Regional Collaboration Centre – Panama
Promoting Action Against Climate Change

Analysis of the existing institutional, political, legal, technological framework for the development of a national GHG emissions registry and CO2-eq mitigation actions

Collaborative Instruments for Ambitious Climate Action initiative (CIACA)

The Regional Collaboration Center Panama (RCC Panama) is operated by the secretariat of the United Nations Framework Convention on Climate Change (UNFCCC) in collaboration with CAF-Development Bank of Latin America. The RCC Panama promotes of Clean Development Mechanism and support to Latin American countries for the implementation of Paris Agreement.

The Collaborative Instruments for Ambitious Climate Action initiative ("CIACA") which is being implemented through the RCCs with the purpose to support countries in the identification and adoption of carbon pricing instruments, for Latin-American

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The contributions of the RCC Panama may contain advice, opinions and statements from various suppliers of information the findings, interpretations and conclusions expressed herein do not necessarily reflect the views of RCC Panama. The Executive Summary and Analysis are provided in English and Spanish version for facilitation.

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EXECUTIVE SUMMARY

The UNFCCC Regional Collaboration Centre Panama (RCC Panama) implements the Collaborative Instruments for Ambitious Climate Actions (CIACA) to assist Panama in the development of carbon pricing approaches. The RCC assistance to Panama consists of i) identification of available options for development of instruments of carbon pricing adapted to Panama's needs, ii) elaboration of concrete proposals, iii) adopting the instruments on a national level and iv) implementation of the instruments.

In this framework, together with the Ministry of Environment, the consultancy "Analysis of the existing institutional, political, legal, technological framework for the development of a national GHG emissions registry and CO_2-eq mitigation activities" was executed, as a first diagnosis of the different aspects related to GHG emissions. The scope of the consultancy included an analysis of the national context, the legal and technological framework for the implementation of an emissions registry and CO_2-eq mitigation actions, relevant national policies, GHG inventories elaborated, mitigation mechanisms implemented and under development, relevant environmental regulation instruments, main governmental actors, as well as the national decision-making process.

Political Framework and Policies:

The political framework in which MiAmbiente is the focal point for climate change and leading the national initiatives together with other ministries and governmental institutions is in place and considered adequate. Climate change issues are discussed within the national commission on climate change (CONACCP) which advises and coordinates with MiAmbiente. The CONACCP is well represented by all institutions related to climate change, especially after the 2013 modification of its composition. A new revision and modification of CONACCP is foreseen to include civil society and private enterprise counsels, which is strongly recommended.

The national climate change policy approved in 2007, has become out of date and a new policy is under development. All other existing strategies, plans or programs are still under development and not in place yet. The REDD+ strategy together with the Alliance for the Million developed by MiAmbiente is in a very advanced phase however, and recently the Ministry of Agricultural Development published its climate change plan as a first step. Only the national energy plan 2015 – 2050 of the Secretary of Energy is approved and in execution, however big private investments in LNG for energy purposes is causing a diversion of the ambitious alternative scenario, which is followed by government and where large scale up of solar and wind energy is needed and planned. Private investments in the latter technologies could fall behind because of a (future) strong participation of natural gas in the electricity matrix of Panama and its energy demand in general which would also affect the NDC goals presented by Panama.

GHG Inventories, Main sectors, Mitigation Programs:

From the most recent inventory reports it can be concluded, that national GHG emissions in Panama are on the rise and that the intended national strategy to develop a low carbon economy is very much needed. The first biannual update report (BUR1) with reference year 2013 demonstrates that the AFOLU sector has turned from a net sink of GHG to a net emitter of GHG. Total GHG emissions are 15876 Gg CO_2-eq. including the absorptions by the AFOLU sector. Improvements in data quality, transparency and integrity can be made, which makes a national emission and mitigation registry of GHG very relevant.

The 5 main subsectors of GHG emissions are i) deforestation, ii) transport, iii) enteric fermentation, iv) fossil fuel power plants, and v) industry (heat boilers), respectively. The National Climate Change Strategy and its plans and programs under development: REDD+, Alliance for the Million, Program for Urban Sustainable Mobility represent most of the priority GHG emission sectors and national priorities are in line with these mitigation actions.

Mitigation programs and projects include the REDD+, the national sustainable mobility program (NAMA) and CDM. The mitigation programs include deforestation, transport and fossil fuel power plants emissions. Other NAMAs do include enteric fermentation emissions, amongst other agricultural emissions, and industry emissions, but are still in its idea phase.

Main Governmental Actors:

The availability of GHG emissions and mitigation data within the main governmental actors can be improved significantly, which makes the national registry on GHG emissions very relevant to dispose of integral, reliable, precise and comparable data in the future. Six main governmental actors related to climate change are: i) Ministry of Environment (MiAmbiente), ii) Secretary of Energy (SNE), iii) Ministry of Agricultural Development (MIDA), iv) Civil Aviation Authority (AAC), v) Panama Maritime Authority (AMP), and vi) Panama Canal Authority (ACP). However, at least 15 governmental actors are related to climate change. The national commission on climate change (CONACCP) includes even 27 governmental institutions, which shows a very broad distribution of responsibilities and/or competences in governmental institutions. Therefore, it is considered of primordial importance that MiAmbiente takes a strong lead, that should be backed up by the entire cabinet led by the president of the Republic of Panama.

MiAmbiente as the focal point for the UNFCCC is, and should be, the leading authority on climate change issues. Both within the governmental structure as towards the private sector and society as a whole. MiAmbiente is taking on this responsibility and is actively working on the implementation of a national GHG emissions registry and mitigation actions. A lot of work has to be done still, and MiAmbiente is fully aware of this. Improvement of technical capacity in human resources and infrastructure is very much needed, within MiAmbiente as well as in all other governmental institutions and private companies, maybe with exception of the ACP who is very advanced in the measurement, reporting and verification of its GHG emissions and its mitigation actions. A leading role of MiAmbiente for awareness and capacity building is needed, not in the least to be able to

create a broad support basis with the main stakeholders for implementation of, and actions needed for, a national registry and future carbon pricing. With regard to the actions needed, the current absence of specific GHG emissions data per company, project or activity, and more importantly, how to measure, report and verify those emissions (and mitigation actions) is considered the first priority needed for improvement. There do not exist clear rules on Measurement, Reporting and Verification, and those should be agreed upon and established together with the main stakeholders.

Technological and Legal Framework:

There is no law on climate change specifically, that establishes goals, (incentive) programs, national GHG emissions registry, mitigation actions, measurement, reporting and verification (MRV) programs. Such a law would be necessary in medium term when GHG emissions will have to be reported mandatory to the national emissions registry. For implementation of a voluntary reporting scheme of national GHG emissions registry, such a law is not required. Several laws and executive decrees, that are regulating air pollution could offer the possibility of modification to regulate CO_2 emissions per km for example for mobile sources and include mandatory measurement and reporting of GHG emissions of the transport sector, as one of the main GHG emitters.

It should be mentioned that a great amount of activity data from the energy sector is available at SNE, which is obtained by mandatory information reported by each market agent. Improvements can still be made; however, the energy sector seems adequately organized to be able to report GHG emissions to a future registry. Although direct GHG emissions are not reported at this moment, including GHG emissions reporting would be relatively easy in the current legal framework of the energy sector.

With respect to the technological framework, MiAmbiente is in its initial phase of building a national platform on climate transparency, including the National Registry of GHG emissions and Mitigation Actions. Currently, MiAmbiente does not have any infrastructure or databases on emissions data yet, except for the forestry sector (REDD+). Infrastructure and human resources within the SNE are available but limited and some databases / platforms are saturated and out of date. Improvements are planned to modernize the platforms and databases.

Also, MIDA is gathering activity data on the agriculture sector, however here more improvements are considered necessary, as weaknesses are considered to be present in data recollection, consolidation, processing and analysis. AAC and ACP seem quite advanced in gathering activity data, where ACP already has its GHG emissions reported on a monthly basis. AMP possesses data with activity data from the national and international maritime activity, however no detailed information could be gathered on the data available.

National Decision-Making Process:

Approval of national laws is competence of the national parliament, although preparation and elaboration can be initiated from government and civil society as well. For a future law on climate

change discussion and approval by national parliament is compulsory. This can be a long process in which changes or modifications can be included in the final approved law, which were not intended in the original law proposal. If a broad support can be gained at all levels of society, political and private institutions, approval might be achieved easier and more importantly, essence and spirit of the climate law might be conserved during the discussions in parliament.

However, a more direct implementation of an obligatory reporting of GHG emissions for the registry can be achieved also by modification of already existing resolutions or decrees, for example on mobile and stationary emissions, to include mandatory reporting on GHG emissions of private companies and institutions. Therefore, only governmental approval is needed, mainly by the minister of the corresponding ministry that has the competence of the matter. For voluntary reporting of GHG emissions no modifications of legal norms are necessary.

Environmental Regulation Instruments:

Through existing environmental regulations, the main national sources of GHG emissions such as the AFOLU and energy sector (both electricity generation and transport) have data available on producers' level obtained both mandatory as voluntarily. These two sectors account for the vast majority of national GHG emissions. Data on industry and waste sectors are more difficult to obtain, however existing regulations such as the EIS and AA/PAMA reports do generate data on these sectors. Evaluation of the data available should be done to determine if useful GHG activity data can be obtained from these databases, managed within MiAmbiente.

The preliminary design of the national climate transparency platform contemplates that companies/projects/activities will voluntarily report their GHG emissions (according to a standard methodology) on an annual basis. MiAmbiente will verify and register reported data and elaborate tendential base lines. Therefore, most data available through current environmental regulations as activity data within the respective governmental institutions can be used as a verification method for the voluntarily reports of GHG emissions of companies/projects/activities. For mandatory reports from the different sectors, modifications of existing environmental regulations might be a short-term solution to gather GHG emission data, without having to elaborate a climate change law. A comprehensive climate change law is recommended in the mid-term to regulate in an integral way all aspects related to climate change.

Development of a national GHG emission and mitigation action registry and its implication on carbon pricing instruments.

Considering the country context as described in the previous analysis, it can be foreseen that the development of a national registry of GHG emissions and mitigation actions would be of a voluntary nature as starting point, since currently there is not a law/regulation that requires reporting of GHG. The voluntary national registry would serve as a portal to hold information on national emissions, as well as the mitigation actions taking place in Panama, it will help to put an adequate price on

carbon and will lay the foundations for Panama to implement measures for the commercialization of emissions or create a carbon tax.

RESUMEN EJECUTIVO

El Centro Regional de Colaboración Convención Panamá (CRC Panamá) de la Convención Marco de las Naciones Unidas para el Cambio Climático (CMNUCC) implementa las acciones climáticas ambiciosas (CIACA) para ayudar a Panamá en el desarrollo de los mecanismos para la fijación de precios al carbono. La asistencia de la CRC Panamá consiste en i) identificación de las opciones disponibles para el desarrollo de instrumentos de precios al carbono adaptado a Panamá, ii) elaboración de propuestas concretas, iii) la adopción de los instrumentos a nivel nacional y iv) aplicación de los instrumentos.

En este marco, junto con el Ministerio de Ambiente, la consultoría "DIAGNÓSTICO DE LOS SECTORES ECONÓMICOS, MARCO INSTITUCIONAL, POLÍTICO, LEGAL Y TECNOLÓGICO PARA EL DESARROLLO DE UN REGISTRO NACIONAL SOBRE EMISIONES Y ACTIVIDADES DE MITIGACIÓN DE CO_2-EQ. EN LA REPÚBLICA DE PANAMÁ" fue ejecutado, como un primer diagnóstico de los diferentes aspectos relacionados con las emisiones de GEI. La consultoría incluyó un análisis del contexto nacional, el marco legal y tecnológico para la implementación de un registro de emisiones y acciones de mitigación de CO_2-eq, las políticas nacionales pertinentes, los inventarios de GEI elaborados, mecanismos de mitigación, instrumentos de regulación ambiental, principales actores gubernamentales, así como el proceso nacional de toma de decisiones.

Marco político:

El marco político donde MiAmbiente es el punto focal de cambio climático y liderando las iniciativas nacionales junto con otros ministerios e instituciones gubernamentales es considerado adecuado. El cambio climático se discute en la Comisión Nacional sobre el Cambio Climático de Panamá (CONACCP) que asesora y coordina con MiAmbiente. El CONACCP está bien representado por todas las instituciones relacionadas con el cambio climático, especialmente después de la modificación del 2013 de su composición. Una nueva revisión y modificación del CONACCP está previsto para incluir a la sociedad civil y los consejos de empresa privada, la cual es recomendada.

La política de cambio climático aprobada en el 2007, se ha convertido obsoleto y una nueva política está en desarrollo. Todas las existentes estrategias, planes o programas están todavía en desarrollo, aunque la estrategia REDD + en conjunto con la Alianza para el Millon de Hectáreas desarrollado por MiAmbiente está en una fase muy avanzada, y el Ministerio de Desarrollo Agropecuario (MIDA) ha publicado recientemente su plan para el cambio climático. Sólo el Plan Energético Nacional 2015 – 2050 de la Secretaria de Energía está aprobado y en ejecución, sin embargo, grandes inversiones privadas en LNG para fines energéticos está causando una desviación del ambicioso escenario alternativo, lo cual es promovido por el gobierno y en lo cual un gran crecimiento de la energía solar y eólica es necesario y previsto. La inversión privada en estas últimas tecnologías podría caer debido a una fuerte (futura) participación de gas natural en la matriz eléctrica de Panamá, que también afectaría los objetivos de la NDC presentados por Panamá.

Inventarios Nacionales de GEI, Principales Sectores y Programas de Mitigación:

Los últimos informes nacionales de inventarios de GEI indican, que las emisiones nacionales de GEI en Panamá van en aumento y por lo tanto la estrategia nacional prevista para desarrollar una economía baja en carbono es muy necesitada. El primer informe de actualización bienal (BUR1) de 2013 muestra que el sector AFOLU se ha convertido de un sumidero neto de GEI a un emisor neto de GEI. El total de emisiones de GEI es 15 876 Gg CO_2-eq., incluyendo las absorciones por parte del sector AFOLU. Mejoras en la calidad de los datos, la transparencia y la integridad son requeridos, lo que hace un registro nacional de emisiones y mitigación de GEI muy relevante.

Los 5 principales subsectores de las emisiones de GEI son i) deforestación, ii) transporte, iii) fermentación entérica, iv) termoeléctricas y v) industria (calderas), respectivamente. La estrategia nacional de cambio climático y sus planes y programas en desarrollo: REDD +, Alianza para el Millón, Programa Integral de Movilidad Urbana Sostenible (PIMUS) representa a la mayor parte de los sectores prioritarios de emisión de GEI y a las acciones de mitigación responden a las prioridades nacionales establecidas.

Otros proyectos y programas de mitigación incluyen NAMAs y NDC. En estos programas de mitigación se incluyen la deforestación, el transporte y las emisiones de termoeléctricas. Otros NAMAs incluyen las emisiones de la fermentación entérica, entre otras emisiones agrícolas y las emisiones de la industria, pero estos están todavía en su fase de idea.

