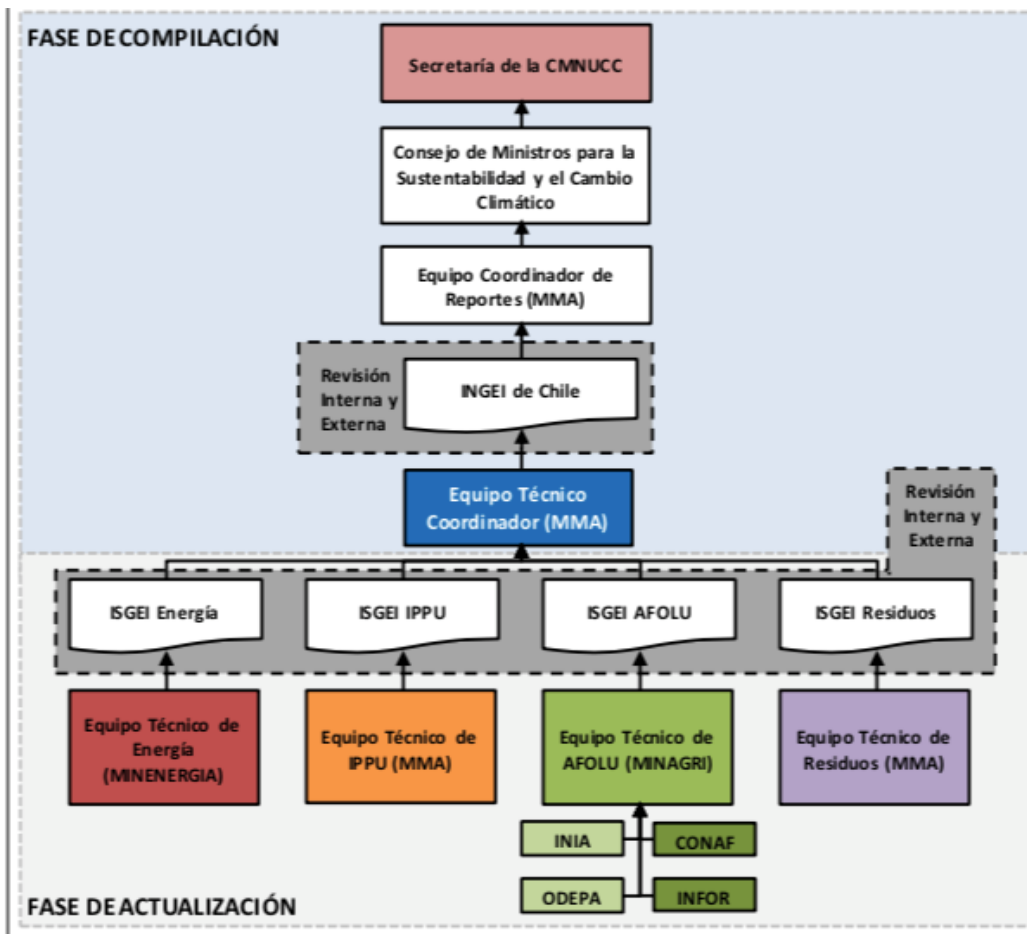
The SNICHILE maintains a consistent work plan for a two-year activity cycle. During the first year of the cycle sectoral GHG inventories (ISGEI) by Sector Technical Teams are updated, while in the second year ISGEI are compiled and cross-cutting themes are developed INGEI of Chile by the Technical Team Coordinator.

In the Figure 9.1The flow chart shown SNICHILE. As indicated, the Energy ISGEI is updated by the Division of Foresight Energy Policy and Energy Ministry; the ISGEI of industrial processes and product use (IPPU) updated by OCC of MMA; the ISGEI of Agriculture is updated by the Ministry of Agriculture through the Agricultural Research Institute; the ISGEI LULUCF is updated by the Ministry of Agriculture through the Forestry Institute (INFOR) and the National Forestry Corporation (CONAF); Waste and ISGEI was updated by the Office of circular economy legislative implementation and in collaboration with the Department of Climate Change, both of MMA. Once the upgrade process is completed,

The methodology for unbundling the last INGEI of Chile was to identify proxies (proxy) emissions or removals of GHG Energy, IPPU and waste sectors, which were already regionalized and had a

strong correlation with the source or sink GEI. These proxies proceeded to disaggregate national emissions and removals of GHG in 15 administrative regions (the region of Dims added yet since this was created after 2016). A table detailing the proxy used and their sources is found as Appendix 1 hereto. The GHG emissions and removals from LULUCF and Agriculture sectors are estimated at the regional level by the Task sector, so it was not necessary to disaggregate during this process and is only required to compile regional level.

Figure 9.1 Institutional arrangements SNICHILE.



Source: Third National Communication on Climate Change Chile.