Principales Actores Gubernamentales:

La disponibilidad de datos en los principales actores gubernamentales sobre las emisiones de GEI y medidas de mitigación puede mejorarse significativamente, que hace el registro nacional de emisiones de GEI muy relevante para disponer en el futuro de datos de manera integral, confiable, preciso y comparable. Los seis principales actores gubernamentales relacionados con el cambio climático entrevistados son: i) Ministerio de Ambiente (MiAmbiente) ii) Secretaria Nacional de Energía (SNE), iii) Ministerio de Desarrollo Agropecuario (MIDA), iv) Autoridad de Aviación Civil (AAC), v) Autoridad Marítima de Panamá (AMP) y vi) Autoridad del Canal de Panamá (ACP). Sin embargo, por lo menos 15 instituciones gubernamentales se relacionan con el cambio climático. La Comisión Nacional sobre el Cambio Climático (CONACCP) incluye incluso 27 instituciones gubernamentales, que demuestra una distribución muy amplia de responsabilidades y competencias en las instituciones gubernamentales. Por lo tanto, se considera de primordial importancia que MiAmbiente toma el liderazgo, que debe ser respaldada por todo el gabinete dirigido por el presidente de la República de Panamá,

MiAmbiente como punto focal ante la CMNUCC es la principal autoridad en temas del cambio climático en Panamá. Esto aplica tanto dentro de la estructura gubernamental como hacia el sector privado y la sociedad en su conjunto. MiAmbiente está asumiendo esta responsabilidad y está trabajando activamente en la implementación de un registro de emisiones GEI y medidas de mitigación. Mucho trabajo falta por hacer todavía, y MiAmbiente es plenamente consciente de ello. Fortalecimiento de la capacidad técnica de recursos humanos y la infraestructura es muy necesaria,

dentro de MiAmbiente así como en otras instituciones gubernamentales y empresas privadas, tal vez con la excepción de la ACP, que está muy avanzado en la medición, reporte y verificación de sus emisiones de GEI y las acciones de mitigación.

Protagonismo de MiAmbiente para la concientización y creación de capacidades es necesaria, para ser capaces de crear una base de apoyo de los principales actores para la implementación de un registro nacional de GEI y un futuro precio al carbono. Con respecto a las acciones necesarios, la ausencia actual de datos específicos de las emisiones de GEI por empresa, proyecto o actividad, y más importante aún, cómo medir, reportar y verificar las emisiones (y acciones de mitigación) se considera la primera prioridad para lograr una mejora. No existen reglas claras sobre medición, reporte y verificación, y estas deben ser acordados y establecidos junto con los principales actores.

Marco Tecnológico y Legal:

No existe una ley sobre cambio climático, que establece objetivos, programas de incentivos, registro nacional de emisiones de GEI, acciones de mitigación, medición, reporte y verificación (MRV). Dicha ley sería necesaria en el mediano plazo, cuando las emisiones de GEI debe ser reportado obligatoriamente. Para la aplicación de un régimen voluntario de presentación de reportes o datos al registro nacional de emisiones de GEI, dicha ley no es necesaria. Varias leyes y decretos ejecutivos, que regulan la contaminación atmosférica podrían ofrecer la posibilidad de modificación para regular las emisiones de CO_2 por kilómetro por ejemplo e incluir una obligatoria medición y reporte de emisiones de GEI del sector transporte, que es uno de los principales emisores.

Cabe mencionar que existe una gran cantidad de datos de actividad del sector energético en el SNE, que se obtiene mediante la obligatoria información reportada por cada agente del mercado. Todavía pueden introducirse mejoras; sin embargo, el sector energético parece adecuadamente organizado para reportar las emisiones de GEI a un futuro registro. Aunque no se reportan las emisiones directas de GEI en este momento, la inclusión de las emisiones GEI sería relativamente fácil dentro del actual marco jurídico del sector energético.

Con respecto al marco tecnológico, MiAmbiente está en su fase inicial de la construcción de una plataforma nacional de transparencia climática, incluyendo el registro nacional de GEI y acciones de mitigación. Actualmente, MiAmbiente no tiene ninguna infraestructura o bases de datos sobre emisiones, excepto para el sector forestal (REDD +). Infraestructura y recursos humanos dentro de la SNE están disponibles, pero son limitados y algunas bases de datos / plataformas están saturados y antiguas. Mejoras están previstas para modernizar las plataformas y bases de datos.

También, MIDA está reuniendo datos de actividad en el sector agropecuaria, sin embargo, aquí mejoras se consideran necesarios, ya que debilidades en el análisis, consolidación, procesamiento y recolección de datos están presentes. AAC y ACP parecen bastante avanzado en la recopilación de datos de actividad, donde la ACP ya mide sus emisiones de GEI de manera mensual. LA AMP posee

datos de actividad de la actividad marítima nacional e internacional, sin embargo, no toda la información se ha podido recogerse.

Proceso Nacional de Toma de Decisiones:

Aprobación de las leyes nacionales es competencia de la Asamblea Nacional, aunque la preparación y elaboración pueden iniciarse desde el gobierno o la sociedad civil. Para una futura ley sobre el cambio climático, la discusión y aprobación por la Asamblea es obligatoria. Esto puede ser un largo proceso, donde cambios o modificaciones pueden incluirse en la ley final aprobada, que no fueron intencionados en el proyecto de ley. Si se logra un amplio respaldo en todos niveles de la sociedad, las instituciones políticas y privadas, una aprobación podría lograrse más fácil y más importante aún; la esencia y el espíritu de la ley de cambio climático se conserva.

Sin embargo, la aplicación de un reporte obligatorio de emisiones de GEI para el registro nacional, se puede alcanzar mediante la modificación de resoluciones o decretos ya existentes, por ejemplo, las de emisiones de fuentes móviles y fijas. Por ello, se necesita sólo de una aprobación ministerial. Para un reporte voluntaria de las emisiones de GEI, modificaciones de las normas jurídicas no son necesarias.

Instrumentos de Gestión Ambiental:

A través de las regulaciones ambientales existentes, las principales fuentes de emisiones de GEI, como el sector AFOLU y energía (generación de electricidad y transporte) tienen datos disponibles a nivel empresarial que son obtenidos tanto obligatoria como voluntariamente. Estos dos sectores representan la gran mayoría de emisiones nacionales de GEI. Datos sobre emisiones de los sectores industrial y de residuos son más difíciles de obtener, sin embargo, existen regulaciones como los informes de EIA y AA/PAMA que generan datos sobre estos sectores. Se debe realizar una evaluación de los datos disponibles en estas bases de datos administrados por MiAmbiente, para determinar si pueden ser útiles para el registro nacional.

The preliminary design of the national climate transparency platform contemplates that companies/projects/activities will voluntarily report their GHG emissions (according to a standard methodology) on an annual basis. MiAmbiente will verify and register reported data and elaborate tendential base lines. Therefore, most data available through current environmental regulations as activity data within the respective governmental institutions can be used as a verification method for the voluntarily reports of GHG emissions of companies/projects/activities. For mandatory reports from the different sectors, modifications of existing environmental regulations might be a short-term solution to gather GHG emission data, without having to elaborate a climate change law. A comprehensive climate change law is recommended in the mid-term to regulate in an integral way all aspects related to climate change.

El diseño preliminar de la plataforma nacional de transparencia climática contempla que las empresas/proyectos/actividades reportarán voluntariamente sus emisiones de GEI (según una metodología estándar) anualmente. MiAmbiente verificará y registrará los datos y elaborará líneas

tendenciales. Por lo tanto, la mayoría de los datos disponibles que manejan las respectivas instituciones gubernamentales puede ser utilizada como un método de verificación de los datos reportados. Para informes obligatorios de los distintos sectores, modificaciones de la normativa ambiental vigente podrían ser una solución a corto plazo para recopilar datos de emisiones de GEI, sin tener que elaborar una ley de cambio climático. Una ley de cambio climático se recomienda a mediano plazo para regular de manera integral todos los aspectos relacionados al cambio climático.

1. Introduction

The UNFCCC Regional Collaboration Centre Panama (RCC Panama) supports national climate action through capacity-building, technical assistance and strategic networking in close collaboration with its prominent partner the Development Bank of Latin America (CAF). Since adoption of the Paris Climate Change Agreement in December 2015, the RCCs have had the broader task of supporting implementation of countries' Nationally Determined Contributions (NDC), with a particular focus on markets and mechanisms. The Collaborative Instruments for Ambitious Climate Actions (CIACA) aims to assist countries like Panama in the development of carbon pricing approaches for this implementation of their NDCs and foster cooperation.

The RCC assistance to Panama consists of i) identification of available options for development of instruments of carbon pricing adapted to Panama's needs, ii) elaboration of concrete proposals, iii) adopting the instruments on a national level and iv) implementation of the instruments.

In this framework, together with the Ministry of Environment, the consultancy "Analysis of the existing institutional, political, legal, technological framework for the development of a national GHG emissions registry and CO_2-eq mitigation activities" is executed. The scope of the consultancy included an analysis of the national context, the legal and technological framework for the implementation of an emissions registry and CO_2-eq mitigation actions. Equally, national objectives and priorities and relevant national policies (current or planned) were mapped. Also, the inventoried greenhouse gases and the mitigation mechanisms were considered, the priority sectors that emit GHGs, the different environmental regulation instruments, the main governmental actors in the matter and compilation of their points of view are described, as well as the national decision-making process.

This final report contains the analysis of gathered information on the above-mentioned issues, including recommendations on implementation of a national GHG emission registry as a first required step to be able to implement a mechanism for carbon pricing.

2. National Context

The Republic of Panama, located in the Central American region, has a total area of 75,031 km^2. The country is divided in 10 provinces, 77 districts and 5 indigenous counties. According to the 2010 population census, the country has a population of 3,405,813 inhabitants. The Gross Domestic Product (GDP) of Panama represents 62,284 million USD (2017) with a growth rate of 5.3%. Panama is one of the fastest growing countries on the American continent. Although energy consumption has grown together with GDP, the energy intensity has fallen in the last decade as is shown in Figure 1.

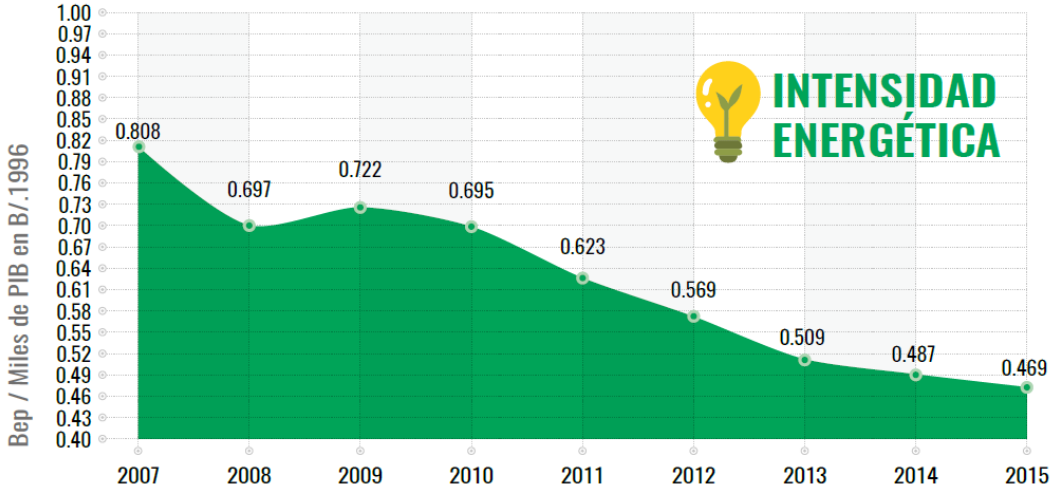

Figure 1: Energy intensity 2007 - 2015

Because of its size and relatively small population, Panama is responsible of only 0,02% of global GHG emissions (excluding AFOLU), although without any strong mitigation actions, emissions may rise substantially in the next decades. Also, the emissions per capita are low in comparison with the average of other regions in the world, only to be overcome by Africa. However, the country is extremely vulnerable to climate change effects. Adaptation to climate change is therefore an important issue in climate change policies. Panama recognizes climate change as an important global threat and recognizes its common responsibility, but differentiated in its participation to stabilize GHG levels in the atmosphere, as was expressed in Law # 8 of 2015 that created the Ministry of Environment.

In the first semester of 2018 the total installed capacity for electricity generation was composed of 53% hydro, 8% wind, 3% solar power (totaling 64% renewable energy) and 36% thermal power (oil products and coal). The installed renewable energy capacity generated around 75% of all electricity in the country (figure 2).

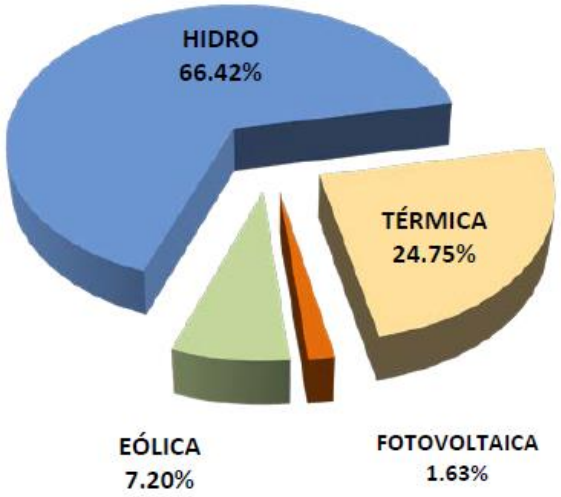

Figure 2: Composition electricity generation I semester 2018

However, in terms of primary energy supply, roughly two-thirds consists of fossil fuels as the country's transport sector has until recently relied almost entirely on oil and oil products. With the successful implementation of Line 1 of Metro Panama and Line 2 to near completion, the electrification of Panama's transportation sector has begun. Plans for Line 3 and 4 of Metro Panama are in place and a feasibility study of an electric train to the western province Chiriquí is underway.

In terms of mitigation actions, Panama is part of the Kyoto Protocol since 1998 and has promoted different projects, to benefit from the Clean Development Mechanism, and as a result, currently has 23 projects registered in the UNFCCC. Also, Panama has developed a portfolio of 12 proposals as Nationally Appropriate Mitigation Actions (NAMAs).

Within the framework of the Paris Agreement, the Ministry of Environment has identified two main priority sectors, energy and AFOLU, under the Nationally Determined Contributions (NDCs), to achieve significant emission reductions.

Panama is in an advanced process of national preparation to implement a national strategy to reduce emissions from deforestation and forest degradation (REDD+). Currently, it is in the final phase of construction of the four pillars of REDD+ which includes: a) construction of forest reference levels, b) construction of the national forest monitoring system, c) construction of the national system of safeguards; and d) preparation of the national REDD+ strategy.

3. Political Framework, Policies, National Priorities and Objectives

The Ministry of Environment (MiAmbiente), is the focal point before the UNFCCC since 1995, through the Department of Climate Change. Law # 41 of 1998 establishes the administrative organization in the field of environmental management which is composed of:

- The Interinstitutional Environmental System (SIA): Coordinating role within all governmental institutions with environmental competence (*the national council on the environment (CNA) was eliminated through Law # 8)*;
- MiAmbiente: Executive, coordinating and technical entity, establishes proposals for environmental policies, responsible for implementation, control and inspection, and monitoring of compliance of legal framework;
- National, Provincial, District and County/Local consultation commissions: Political, strategic and supervising entities, each on its correspondent level, to assure citizen participation.

These three entities form part of the Interinstitutional Environmental System (SIA), which is conformed of the sectorial public institutions with environmental competence (Figure 3). Part of the obligations of SIA is to establish the necessary mechanisms to assure that environmental issues are addressed in an integral way on a national level.

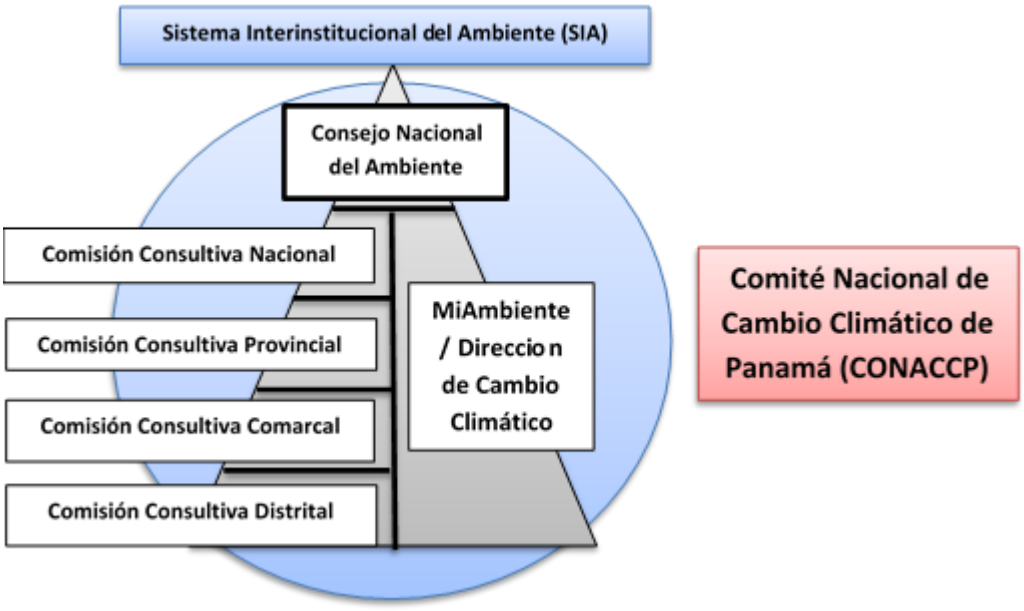

Figure 3: Institutional Framework of Environmental Competence and Climate Change in Panama

The national climate change policy was defined in 2007, together with its principles, objectives and action lines. Although the policy resulted in the inclusion of climate change in the national environmental strategy 2008 - 2012, where it was recognized as an exceptional global and national

challenge and 13 action lines were defined, the policy was not implemented because of change in governmental power. Currently a proposal to modify the climate change policy is discussed within the Ministry of Environment to update it according to the new international and national developments.

As Figure 3 shows, a special national commission on climate change (CONACCP) was formed, to advise MiAmbiente on implementation of climate change policy. This commission was established in 2009 and modified in 2013, to add more institutions related to climate change. A new revision and modification of the Executive Decree is foreseen to include civil society and private enterprise counsels, for one of the goals of CONACCP is to create mechanisms of coordination between civil society and the public sector in order to contribute jointly compliance of international agreements by Panama.

The Strategic Government Plan 2014 – 2019 (PEG 2014) included climate change in one of its priority action lines with 4 sectorial actions defined; Energy, Urban Mobility, Water and Sanitation and Residential. Part of PEG 2014 is to develop a national strategy on climate change. This strategy is under development, but a draft version reveals that both vision and goal of the strategy is to impulse transition to a low carbon economy. Within the strategy, three plans have been developed: adaptation, capacity development/technology transfer and low carbon economy (Figure 4). Strategic lines within the low carbon economy plan are low carbon energy, clean transport, REDD+, national carbon market and eco state, with 4 priority sectors for mitigation: Energy, Agriculture, Forestry/Land Use and Government (Figure 5).

Within the energy sector a national program for urban mobility has been elaborated, as well as a national energy program, that consists of the national energy plan 2015 – 2050 developed by the Secretary of Energy. The urban mobility program was developed also as one of the 11 NAMAs, and is one of its most advanced in its development/implementation. Within the forestry and land use sector, a REDD+ program was elaborated. Apart from the REDD+ program, a public-private alliance was established that aims reforesting one million hectares in 20 years (“Alianza por el Million de Hectareas”) as from 2015. Together with the REDD+ strategy the goal is to recover the forest coverage to 46.2% of national territory. Also, a program for a green government is under development. A program for agriculture is not included in the draft strategy yet, however the Ministry for Agricultural Development (MIDA) recently finished its Climate Change Plan for the agricultural sector.

Last but not least, a program for a national carbon market is being developed, which is of special interest within the scope of this report.

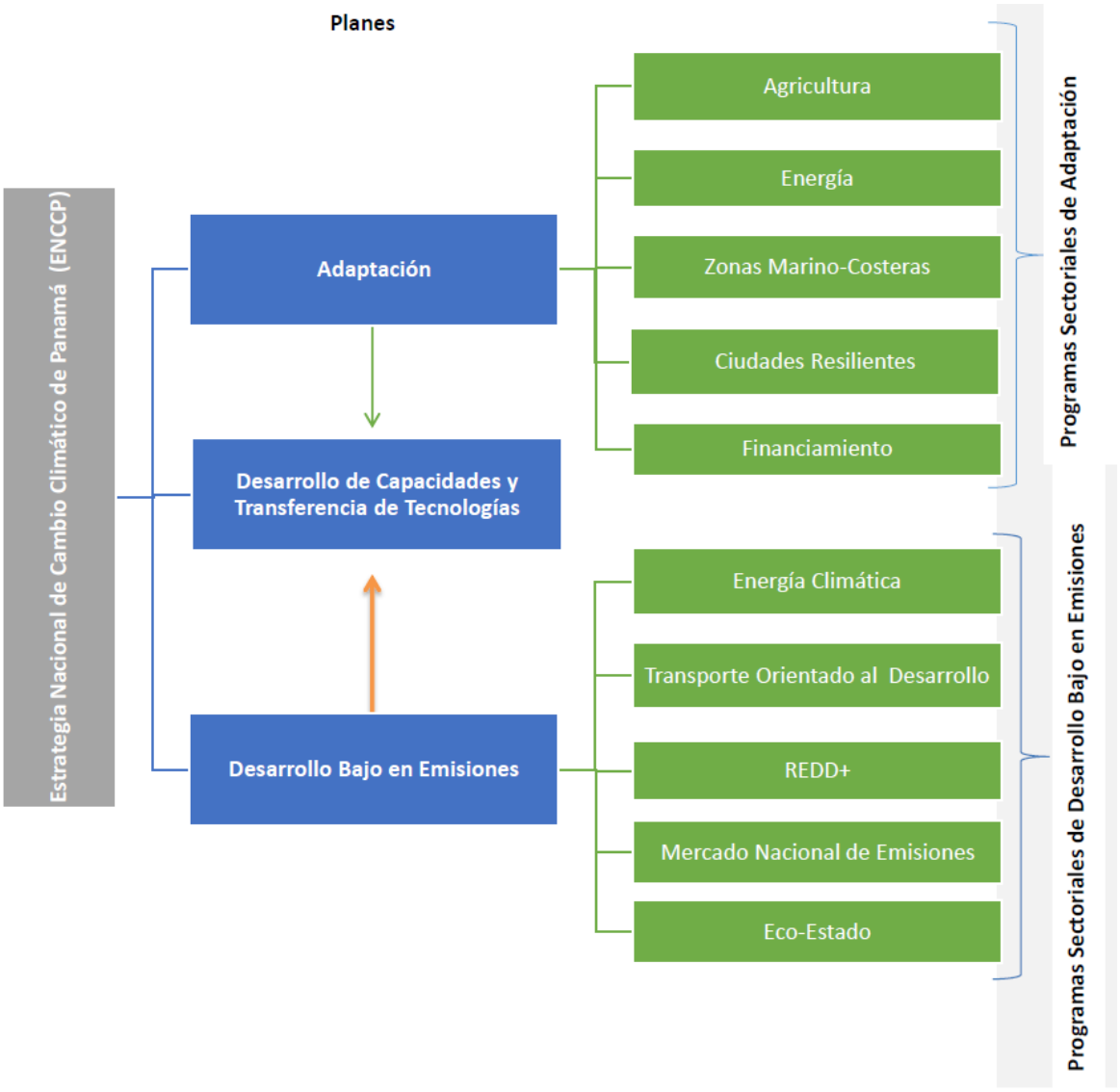

Figure 4: Schematic structure of national strategy on climate change (draft version)

Figure 5: Priority sectors for mitigation (draft version)

Below some of the most important policies and programs on climate change are summarized:

3.1 National Energy Plan 2015 – 2050

The National Energy Plan 2015 – 2050 (PEN 2015 – 2050), developed by the Secretary of Energy (SNE), compares a "business-as-usual" reference-case scenario with an alternative, ambitious scenario. The PEN 2015 – 2050 was approved in 2016 and the ambitious alternative scenario suggests that renewable energy could reach 70% of the power supply in the next 35 years. The government indicated that it will adopt this alternative scenario. This scenario favors renewable power generation above oil, coal and natural gas and also contains proposals for energy efficiency and scenarios for reduction of fuel consumption in the transport sector. A short-term operative plan 2015 – 2019 has been elaborated to implement the PEN 2015 – 2050. An updated PEN was presented under the current government in 2017, because of important facts that have changed the national energy panorama. These important facts mainly refer to the large-scale introduction of natural gas (LNG) for power generation and possibly other energy uses. A large thermoelectric LNG plant of 380 MW was taken into operation in 2018 and another LNG plant of 440 MW is planned to be built, which will change the energy matrix in Panama drastically. In 2020 it is expected that more than 20% of the total installed capacity in Panama is natural gas fueled. The updated PEN does not contain a change in energy policy or scenarios, but mainly describes current developments. The projected GHG emissions rise until 2050, although energy intensity per USD falls and participation of renewable power generation rises up to 73.3%. However, transport will still account for 61.9% of total GHG emissions according to the plan.

3.2 Reduction of Emissions from Deforestation and Forest Degradation

Panama is in an advanced process of national preparation to implement a national strategy to reduce emissions from deforestation and forest degradation (REDD+). Currently, it is in the final

phase of construction of the four pillars of REDD+ which includes: a) construction of forest reference levels, b) construction of the national forest monitoring system, c) construction of the national system of safeguards; and d) preparation of the national REDD+ strategy.

The national forest and carbon inventory have finished its pilot phase and in its final phase. The national forest monitoring system has been developed and a complete map of forest coverage and land use for Panama has been approved. Satellite imagery such as Collect Earth, Open Foris and Rapid Eye is used for inventory and monitoring. Its relation with the IPCC scheme of GHG emissions and absorptions is shown in Figure 6.

The levels of reference of forest emissions/absorptions (NREF) have been determined, being 27.7 Mton CO_2-eq. net absorption. This value is based on historic data between 2000 and 2015 and is valid for a five-year period 2016 – 2020.

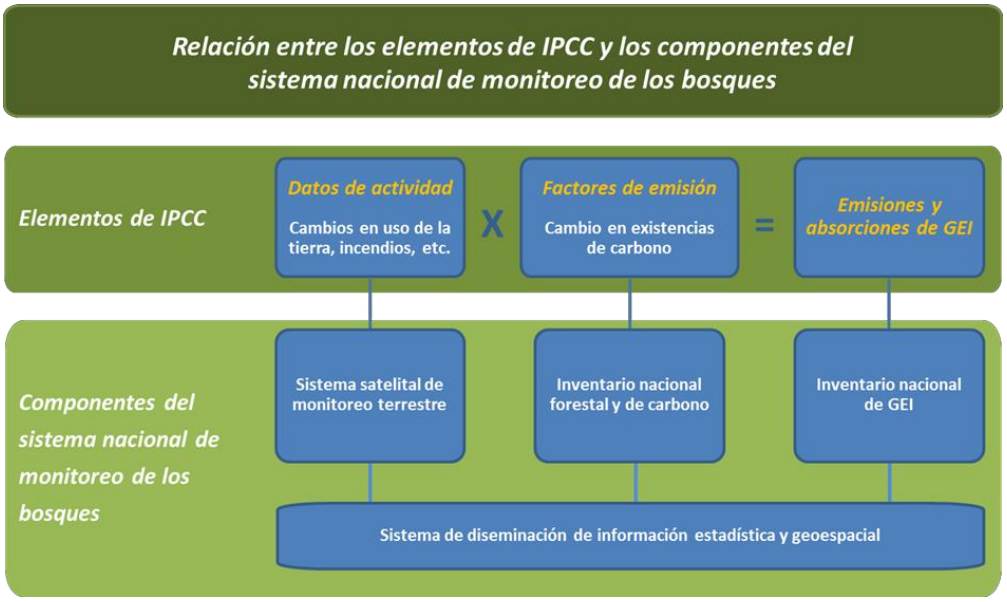

Figure 6: Relation between IPCC elements and national forest monitoring system

Conservation policies of forests and ecosystems have reduced deforestation rate in Panama. In 1990 deforestation rate was around 24 000 ha/year, which has been reduced to around 12 000 ha/year in 2016, according to official data, using the new and better satellite imagery techniques mentioned above. This means that deforestation rate has halved in 26 years. Associated GHG emissions have consequently been reduced from more than 10 Mton CO_2-eq. to 5.4 Mton CO_2-eq. per year.

The REDD+ strategy considers implementation in two scenarios: Conservation of existing forests that act as carbon reserves and reforestation of deforested lands, that can act as carbon sinks. The obtained economic benefits can be used for conservation programs and protection of watersheds and forest plantation either for commercial exploitation or forest conservation of agroforestry. All

initiatives within the REDD+ strategy, form part of the integral watershed management framework. To guarantee transparency of results and impacts of the REDD+ strategy, a measurement, reporting and verification (MRV) system is required and under development (Figure 7).

Figure 7: Scheme of REDD+ strategy

The REDD+ strategy in Panama is directly related to the initiative of the Alliance for a Million Hectares, discussed hereafter.

3.3 Alliance for the Million Hectares

The initiative Alliance for the Million Hectares is a Public Private Partnership that aims to reforest or restore 1 million hectares of forests, corresponding to 13% of national territory. The Alliance will contribute to generation of rural labor, production of raw material for the wood industry, and conserve and restore natural resources that will augment national carbon reserves. The goals of the alliance are: i) reduce deforestation rate and forest degradation, ii) conserve and augment ecosystems in the watersheds, iii) conserve natural forests, iv) restore river beds, biological corridors and buffer zones of protected areas, v) produce raw material of wood, and vi) contribute to climate change adaptation and mitigation (Figure 8).

Figure 8: Objectives Alliance for the Million Hectares

In the framework of the alliance a national forestry strategy 2050 (AXM ENFOR) has been elaborated which is available in draft. AXM ENFOR presents strategic goals, challenges and scenarios from 2018 to 2050. Strategic goals have been elaborated on short term (operative, 2020), medium term (sustainability, 2030) and long term (investments, 2050). The draft version available of AXM ENFOR does not contain many specific and quantified goals and is considered to be in its initial phase.

3.4 National Program Sustainable Urban Mobility

The metropolitan area of Panama constitutes only 5% of the total national territory, but inhabits 46% of the population. Projections for 2035 indicate that the current population of 1.8 million will grow approximately 70%. Another important fact is that 60% of the jobs are situated within the city center. This situation has caused severe congestion problems in Panama City and its surroundings. Besides air pollution issues within the City of Panama, the transport sector in general is one of the main sources of GHG emissions. The national government has developed a program for sustainable urban mobility (PIMUS), which is included in the climate change strategy and has been presented as one of the Nationally Appropriate Mitigation Actions (NAMA). A list of ten (10) lines of action has been developed, within 5 programs (Figure 9).

Figure 9: Programs that compose PIMUS

The key component of PIMUS is the construction of 4 metro lines in the metropolitan area, that was initiated by the Secretary of Metro, established in 2009. Line 1 of the metro system is operative, while line 2 will enter into operation in 2019. A tender for line 3 of the metro, that will connect residential areas outside of Panama City on the western side of the Panama Canal, has been published and plans for line 4 are in place. The metro system of Panama City has started the electrification of public transport in Panama. PIMUS will reduce environmental impact of transport, besides other benefits (Figure 10).

Worth mentioning also, is the recent initiative of the Secretary of Energy to establish a committee to elaborate a national strategy on electric mobility.

Figure 10: Environmental and social benefits of PIMUS

3.5 Climate Change Plan for Agriculture

The Ministry of Agricultural Development (MIDA) is responsible for the development of agriculture and livestock business. As the responsible entity for the policies and planification of both adaptation and mitigation of climate change in the agricultural sector, MIDA has recently developed the national plan for climate change for the agricultural sector (PNCCSA, 2018). The PNCCSA was developed in close collaboration with MiAmbiente and international collaboration entities as shown in figure 11.

Figure 11: Committee of collaboration of the PNCCSA

The PNCCSA has 5 strategic lines, each with its specific objectives and lines of action. It has been consulted and validated with the agricultural sector and is in line with global, regional and national policies related to climate change such as the UNFCCC, Millennium Development Goals (MDG), various regional agreements and national policies (figure 12).

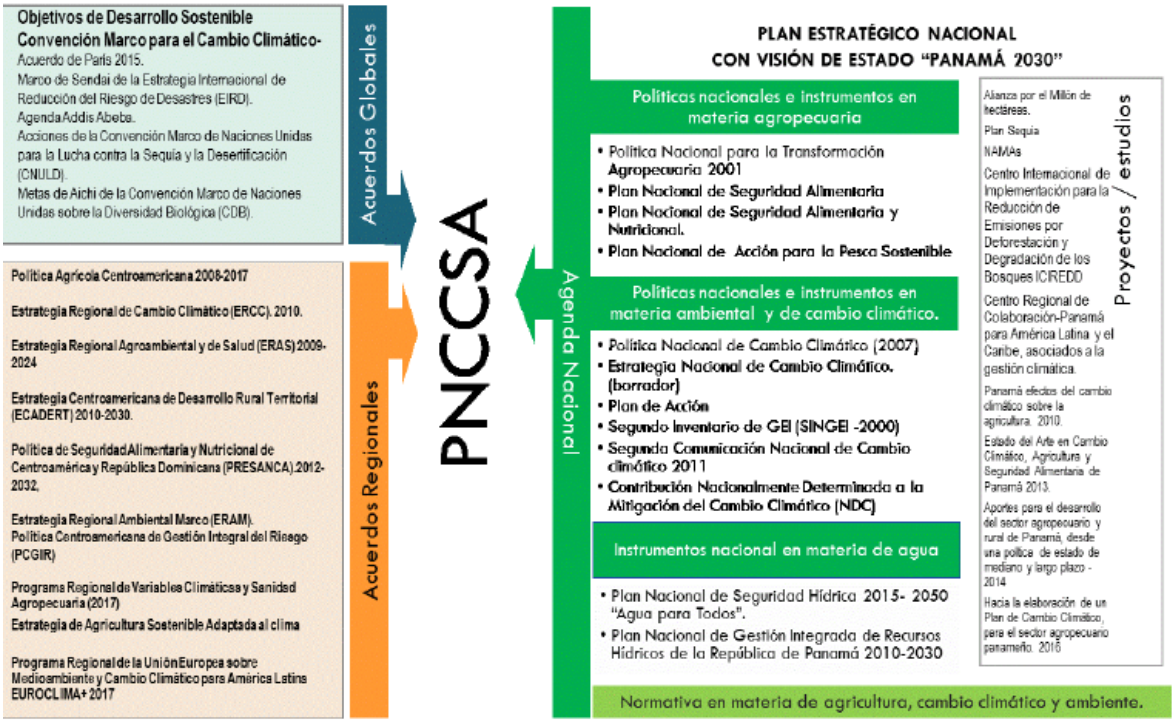

Figure 12: Global, regional and national framework of PNCCSA

In total 15 specific objectives have been defined with a total of 71 lines of action. Implementation of these plans require the promulgation of a legal norm that will result in fulfillment of all its goals, according to the document. For the policy has only recently been developed an internalization process within the ministry of agriculture will be needed to determine the mechanisms that assure implementation of the PNCSSA. No quantifiable goals on emission reductions are present in the document.

3.6 National Program Carbon Market

As mentioned earlier, the climate change strategy (under development) contains, within its plan for a low carbon economy, a program for a national carbon market. The plan indicates that such a national carbon market is a crucial instrument within the environmental regulations to comply with the goals of climate agreements. Also, it will promote a change of culture in priority sectors and therefore help transform into a low carbon economy.

The program indicates that the national carbon market will be based on a commercial system in which companies and/or individuals can buy or sell carbon credits, coming from the carbon capture and carbon storage in the forestry sector (REDD+/Alliance for the Million). To be able to implement such a carbon market, it is recognized that a national emission registry is indispensable as part of a national platform for climate transparency.

Also, reference is made to the Clean Development Mechanisms (CDM) of the regulated market and the Verified Carbon Standard (VCS) as the basis of the carbon market.

Three lines of action have been defined:

1. Definition of the applicable methodologies, validated by MiAmbiente and the regulator of the carbon market,
2. Definition of the project cycle to participate in the carbon market that is consonant with existing environmental management instruments and that includes a MRV system,
3. Design of the operative system and implementation of the national carbon market

3.7 National Climate Change Strategy

With this Strategy, Panama expects to move towards to a low carbon economy based on its national public policy which maintains the balance between economic growth, social integration and environmental management as the pillars to promote compliance of the NDC and the Sustainable Development Goals. The Nation Climate Change Strategy contains:

- Legal and Institutional Framework for Climate Change
- Adaptation & Mitigation
- Climate change scenarios and vulnerabilities
- The Roadmap to low-carbon socio-economic development in prioritized sectors.
- Proposed Mitigation Actions at a National Level
- Climate change targets 2030
- Transparency framework 2030-2050

3.8 National Priorities and Objectives

The National Strategy on Climate Change under development indicates three national priorities, which are:

1. Adaptation to Climate Change,
2. Low Carbon Economy Development, and
3. Capacity Development / Technology Transfer.

The latter two are of importance in the framework of this analysis. Strategic lines within the low carbon economy development plan are:

i. Low carbon energy,
ii. Clean transport,
iii. REDD+,
iv. National carbon market, and
v. Eco state or Green Government.

Also 4 priority sectors for mitigation are indicated:

A. Energy,
B. Agriculture,
C. Forestry / Land Use, and
D. Government

3.9 Analysis

The political framework in which MiAmbiente is the focal point for climate change and leading the national initiatives together with other ministries and governmental institutions is in place and considered adequate. The Interinstitutional Environmental System (SIA), conformed of the sectorial public institutions with environmental competence is working together and coordinating directly with MiAmbiente and the National, Provincial, District and County/Local consultation commissions to assure that environmental issues are addressed in an integral way on a national level.

Climate change issues are discussed within the national commission on climate change (CONACCP) which advises and coordinates with MiAmbiente. The CONACCP is well represented by all institutions related to climate change, especially after the 2013 modification of its composition. Private enterprise counsels and civil society do not form part of CONACCP. In the light of a national registry on GHG emissions and mitigations actions, which inputs depend on reporting directly from companies, projects or activities, the absence of the private sector is considered a weakness of CONACCP. A new revision and modification of CONACCP are foreseen to include civil society and private enterprise counsels, which is strongly recommended, for one of the goals of CONACCP is to create mechanisms of coordination between civil society and the public sector in order to contribute jointly compliance of international agreements by Panama.

The national climate change policy was approved in 2007, and many national developments on climate change have taken place since then, but they were mainly driven by adherence to new international treaties, international obligations or private national initiatives. Because of these international and national developments since 2007, the policy has become out of date.

Besides the climate change policy, only the national energy plan 2015 – 2050 of the Secretary of Energy is approved and in execution, however big private investments in LNG for energy purposes

is causing a diversion of the ambitious alternative scenario, which is followed by government and where large scale up of solar and wind energy is needed and planned. Private investments in the latter technologies could fall behind because of a (future) strong participation of natural gas in the electricity matrix of Panama and its energy demand in general. Additionally, the growth of installed capacity in solar, wind and biomass power, is also included in the NDC presented by Panama.

All other mentioned strategies, plans or programs are still under development and not in place yet. The REDD+ strategy together with the Alliance for the Million developed by MiAmbiente is in a very advanced phase however, and recently the Ministry of Agricultural Development published its climate change plan as a first step.

The National Climate Change Strategy serves the vertebral column of the existing climate changes programs such as REDD+, Alliance for the Million, Program for Urban Sustainable Mobility National Energy Strategy, etc. It also provides the country's vision and commitment to comply with the NDC and 17 SDGs with the aim to promote the sustainable development and to move forward to a low carbon economy.

3.10 Análisis

El marco político en el que MiAmbiente es el punto focal para el cambio climático y el liderazgo de las iniciativas nacionales junto con otros ministerios e instituciones gubernamentales está en su lugar y se considera adecuado. El Sistema Ambiental Interinstitucional (SIA), conformado por las instituciones públicas sectoriales con competencia ambiental, está trabajando en conjunto y coordinando directamente con MiAmbiente y las comisiones de consulta Nacional, Provincial, del Distrito y del Condado para asegurar que los problemas ambientales se aborden de manera integral a nivel nacional.

Los problemas del cambio climático se discuten dentro de la comisión nacional sobre el cambio climático (CONACCP) que asesora y coordina con MiAmbiente. El CONACCP está bien representado por todas las instituciones relacionadas con el cambio climático, especialmente después de la modificación de 2013 de su composición. Los consejos de empresas privadas y la sociedad civil no forman parte del CONACCP. A la luz de un registro nacional de emisiones de GEI y acciones de mitigación, cuyos aportes dependen de la presentación de informes directamente de las empresas, proyectos o actividades, la ausencia del sector privado se considera una debilidad de CONACCP. Se prevé una nueva revisión y modificación de CONACCP para incluir consejos de la sociedad civil y empresas privadas, lo que se recomienda encarecidamente, ya que uno de los objetivos de CONACCP es crear mecanismos de coordinación entre la sociedad civil y el sector público para contribuir al cumplimiento conjunto de Acuerdos internacionales por Panamá.

La política nacional sobre el cambio climático se aprobó en 2007, y desde entonces se han producido muchos desarrollos nacionales sobre el cambio climático, pero se debieron principalmente a la adhesión a nuevos tratados internacionales, obligaciones internacionales o

iniciativas nacionales privadas. Debido a estos acontecimientos internacionales y nacionales desde 2007, la política se ha quedado obsoleta.

Además de la política de cambio climático, solo el plan energético nacional 2015-2050 de la Secretaría de Energía está aprobado y en ejecución, sin embargo, las grandes inversiones privadas en GNL con fines energéticos están provocando un desvío del ambicioso escenario alternativo, que es seguido por el gobierno y donde se necesita y planifica una gran escala de energía solar y eólica.

Las inversiones privadas en estas últimas tecnologías podrían retrasarse debido a una (futura) fuerte participación del gas natural en la matriz eléctrica de Panamá y su demanda de energía en general. Además, el crecimiento de la capacidad instalada en energía solar, eólica y de biomasa también se incluye en el NDC presentado por Panamá.

Todas las demás estrategias, planes o programas mencionados aún están en desarrollo y aún no están implementados. Sin embargo, la estrategia REDD + junto con la Alianza para el Millón desarrollada por MiAmbiente se encuentra en una fase muy avanzada, y recientemente el Ministerio de Desarrollo Agropecuario publicó su plan de cambio climático como un primer paso.

La Estrategia Nacional de Cambio Climático sirve a la columna vertebral de los programas existentes de cambio climático, como REDD +, Alianza para el Millón, Programa para la Movilidad Urbana Sostenible, Estrategia Nacional de Energía, etc. Una de las contribuciones más importantes es la visión y el compromiso del país para cumplir el NDC y los 17 ODS, principalmente con el objetivo de promover el desarrollo sostenible y avanzar hacia una economía baja en carbono y un desarrollo sostenible.

4. Greenhouse Gas Emissions, Main Sectors and Mitigation Measures

4.1 Greenhouse Gas Emissions and Main Sectors

Panama has elaborated 5 inventories on national GHG emissions with reference years 1994 (National Communication 1 – NC1), 2000 (NC2), 2005, 2010 (NC3) and 2013 Biennial Update Report 1 – BUR1). NC1 was elaborated in the year 2000, NC2 in the year 2010, while the NC3 and BUR1 were submitted recently in 2018 to the UNFCCC. All NC's and the BUR1 reported on three main GHG emissions CO_2, CH_4 and N_2O. The F-gases are not included (mainly refrigeration gases). In table 1 the estimates of national GHG emissions according to the NC's and BUR are shown per gas (expressed in CO_2–eq.).

Year	CO_2	CH_4	N_2O	Total

	(Gg CO_2-eq. per year)[1]			
1994	15 189	6 450	2 496	**24 135**
2000	26 402	5 704	1 280	**33 386**
2005	5 392	4 360	973	**10 725**
2010	8 250	4 836	920	**14 006**
2013	10 178	5 829	1 134	**17 141**

Table 1: National GHG emissions Panama

Noteworthy, the data reported on emissions of deforestation in the AFOLU sector were included in the national communications of 1994 and 2000, whereas absorptions were excluded. In NC3 (2005 and 2010), emissions and absorptions from deforestation and forests are both excluded in the data, and in BUR1 a net-CO_2 emission is reported (including emissions of deforestation minus absorption from forests). These differences in approach make it difficult to compare the values reported. Also, NC3 indicates the poor data quality of (mainly) deforestation emissions and forest absorptions in the NC1 and NC2 reports. Panama opted to not include/elaborate their National Inventory Report (NIR) in their national communications, which also makes it difficult to track emissions and make comparisons. Therefore, only data from 2005 onwards can be used for comparison and it can be concluded that GHG emissions in Panama have risen drastically over the last decade.

Main sectors of GHG emissions are the energy and AFOLU sector in general with a contribution of around 90% of all emissions. The latest data as reported of the BUR1 inventory per sector are shown in table 2.

Sector	**CO_2-eq**	**%**
	(Gg CO_2-eq.	
Energy	8708.7	45.7%
Waste	1130.9	5.9%
AFOLU	8432.5	44.2%
Industry	790.9	4.1%
Total	19063.0	100.0%

Table 2: GHG emissions 2013 per sector (AFOLU absorption NOT included)

Dividing the main sectors in subsectors, results in the following 5 main subsectors i) deforestation, ii) transport, iii) enteric fermentation, iv) fossil fuel power plants, and v) industry (heat boilers).

A recent revision of the national inventories by a team of experts of the UNFCCC under the Global Support Program of the Latin-American web of national GHG inventories (RedINGEI) was executed of the most recent 2013 inventory (BUR1), which was the first international revision by experts of a national inventory from Panama. A list of general and specific remarks and comments were elaborated and presented to the Panamanian government.

[1] The most recent global warming potential values (GWP) relative to CO_2 from the fifth assessment report (AR5) have been used for calculation of the CO_2-equivalent emissions (CH_4: 28 and N_2O: 265), that differs from the values reported in the inventories. Gg stands for Giga grams (10^9 grams equivalent to kiloton (kton))

A general comment is related to the absence of an archive and documentation system (registry) in which all information related to the inventory is gathered, that would increase transparency and quality control. This comment is directly related to the national platform of climate transparency, currently under construction. Also, the absence of a comparative table with data from previous inventories is mentioned.

Important specific comments are related to the absence of an estimation of GHG emissions of the F-gases, already mentioned above, the absence of an estimation of the international and national maritime emissions, fugitive emissions from fossil fuels employed, precursor gases amongst others.

Another issue that can be mentioned is the absence of the inclusion of gender and indigenous people topic within climate change policies, a compromise that is included in the Paris Agreement.

4.2 Mitigation Measures

In Panama several (national) programs with mitigation measures are under implementation and development. In chapter 3 the REDD+ program with the Alliance for the Million Hectares, were already mentioned. In this chapter other mitigation programs will be mentioned.

Nationally Determined Contributions (NDC)

Within the framework of the Paris Agreement, the Ministry of Environment has identified two main priority sectors under the Nationally Determined Contributions (NDCs), the energy sector and the AFOLU sector. The NDC was presented in 2016 and aims to achieve significant emission reductions in the electricity generating sector by incrementing in installed capacity of new renewables technologies (solar, wind and biomass) with 30% in 2050 in comparison with 2014. The projected electricity generation estimated by the SNE of such a capacity increase is shown in Figure 13.

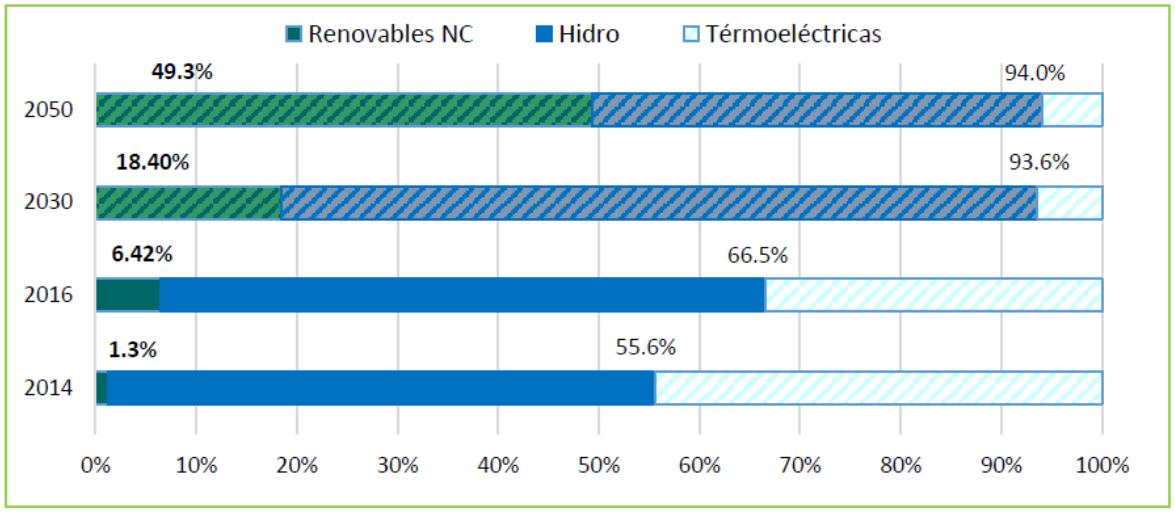

Figure 13: Projected Power Generation NDC

Figure 13 suggests that the projected power generation in 2050 of renewables could account for 94% of the total energy generation.

As for the AFOLU sector the NDC states a unilateral 10% increase in absorption capacity of Panamanian forests in 2050 compared to the reference scenario using national funds and based on the REDD+ program and the Alliance for the Million Hectares (base year 2015). However, if strong international funding is obtained this increase in absorption capacity would rise to 90% (Figure 14).

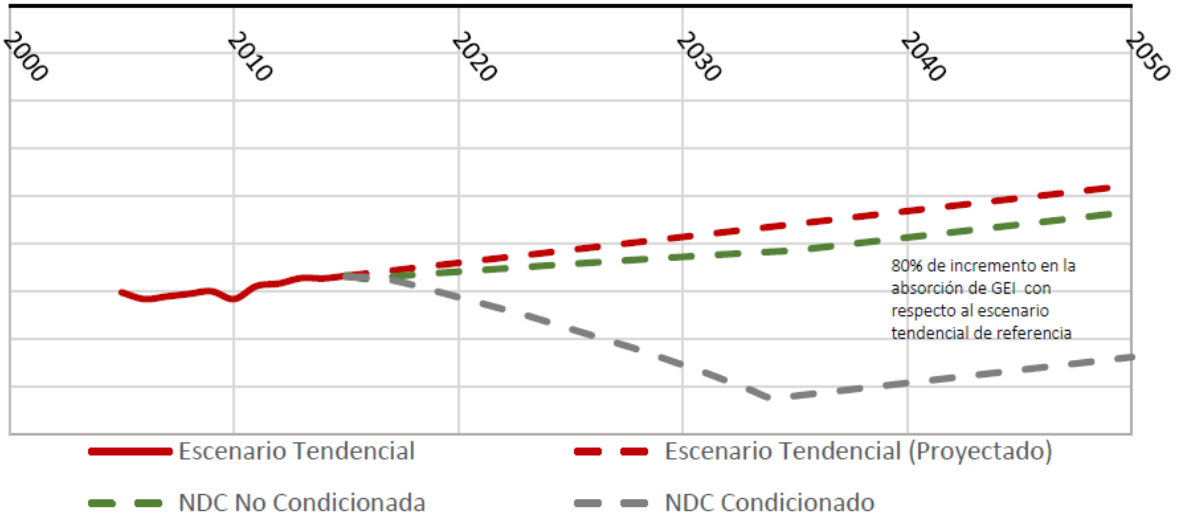

Figure 14: Projected absorption capacity of AFOLU sector compared to reference scenario with international funding

To be able to meet the NDC goal, Panama is in the process of elaborating the regulatory framework for the AFOLU sector to strongly promote reforestation and conservation schemes.

National Appropriate Mitigation Actions (NAMA)

In 2016 Panama presented its National Appropriate Mitigation Actions (NAMAs) to the UNFCCC. The NAMAs were developed in line with the Strategic Government Plan (PEG 2014). As of today, Panama has produced 12 proposals, that represent an opportunity to contribute to a low carbon economy in Panama. Sectorial projects have been proposed, containing both public and private initiatives in the following sectors: i) energy, ii) transport, iii) industry, iv) agriculture, v) buildings and vi) waste.

The 12 NAMAs are:

1. Urban Mobility
2. Energy Efficiency
3. Green Government
4. Waste Water Treatment Plant for Panama City
5. Basic Rural Sanitation

6. Remediation and Closure of Open Waste Dumps
7. Cement Industry
8. Bovine Sector
9. Porcine Sector
10. Poultry Sector
11. Refrigerants Recycling from Cooling
12. Rice Sector

Almost all proposals are at the level of general ideas or project cards, with the exception of the urban mobility NAMA and Energy Efficiency NAMA, that are in the design phase and the Bovine NAMA that is in preparation of their conceptual note. However, some NAMAs are related to projects in execution, such as the Urban Mobility, Energy Efficiency, Waste Water Treatment Plant for Panama City and Basic Rural Sanitation. The refrigerants recycling NAMA is closely related to the implementation of the Montreal Protocol, which is in execution. Altogether these initiatives should reduce more than 30 Mtons of CO_2-eq per year. The Refrigerants Recycling NAMA accounts for more than 2/3 of that total.

A concept note on the NAMA of sustainable urban mobility program has been presented to the Green Climate Fund. Six catalytic projects of the national sustainable mobility program have been presented to obtain financing, to be executed in a period of 5 years, with a total investment of $ 468 Million and 2.48 Mton of projected CO_2 reduction in the 2020 – 2035 period. Full implementation of this NAMA project is expected to reduce GHG emissions by 5.29 Mton CO_2 in the same period in the metropolitan region, corresponding to 18% of Business as Usual scenario.

Other mitigation programs that can be mentioned are projects of Clean Development Mechanisms (CDM) under the Kyoto Protocol, projects under voluntary programs such as the Verified Carbon Standard (VCS), and others. Also, the implementation of solar energy systems for auto consumption can be mentioned.

CDM

As an Annex 2 country under the Kyoto Protocol, from host Panama were presented 31 CDM projects, according to the CDM pipeline website (www.cdmpipeline.org), of which 23 projects were registered between 2005 and 2017 (see table 3).

Registered	Project title	Other Parties	Estimated GHG emission Reductions (ton CO_2/year)
23/10/2012	Penonome Wind Farm	United Kingdom of Great Britain and Northern Ireland	381881
24/12/2005	Project for the refurbishment and upgrading of Dolega hydropower plant	Spain	12167
24/12/2005	Project for the Refurbishment and Upgrading of Macho de Monte Hydropower Plant	Spain	10963

Registered	Project title	Other Parties	Estimated GHG emission Reductions (ton CO_2/year)
23/11/2012	Toabré Wind Farm	United Kingdom of Great Britain and Northern Ireland	372657
23/02/2009	Santa Fe, Energy Wind farm	United Kingdom of Great Britain and Northern Ireland	172877
20/12/2012	Las Perlas Sur Hydroelectric Plant Project	Switzerland	30684
26/11/2015	Sewage treatment Plant for Panama Bay and city sanitation		3504
29/11/2012	Mendre Hydroelectric Power Plant Project		56841
21/10/2006	Concepción Hydroelectric Project	Switzerland	36126
21/11/2014	Bajo de Mina Hydroelectric Project		119480
21/11/2014	Baitun Hydroelectric Project		183106
24/01/2017	Pando and Monte Lirio Hydroelectric Plants		232627
21/12/2012	Las Perlas Norte Hydroelectric Plant Project	Switzerland	30684
10/3/2007	Paso Ancho Hydroelectric Project	United Kingdom of Great Britain and Northern Ireland	22233
28/12/2012	Macano Small Hydro Power Plant		12046
1/10/2005	Los Algarrobos Hydroelectric Project	Spain	37213
31/12/2012	Dos Mares Hydroelectric Project		349444
20/04/2012	Bajo Frío Hydro Power Project		151560
26/01/2011	Barro Blanco Hydroelectric Power Plant Project		66934
12/8/2013	El Fraile Small Hydro Power Plant		14011
18/09/2011	CEMEX Panama: Bayano cement plant Alternative fuels project	United Kingdom of Great Britain and Northern Ireland	29212
21/12/2012	Cerro Patacón Landfill Gas Utilization Project	Netherlands	223658
10/6/2013	CEMEX Panama: Alternative fuels and biomass project at kiln 2 of Bayano cement plant	United Kingdom of Great Britain and Northern Ireland	70883

Table 3: Registered CDM projects in Panama (https://cdm.unfccc.int/)

Total registered reductions from table 3 sum up 2,621 kCERs per year, however only 340 kCERs from 5 projects have been issued and another 315 kCERs from 8 projects are currently at validation according to the CDM pipeline excel file, which shows that registered and approved reductions are not necessarily accomplished. The reporting of the validated CERs is publicly available and can be used to register the mitigation actions that have been realized and sold in Panama to avoid double counting. Worth mentioning is that MiAmbiente, after project approval as national focal point, loses track of the implementation and results of the CDM projects, for reporting is done directly by the project promotor to the administrative secretariat that manages the CDM project.

VCS/CCB/California

In the database available at https://www.vcsprojectdatabase.org/#/home no Verified Carbon Standard projects were found in Panama. Under the Climate, Community and Biodiversity (CCB) program, there are 4 projects registered in Panama (see table 4).

Project Name	Project Proponent	Project Type	CCB Standards Edition	Distinction(s)	CCB Status
Panama Canal Authority Sustainable Forest Cover Establishment Project	Panama Canal Authority	ARR	Second Edition	Biodiversity Gold	Validation expired
CO2OL Tropical Mix Reforestation Project	Forest Finance Service GmbH	ARR	Second Edition		Validation expired
CO2OL Native Tree Species Reforestation	Forest Finance Service GmbH	ARR	Second Edition		Withdrawn
Panama Native Species Reforestation	CO2OL	ARR	First Edition	Gold	Validation expired

Table 4: Registered CCB projects in Panama (https://www.vcsprojectdatabase.org/#/ccb-projects)

However, as shown in the table, one project has been withdrawn and 3 projects have their validation expired.

Solar Auto Consumption projects

The Panamanian electricity service regulator (ASEP) approved in 2012 a regulation for installation of solar powered plants (or any other renewable energy source) up to 500 kW at private installations for auto consumption, which was modified and amplified in 2016. The regulations include an obligation to register and report the electricity generated and injected in the distribution grid by the electricity distributor to ASEP. ASEP publishes the consolidated data of these auto consumption projects on its website and as of June 2018, 374 solar systems were installed with a total maximum installed capacity of 19.6 MW (the total installed solar capacity of large grid connected plants (18 plants) was 126 MW as of December 2018). No more recent data on auto consumption solar plants have been found, however these data should be available through ASEP and can be used for registering purposes in an emission and mitigation national registry.

4.3 Analysis

From the most recent inventory reports it can be concluded, that the national GHG emissions in Panama are on the rise and that the national strategy to develop a low carbon economy is very much

needed. The first biannual update report (BUR1) with reference year 2013 demonstrates that the AFOLU sector has turned from a net sink of GHG to a net emitter of GHG. Total GHG emissions are 15876 Gg CO_2-eq. including the absorptions by the AFOLU sector. Comparison with former GHG national inventories is difficult because of differences in methodologies, also because of the absence of a national inventory report (NIR). Improvements in data quality, transparency and integrity can be made, which makes a national emission and mitigation registry of GHG even more relevant. The 5 main subsectors of GHG emissions are i) deforestation, ii) transport, iii) enteric fermentation, iv) fossil fuel power plants, and v) industry (heat boilers), respectively.

Looking at the mitigation programs and projects (including those mentioned in chapter 3) it can be concluded that all but two of the five main subsectors are included in mitigation programs, only excluding enteric fermentation and industry. The REDD+ includes deforestation emissions, the national sustainable mobility program (the most advanced NAMA) includes transport emissions and the NDC includes deforestation and fossil fuel power plants emissions. A stimulation program for a strong promotion of hybrid and electric vehicle cars and buses could be complementary to this NAMA.

Other NAMAs do include enteric fermentation emissions, amongst other agricultural emissions, and industry emissions, but are still in its idea phase.

In general, the availability of GHG emissions and mitigation data can be improved significantly, which makes the national registry on GHG emissions very relevant to dispose of integral, reliable, precise and comparable data in the future.

4.4 Análisis

De los informes de inventario más recientes se puede concluir que las emisiones nacionales de GEI en Panamá están en aumento y que la estrategia nacional para desarrollar una economía baja en carbono es muy necesaria. El primer informe de actualización bianual (BUR1) con el año de referencia 2013 demuestra que el sector AFOLU ha pasado de un sumidero neto de GEI a un emisor neto de GEI. Las emisiones totales de GEI son 15876 Gg CO2-eq. Incluyendo las absorciones por parte del sector AFOLU. La comparación con los inventarios nacionales de GEI anteriores es difícil debido a las diferencias en las metodologías, también debido a la ausencia de un informe de inventario nacional (NIR). Se pueden realizar mejoras en la calidad de los datos, la transparencia y la integridad, lo que hace que un registro nacional de emisiones de GEI y de mitigación sea aún más relevante. Los 5 subsectores principales de las emisiones de GEI son i) deforestación, ii) transporte, iii) fermentación entérica, iv) centrales eléctricas de combustibles fósiles, y v) industria (calderas de calor), respectivamente.

Al observar los programas y proyectos de mitigación (incluidos los mencionados en el capítulo 3), se puede concluir que todos menos dos de los cinco subsectores principales están incluidos en los programas de mitigación, excluyendo la industria y la fermentación entérica. REDD + incluye las emisiones de la deforestación, el programa nacional de movilidad sostenible (la NAMA más

avanzada) incluye las emisiones del transporte y el NDC incluye la deforestación y las emisiones de las plantas de energía de combustibles fósiles. Un programa de estimulación para una fuerte promoción de vehículos y autobuses híbridos y eléctricos podría ser complementario a esta NAMA.

Otras NAMA incluyen emisiones de fermentación entérica, entre otras emisiones agrícolas y emisiones de la industria, pero aún están en su fase de idea.

En general, la disponibilidad de emisiones de GEI y los datos de mitigación pueden mejorarse significativamente, lo que hace que el registro nacional de emisiones de GEI sea muy relevante para disponer de datos integrales, confiables, precisos y comparables en el futuro.

5. Main Governmental Actors

5.1 Ministry of Environment

The Ministry of Environment (MiAmbiente), as the focal point before the UNFCCC since 1995, is the main governmental actor in the field of climate change, through the Department of Climate Change. The climate change unit operates since 2006 and is responsible for facilitating and promoting the application of the Climate Change Convention. The different units operating within the department of climate change are: i) International Processes, ii) Financing, iii) Mitigation, iv) Mitigation REDD+, and v) Adaptation.

Through Law 88 of 1998, Panama adopts the Kyoto Protocol and currently has 21 Clean Development Mechanisms (CDM) projects registered in the UNFCCC, 11 in the process of validation and 10 in process. Within the framework of the Paris Agreement, the Ministry of Environment has identified two main priority sectors under the Nationally Determined Contributions (NDCs) presented in 2016, i.e. i) Energy sector and ii) FOLU sector. The NDC aims to achieve significant emission reductions that must be recorded and reported.

Within the framework of its climate change policies, Panama has developed a portfolio of 13 Nationally Appropriate Mitigation Actions (NAMAs), nine of them at the level of general ideas (project cards), two being in the design phase and two in preparation of their conceptual note. All these initiatives will also have a positive impact on the country's mitigation actions, and these reductions should be included in a centralized registry, which helps improve transparency and avoid double counting.

In addition to the CDM projects, NAMAs and NDCs, there are other private initiatives that are marketing carbon operating in a non-regulated market, and due to the low level of sophistication of this process, MiAmbiente expresses the need to generate a GHG registry that will enable the country to avoid potential double counting.

The department of climate change is in an advanced process of preparation to implement a national strategy to reduce emissions from deforestation and forest degradation (REDD+). Currently, it is in the final phase of construction of the four pillars of REDD+ which includes: a) construction of forest reference levels, b) construction of the national forest monitoring system, c) construction of the national system of safeguards; and d) preparation of the national REDD+ strategy. In addition to the above, it has established a public-private alliance with the objective of reforesting one million hectares in 20 years, instituting for this purpose a law of forest incentives (fiscal and non-fiscal). In this framework, the aforementioned REDD+ strategy together with the Alliance for the Million Hectares, will represent an important potential carbon offset option, not only in the domestic market (once this is built), but also in a future voluntary commitment of the reduction of the

emissions of national companies of aviation and maritime transport, considering Panama being a logistic international hub and having the flag of the largest merchant fleet in the world.

The above imposes the need to establish a registry on carbon trade, as well as mitigation, which allows adequate control, transparency and access to this information.

Currently no governmental directive or norm establishes the methodology of reporting GHG emissions or reductions for private or public entities. Nor any in-house capacity (human resources) is available to register and/or verify such reports, also due to the fact that the national inventories on GHG emissions and absorptions have been outsourced. More importantly, neither in the private sector broad specialized human resource capacity in climate change or GHG emission measurement and reporting is available. This is valid for private companies, environmental consultants / auditors and academic institutions. Therefore, the implementation of the above-mentioned platform has to be accompanied by a training and capacity building program both within the relevant governmental institutions as in the private sector.

5.2 Secretary of Energy

The Secretary of Energy (SNE) was created through law 52 of 2008 and reorganized by law 43 of 2011, being the main governmental entity to deal with national energy policy, energy savings and promotion of renewable energy. The SNE has developed the National Energy Plan 2015 – 2050 (PEN 2015 – 2050), which compares a “business-as-usual” reference-case scenario with an alternative, ambitious scenario. The PEN 2015 – 20150 was approved in 2016 and the ambitious alternative scenario suggests that renewable energy could reach 70% of the power supply in the next 35 years, while at the same time meeting growth in demand. Furthermore, under the ambitious scenario, a solar photovoltaic (PV) and wind energy scale-up, combined with hydropower, would account for 77% of installed power capacity by 2050. As part of the Nationally Determined Contributions (NDCs), the energy sector should show a 15% increase in non-hydropower renewable energy capacity by 2030, and 30% by 2050, compared to base year 2014.

Panama is the pilot country for IRENA’s Clean Energy Corridor of Central America (CECCA) initiative, which supports the accelerated deployment of renewable power at the regional level, which motivated the Renewable Readiness Assessment performed of the Panamanian energy sector. According to the International Renewable Energy Agency (IRENA), SNE faces huge challenges to meet the goals of PEN 2015 – 2050, not in the least because of the current large-scale introduction of natural gas fired power plants. The SNE has expressed the necessity to transform towards a low carbon energy matrix. One of the central issues in the national energy policy is the implementation of a carbon tax as a market mechanism and part of a series of economic reforms.

A draft text of the proposed reforms (presented to the national parliament in October, 2017) of the general law on electricity (Law 6 of 1997) includes such a carbon tax on the kWh price offered by fossil fuel power generators in electricity tenders. A schematic representation of the carbon tax and its influence on other issues such as the decarbonization of the energy matrix, sustainable cities, rational use of energy and energy savings and macroeconomic effects, is shown below.

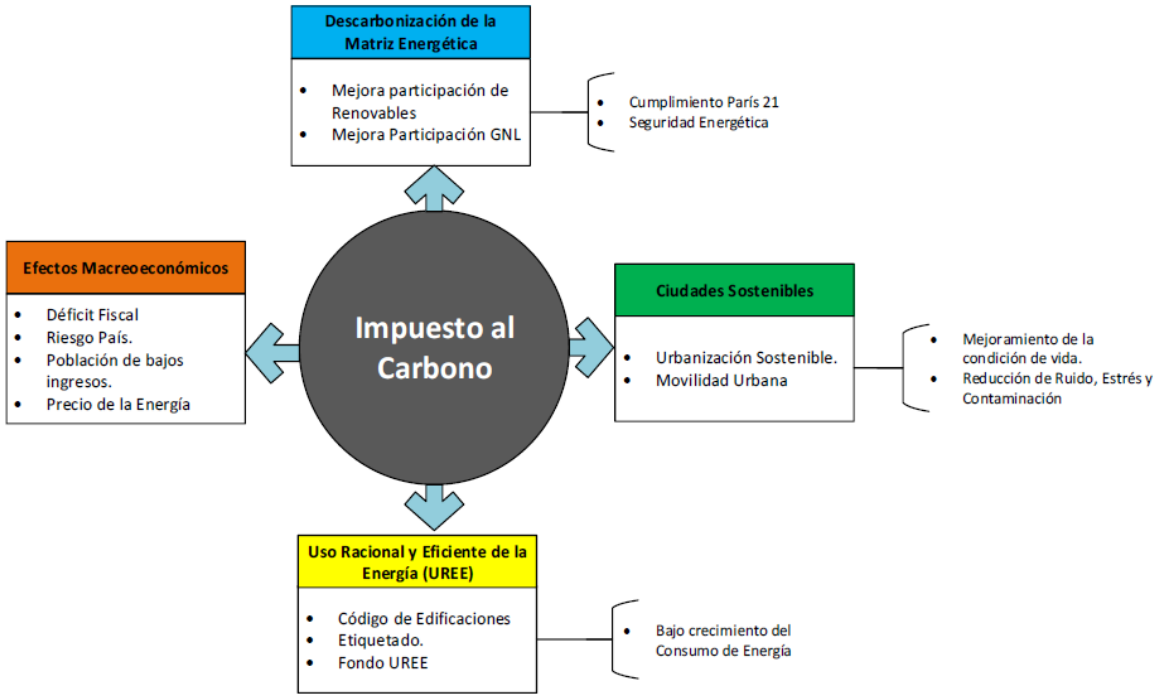

Figure 15: Carbon tax scheme SNE

However, discussions of the proposed law have not led to approval in national parliament and implementation is uncertain. Broad support for the proposal was not achieved, and it is considered indispensable to inform, discuss and reach an agreement with all stakeholders involved on this subject, as well as having all the data processed.

Accomplishing the alternative scenario of the PEN 2015 – 2050 which would lead to a 61% reduction in CO_2 emissions from the energy sector, of which the majority comes from end-use sectors, led by transport represents a huge challenge for SNE. So far, the deployment rate of low carbon technologies has been slow to achieve significant results.

5.3 Ministry of Agricultural Development

The Ministry of Agricultural Development (MIDA) is responsible for development of agriculture and livestock business. As responsible entity for policies and planification of both adaptation and mitigation of climate change in the agricultural sector, MIDA has recently developed the national

plan for climate change for the agricultural sector (PNCCSA, 2018), as described previously. The plan is the first step of MIDA to actively contribute to implementation of adaptation and mitigation of climate change, however it is recognized that legal norms still lack to be able to implement its goals.

An important service of MIDA to its clients is providing technical assistance to small and medium sized producers through its local agencies to promote agricultural development. To render this service, the local agencies request activity data per producer which is received voluntarily and without any legal obligation. Examples of activity data gathered are production area (hectares), crop type and crop production, dairy or beef cows, bovine breed and age. Local data is gathered and processed on a regional and subsequent national level within the planification office. Large-scale producers not require technical assistance and are excluded in these statistics; however, some do report to local or regional agencies on a voluntary basis. With respect to GHG emissions no data is reported or calculated by the planification office of MIDA, although this would be possible on basis of the activity data gathered. The national coverage of the data collection is estimated to be around 80 – 90% of total activity, because of the exclusion of several large-scale producers.

Data from the planification office aliments the national statistical office which in turn aliments FAO/STAT statistics. The national statistical office also gathers data on a periodic basis through national agricultural census

The planification offices do reflect some weakness in data recollection, consolidation, processing and analysis, according to interviewed MIDA representatives. The technical secretary of MIDA is executing a program to improve data collection in both quantity and quality. Also, worth mentioning is the implementation of a traceability program for livestock as from January, 2019, which will improve coverage of cattle data.

According to MIDA representatives emphasis should be given to capacity building on both local agency level as producer level if GHG emission reports were to be generated for a national registry and to build a broad support for GHG mitigation measures.

5.4 Civil Aviation Authority

The Civil Aviation Authority (AAC), besides regulation, registration, safety, environment and all flight related operations, includes air traffic control in Panama. Within the ICAO, Panama participates in the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) program, which was approved in 2016 as a word-wide measure for the aviation market. Panama voluntarily reports the global activities of the three airline companies that operate from Panama (COPA Airlines, DHL and Air Panama). A Monitoring, Reporting and Verification (MRV) infrastructure is installed within the AAC to compare the voluntary reports emitted by the airline companies with AAC data. Air traffic control data, such as origin, destination, airplane type, engine, fuel and weight are processed to

calculate distances and CO_2 emissions and is used for this MRV task. The department of analysis of air transportation within the AAC has the responsibility of monitoring, reporting and verification

MiAmbiente is strongly involved and interested in the national application of the CORSIA program and plans to include the national GHG emissions of the aviation sector in the national GHG emission registry. The AAC is willing and ready to participate in a voluntary GHG emissions registry on a short term with MiAmbiente. AAC informed that issues like scope of emission reporting frequency, and data confidentiality have to be discussed and agreed upon.

AAC has recently presented its Action Plan for CO_2 Emissions Reduction from the International Civil Aviation of the Republic of Panama to the ICAO. The working group involved in the elaboration of the action plan consisted of the aviation institutions and air navigations institutions, as well as Ministry of Environment, Secretary of Energy, airports, fuel providers and airline companies. As part of the action plan a baseline of CO_2 emissions for international flights as of 2013 was established using the ICAO methodology. Panama has opted for technological, operative and market-based measures for implementation of the action plan, with projected quantified emission reductions. The action plan also identifies additional opportunities to enhance current and planned measures, that could represent additional benefits. Technical assistance would be needed to evaluate and implement these opportunities.

5.5 Panama Maritime Authority

The Panama Maritime Authority (AMP) is the governmental institute to oversee all maritime activity in Panama. The geographical location of Panama lying between two oceans and house to the connecting Panama Canal between them, makes Panama a logistic international maritime hub and Panama has the flag of the largest merchant fleet in the world. In 1998 the Panama Maritime Authority was created. The institution has a national maritime strategy that was modified in 2008 and which includes in its strategic objective 5 the prevention of contamination of greenhouse gases (amongst others) to guarantee environmental sustainability of the maritime activity in all its value chain.

The AMP together with the Panama Canal Authority (ACP) are active members within the International Maritime Organization (IMO). The IMO has introduced an international system on improving energy efficiency of vessels and has established design indexes for energy efficiency. Recently, OMI established in its the strategy emissions reduction goals for vessels. Also, it has an international system of certificates to prevent atmospheric contamination. Panama proposed to the OMI the use of an offset program for GHG emissions of vessels through a carbon market. This initiative is related to the REDD+ strategy of Panama and its goals were planned on medium term by AMP. MiAmbiente is strongly involved and interested in this initiative and plans to include the national GHG emissions of maritime sector in the national GHG emission registry.

AMP disposes of fuel consumption data of both the international and national maritime sector which can be used for reporting or verification in the national GHG registry

5.6 Panama Canal Authority

The Panama Canal Authority (ACP) is an autonomous legal entity of the Republic of Panama, with exclusive charge of the operation, administration, management, preservation, maintenance, and modernization of the Canal, as well as its activities and related services. Some 13 to 14 thousand vessels use the Canal every year. The Panama Canal serves more than 144 maritime routes connecting 160 countries and reaching some 1,700 ports in the world. In 2016 a third lane was added to the Panama Canal for the transit of Neopanamax vessels. Herewith the Panama Canal reaffirmed its environmental leadership in the maritime industry, prioritizing water savings and contributing to the reduction of CO_2, being a shorter route and offering greater cargo capacity to its customers.

ACP has implemented the Green Connection Environmental Recognition Program. This initiative promotes the reduction of greenhouse gas emissions by distinguishing vessels that comply with the highest environmental performance standards. Customers can make use of a special CO_2 calculator based on IMO methodology developed for this goal. Besides the progress obtained by the Canal in its environmental programs in operational areas as well as in the Watershed, the ACP is progressing to consolidate itself as a carbon neutral organization. The ACP seeks to mitigate the impact of its activities and to reduce its carbon footprint in a proactive way. Therefore, its goal is to carry out compensation activities with the purpose of balancing in a sustainable way greenhouse gas emission of the organization, through the execution of projects that could generate carbon credits.

Since 2013 ACP is measuring its corporate carbon footprint using the methodology of GHG protocol and have implemented an internal platform to report all operational activities and calculate GHG emissions on a monthly basis. As well the GHG absorptions by conservation, reforesting and agroforestry programs within the canal watershed, that have been certified by First Climate/Gold Standard, are included. ACP does not report its activity data and GHG emissions, nor its mitigation and compensation results to national third parties, because of the absence of clear rules and transparency on which methodologies to use and how to report such data. Therefore, ACP strongly suggests to elaborate such rules nationally and to be transparent about what will be done with the data in a future emission registry and how a carbon market will be implemented. For example, it would be possible and recommendable to establish national emission factors for all fuel types used in Panama on the basis of its composition. Fuel mixtures in Panama differ from internationally established mixtures, and this generates uncertainty on estimated GHG emissions. ACP also recommends the elaboration of a climate change law including clear goals on low carbon/carbon neutrality nationwide. MiAmbiente should be the leading entity for deciding, regulating and emitting these regulations. Also, ACP recommends to focus on both mitigation and compensation

of GHG emissions. For example, future funds obtained by certified carbon credits should be used to promote and incentivize mitigation projects in the private sector in line with low-carbon goals set out in a future regulated law on climate change.

5.7 Analysis

Six main governmental actors related to climate change have been included in this chapter: i) Ministry of Environment (MiAmbiente), ii) Secretary of Energy (SNE), iii) Ministry of Agricultural Development (MIDA), iv) Civil Aviation Authority (AAC), v) Panama Maritime Authority (AMP), and vi) Panama Canal Authority (ACP). Interviews have been carried out with all to obtain the information described above and to discuss their points of view on the implementation of a national registry on GHG emissions and mitigation actions.

It is worthwhile mentioning that besides the SNE other governmental actors have an important role in the energy sector: The National Authority on Public Services (ASEP) is the regulator on electricity services, the Electricity Transmission Company (ETESA - 100% state owned) operates the National Interconnected System (SIN) and is responsible for the distribution of the generated electricity through this high voltage grid (230 kV). Under ETESA's responsibility falls also the National Dispatch Center (CND) that operates the complete electricity grid. Also, the private Distribution Companies (EDEMET, EDECHI and ENSA), who buy the electricity from the power generator and sell it to their end users are 49% state owned. The market for power generators is fully liberal and (nearly fully) privately owned.

Also, the National Authority on Traffic and Transport (ATTT) is responsible for all ground transportation, a sector that is one of the main GHG emitters and ultimately the Secretary of Metro was created in 2009 and is responsible for the execution of a metro system in Panama City, that has initiated the electrification of the transport sector. As well, the Ministry of Industry and Commerce (MICI) can be mentioned.

Therefore, the list of six main governmental actors described in this chapter does not pretend to be complete. The addition of the above-mentioned institutions sums up a total of 15 governmental actors related to climate change. The national commission on climate change (CONACCP) includes even 27 governmental institutions, which shows a very broad distribution of responsibilities and/or competences in governmental institutions. Therefore, it is considered of primordial importance that MiAmbiente takes a strong lead, that should be backed up by the entire cabinet led by the president of the Republic of Panama.

MiAmbiente as the focal point for the UNFCCC is and should be the leading authority on climate change issues. Both within the governmental structure as towards the private sector and society as a whole. MiAmbiente is taking on this responsibility and is actively working on the implementation

of a national GHG emissions registry and mitigation actions. A lot of work has to be done still, and MiAmbiente is fully aware of this. Improvement of technical capacity in human resources and infrastructure is very much needed. The same requirement is valid for all other governmental institutions, with exception of the ACP who is very advanced in the measurement, reporting and verification of its GHG emissions and its mitigation actions. Of equal importance is the weak technical capacity of consultants, advisors, universities and private companies with respect to climate change actions that have to be taken on. A leading role of MiAmbiente for awareness and capacity building is needed, not in the least to be able to create a broad support basis with the main stakeholders for implementation of, and actions needed for, a national registry and future carbon pricing.

With regard to the actions needed, the current absence of specific GHG emissions data per company, project or activity, and more importantly, how to measure, report and verify those emissions (and mitigation actions) is considered the first priority needed for improvement. There do not exist clear rules on MRV, and those should be agreed upon and established together with the main stakeholders.

The “failure” of the proposed “carbon tax” presented by the SNE to the National Assembly in the modifications to Law # 6, is an example that broad support must be gained first at high political level. Also, experiences in Mexico concerning the implementation of a national registry of GHG emissions can be mentioned to support the fact that MRV must be agreed upon as a first step. Recommendations from ACP point strongly towards establishing clear rules on MRV together with the establishment of quantified goals on a low carbon economy.

It should be mentioned that a great amount of activity data from the energy sector is available at SNE, which is obtained by mandatory information reported by each market agent. Improvements can still be made; however, the energy sector seems adequately organized to be able to report GHG emissions to a future registry.

6. Legal and Technological Framework

In this chapter the current situation with respect to the legal and technological framework will be described, in the light of its importance for a successful implementation of a registry on GHG emissions and mitigation actions. An analysis will be made to be able define actions needed in these aspects for implementation.

6.1 Legal Framework

The political constitution of the Republic of Panama in its chapter 6, article 105 expresses that the state has the primordial function to ensure the health of its population. Also, in its chapter 7, Ecological Regimen, article 114 expresses that the state has the fundamental obligation to guarantee a healthy environment for its population, free of contamination. In article 115 it expresses that both state and all its inhabitants have the duty to prevent contamination of the environment and avoid destruction of ecological systems.

In the light of this constitutional context many policies, laws, international treaties, decrees and regulations have been approved with respect to the protection of the environment in general, including climate change. The policies are mentioned and discussed in chapter # 3 Political Framework, National Priorities and Objectives. As for the legal framework, all international and regional treaties related to climate change have been ratified and adopted nationally through its correspondent laws and regulations, such as UNFCCC, Regional Convention on Climate Change, Kyoto Protocol (including its amendments), Montreal Protocol (including its amendments) and the Paris Agreement. Also, on the national level initiatives have been taken to legislate and regulate issues related to climate change. The complete list of laws, regulations and norms related to climate change is too long to be discussed here, but the most relevant laws are mentioned below:

1. Law # 8 of 2015: Created the Ministry of Environment (MiAmbiente), elevating the National Authority of Environment (ANAM) to a Ministry and giving more emphasis on climate change, by reforming Law # 41 of 1998,
2. Law # 41 of 1998: General Law on Environment, that was reformed by Law # 8, adding articles on climate change adaptation and global climate change mitigation,
3. Law # 43 of 2011: Reorganizes the Secretary of Energy and modifies Law # 52 of 2008, that created the Secretary of Energy,
4. Law # 69 of 2012: Law on Rational and Efficient Energy Use, that establishes incentives and promotes the use of efficient and innovative electrical equipment,
5. Laws # 45 of 2004, # 44 of 2011, # 18 of 2013 and # 37 of 2013: Laws that promote the use of, and establish limited fiscal incentives to investments in, renewable energy,
6. Law # 20 of 2011: Establishes the legal framework for the entrance and production of biofuels, and

7. Law # 69 of 2017: Promotes and establishes incentives for forestation programs

By law # 8 of 2015 the former environmental authority was elevated to a ministry, which leaded to the direct assignation of its own annual budget, and modification of the general law on the environment # 41 of 1998, giving climate change a more prominent role. For example, Law # 8 obliges the government to develop a national strategy on a low carbon economy (see chapter 3) and to periodically elaborate and publish the national inventories on GHG. Laws # 41, # 43, and # 69 have been regulated through Executive Decrees, Cabinet Decrees and Resolutions and therefore are implemented.

Law # 41 has a lot of related laws, regulations, decrees and resolutions as a spin-off or that were already in place. Those are related to air, water, soil and waste. With respect to air there are several laws and executive decrees that are regulating air pollution of both fixed and mobile sources of contamination (e.g. thermoelectric power plants, boilers, vehicles). Nitrous oxide is regulated for example, while carbon dioxide is mentioned in the norm for vehicles, but (for obvious reasons) not considered as a contaminant. These norms could offer the possibility to modify its content to regulate CO_2 emissions per km for example for mobile sources and include, mandatory measurement and reporting of GHG emissions. (e.g. Executive Decree # 5 of 2009 (fixed sources) and Executive Decree # 38 of 2009 (mobile sources), as well as Law # 36 of 1996 and Executive Decree # 255 of 1998 on vehicle emissions.

Law # 43 includes mandatory reporting obligations for any energy market agent (in its article 12), which is used by SNE and others for the national system for energy information and documentation. Law # 69 of incentives on forestry programs is currently being regulated. Laws # 45, # 44, # 18 and # 37 are concerned with promotion of and incentives for renewable energy generation. Law # 45 of 2004 exempts renewable energy generators from some taxes (up to 10 and 20 MW) and allows to celebrate a direct PPA with its respective electric distributor (up to 10 MW), Law # 44 of 2011 and # 37 of 2013 dealt with wind and solar specific energy tenders and tax exemptions, whereas Law # 18 of 2013 modifies some articles of Law # 44.

All mentioned laws have some relation with climate change issues, however there is no law on climate change specifically, that establishes goals, (incentive) programs, national GHG emissions registry, mitigation actions, measurement, reporting and verification (MRV) programs, amongst other relevant issues such as adaptation. Such a law would be necessary in medium term when GHG emissions will have to be reported mandatory. As an example, an internal proposal within MiAmbiente to include reports of GHG emissions in resolutions of approval for environmental impact studies (EIA), can be mentioned. Legal department of MiAmbiente considered there was no legal basis (*read: law*) within current environmental legislation to include such an obligation of GHG reporting in resolution of EIA approval and therefore the proposal was retracted, from the modifications of Executive Decree 123 of 2009.

For implementation of a voluntary reporting scheme of national GHG emissions registry, such a law is not required. Support building and clear indications/guidelines (*on measurement and reporting of GHG emissions*) for the interested parties (companies, projects or activities) however, is needed.

6.2 Technological Framework

MiAmbiente:

With respect to the national registry on GHG emissions and mitigation actions, MiAmbiente is initiating its development. Under article 13 of the Paris Agreement, MiAmbiente will build and administrate a national platform on climate transparency, consisting of two main components:

1) Database of National Inventory of GHG emissions, and
2) National Registry of GHG emissions and Mitigation Actions

Component 1 concerns the data of the national inventory reports that are elaborated following the methodology of the IPCC and are reported through the national communications (NC) on climate change and the biannual update reports (BUR). Panama has reported three NCs with four national inventories being 1994, 2000, 2005 and 2010 the respective baseline years, and is due to present its first BUR with 2013 being the baseline year.

Worth noting is that all four national inventories as well as the upcoming BUR have been outsourced as consultancies. MiAmbiente does not have, nor maintain, up-to-date databases on the national inventories. Therefore, component 1 of the national climate transparency platform will be the institutionalization of the national GHG inventories, and the goal is to present the second BUR using data from this platform. Another important note is that the IPCC methodology for national inventories is a top-down methodology, where consolidated national sectorial GHG emissions are being gathered on the energy (including transport), industrial processes, wastes and agriculture, forestry and other land uses (AFOLU) sectors. Such data are not suited for implementing instruments on carbon pricing or carbon trade. Financing of component 1 of the national climate transparency platform will be obtained through GEF and CBIT funds.

Component 2 concerns the registry of GHG emissions and mitigation actions that is needed for the implementation of any scheme of carbon pricing/trading and which will allow adequate control, transparency and access and avoid double counting. This registry will follow a bottom-up methodology, where private companies and public entities will report their GHG emissions and/or their mitigation actions from their companies, projects or activities. These reports will have to be prepared according to a specified method (for example GHG Protocol), and has to be verified and registered. The current plan is that MiAmbiente will verify and register the reports with in-house capacity. The national registry permits traceability of emissions/reductions and evaluate baseline scenarios and trends over the years. And moreover, these data can be used as a verified basis for

(implementing) carbon trading schemes and carbon pricing. Financing of component 2 of the national climate transparency platform will be obtained through CIACA funds.

A preliminary infographic on the national climate transparency platform is showed in Figure 16:

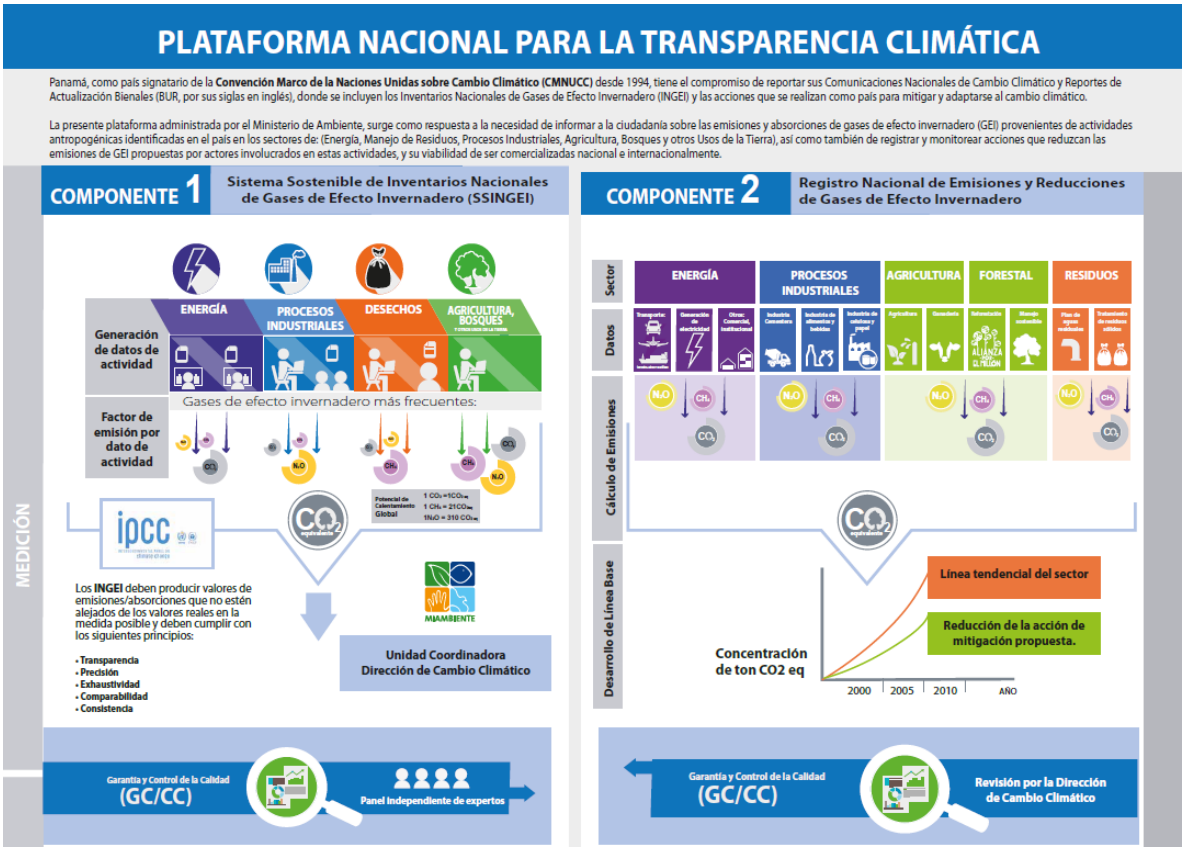

Figure 16a: Infographic National Climate Transparency Platform (Measurement)

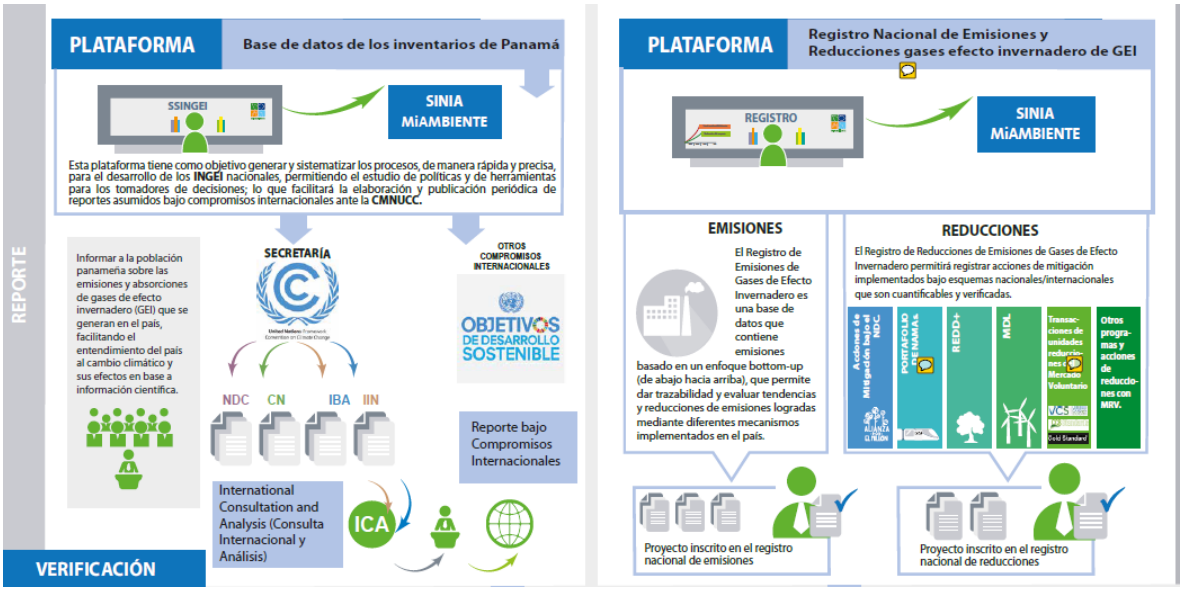

Figure 16b: Infographic National Climate Transparency Platform (Registry or Report)

Concluding, MiAmbiente does not have any infrastructure or databases on emissions data yet, except for the forestry sector (REDD+). This is mainly due to the outsourcing of the IPCC inventories.

With respect to data available within other departments of MiAmbiente, there is a registry of environmental data per sector within the Department of Verification of Environmental Performance with historic data since the year 2000. No GHG emissions are included in this database however. Also, the current development of an internal database that gathers data on monitoring and surveillance of environmental data can be mentioned, however this refers mainly to environmental quality data nationwide. More information on the current data within other MiAmbiente departments will be gathered.

SNE

Infrastructure and human resources within the SNE are available but limited and some databases / platforms are saturated and out of date. Initiatives within SNE related to a national emissions registry are: i) Energy Information System together with the Latin-American Energy Organization (OLADE), ii) Sustainable Transport together with Central American Integration System (SICA), iii) Carbon Pricing together with Partnership for Market Readiness (PMR) of the World Bank Group.

Activity data on power generator or plant level is available within SNE and reported mandatory on a monthly basis by each power generator. Fuel consumption of thermoelectric plants is estimated using power output and efficiency performance per plant, however fuel composition is reported to the electricity grid operator. Fuel consumption for other energy uses is available per sector and also reported mandatory on a monthly basis by each agent (importer or distributor), although not 100% segregated per use (e.g. fuel use in industry does not segregate between energy use (boilers) and transport). No verification system is in place, however customs clearing data on fuels entering the country is available and using this data for verification would be possible to implement.

MIDA

Local data from producers is gathered and processed on a regional and subsequent national level within the planification office of MIDA. The activity data per producer, which is received voluntarily and without any legal obligation, include production area (hectares), crop type and crop production, dairy or beef cows, bovine breed and age. The national coverage of the data collection is estimated to be around 80 – 90% of total activity, because of the exclusion of several large-scale producers. Data from the planification office aliments the national statistical office which in turn aliments FAO/STAT statistics.

The planification offices do reflect some weakness in data recollection, consolidation, processing and analysis, according to interviewed MIDA representatives. The technical secretary of MIDA is executing a program to improve data collection in both quantity and quality. Also, worth mentioning

is the implementation of a traceability program for livestock as from January, 2019, which will improve coverage of cattle data

AAC

A voluntarily system of reporting of GHG emissions of the national flights of the two main airline companies (COPA and Air Panama) is in use by the AAC. A MRV system is in place for verification. A web-based platform, denominated Sistema de Tasas y Vuelos (*Flight - and Rates System*), is available and in use on a daily basis for this purpose. All national air traffic data is available in this platform from COPA Airlines, Air Panama as main operators but also all charter flights are included through this platform (Figure 17), but not processed nor reported at this moment.

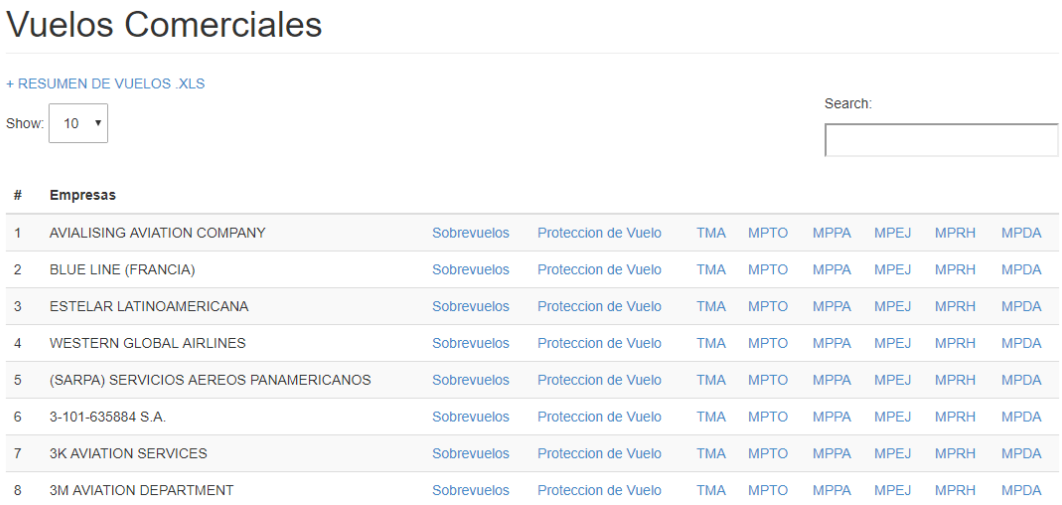

Figure 17: Screen shot platform domestic flight data

ACP and AMP

Since 2013 ACP is measuring its corporate carbon footprint using the methodology of GHG protocol and have implemented an internal platform to report all operational activities and calculate GHG emissions on a monthly basis. As well the GHG absorptions by conservation, reforesting and agroforestry programs within the canal watershed, that have been certified by First Climate/Gold Standard, are included. ACP is adequately equipped to operate and maintain this platform. In the short-term AMP plans to set up a measurement and inventory system for fuel oil use of ships that navigate in Panamanian waters. Currently statistical data from AMP represent monthly sales of marine fuels to ships (national and international). AMP does not recollect data activity nor GHG emissions of national maritime transport and is planning to implement a platform or database for this purpose on medium term.

6.3 Analysis

There is no law on climate change specifically, that establishes goals, (incentive) programs, national GHG emissions registry, mitigation actions, measurement, reporting and verification (MRV) programs. Such a law would be necessary in medium term when GHG emissions will have to be reported mandatory to the national emissions registry. For implementation of a voluntary reporting scheme of national GHG emissions registry, such a law is not required. Several laws and executive decrees, that are regulating air pollution could offer the possibility of modification to regulate CO_2 emissions per km for example for mobile sources and include mandatory measurement and reporting of GHG emissions of the transport sector, as one of the main GHG emitters.
The energy sector is well regulated as far as mandatory reporting concerns, although GHG emissions are not reported or requested by the Secretary of Energy, and only activity data are gathered and improvements are underway. To be able to include GHG emissions reporting would be relatively easy in the current legal framework of the energy sector.

With respect to the technological framework, MiAmbiente is in its initial phase of building a national platform on climate transparency, including the National Registry of GHG emissions and Mitigation Actions. Currently, MiAmbiente does not have any infrastructure or databases on emissions data yet, except for the forestry sector (REDD+). Infrastructure and human resources within the SNE are available but limited and some databases / platforms are saturated and out of date. Improvements are planned to modernize the platforms and databases.

Also, MIDA is gathering activity data on the agriculture sector, however here more improvements are considered necessary, as weaknesses are considered to be present in data recollection, consolidation, processing and analysis. AAC and ACP seem quite advanced in the presence and maintenance of reporting platforms of activity data of their activities, where ACP already has its GHG emissions reported on a monthly basis. AMP possesses data with activity data from the national and international maritime activity, however no detailed information could be gathered on the data available.

6.4 Análisis

No existe una ley específica sobre el cambio climático que establezca objetivos, programas (de incentivos), registro nacional de emisiones de GEI, acciones de mitigación, programas de medición, informes y verificación (MRV). Tal ley sería necesaria en el mediano plazo cuando las emisiones de GEI deberán ser informes obligatorios al registro nacional de emisiones. Para la implementación de un esquema de notificación voluntaria del registro nacional de emisiones de GEI, no se requiere tal ley. Varias leyes y decretos ejecutivos, que regulan la contaminación del aire, podrían ofrecer la posibilidad de modificar la regulación de las emisiones de CO2 por km, por ejemplo, para fuentes móviles e incluir mediciones y reportes obligatorios de las emisiones de GEI del sector del transporte, como uno de los principales emisores de GEI.

El sector energético está bien regulado en lo que respecta a los informes obligatorios, aunque el Secretario de Energía no informa ni solicita las emisiones de GEI, y solo se recopilan datos de actividad y se están realizando mejoras. La posibilidad de incluir el informe de emisiones de GEI sería relativamente fácil en el marco legal actual del sector energético.

Con respecto al marco tecnológico, MiAmbiente se encuentra en su fase inicial de construcción de una plataforma nacional sobre la transparencia climática, incluido el Registro Nacional de Emisiones de GEI y Acciones de Mitigación. Actualmente, MiAmbiente todavía no tiene ninguna infraestructura o base de datos sobre datos de emisiones, excepto para el sector forestal (REDD +). La infraestructura y los recursos humanos dentro del SNE están disponibles, pero son limitados y algunas bases de datos / plataformas están saturadas y desactualizadas. Se planifican mejoras para modernizar las plataformas y bases de datos.

Además, MIDA está recopilando datos de actividad en el sector agrícola, sin embargo, aquí se consideran necesarias más mejoras, ya que se considera que las debilidades están presentes en la recolección, consolidación, procesamiento y análisis de datos. AAC y ACP parecen bastante avanzados en presencia y mantenimiento de plataformas de informes de datos de actividad de sus actividades, donde ACP ya tiene sus emisiones de GEI informadas mensualmente. AMP posee datos con datos de actividad de la actividad marítima nacional e internacional, sin embargo, no se pudo recopilar información detallada sobre los datos disponibles.

7. National Decision-Making Process

The hierarchy in the judicial norms of Panama is shown in the pyramid structure in figure 18.

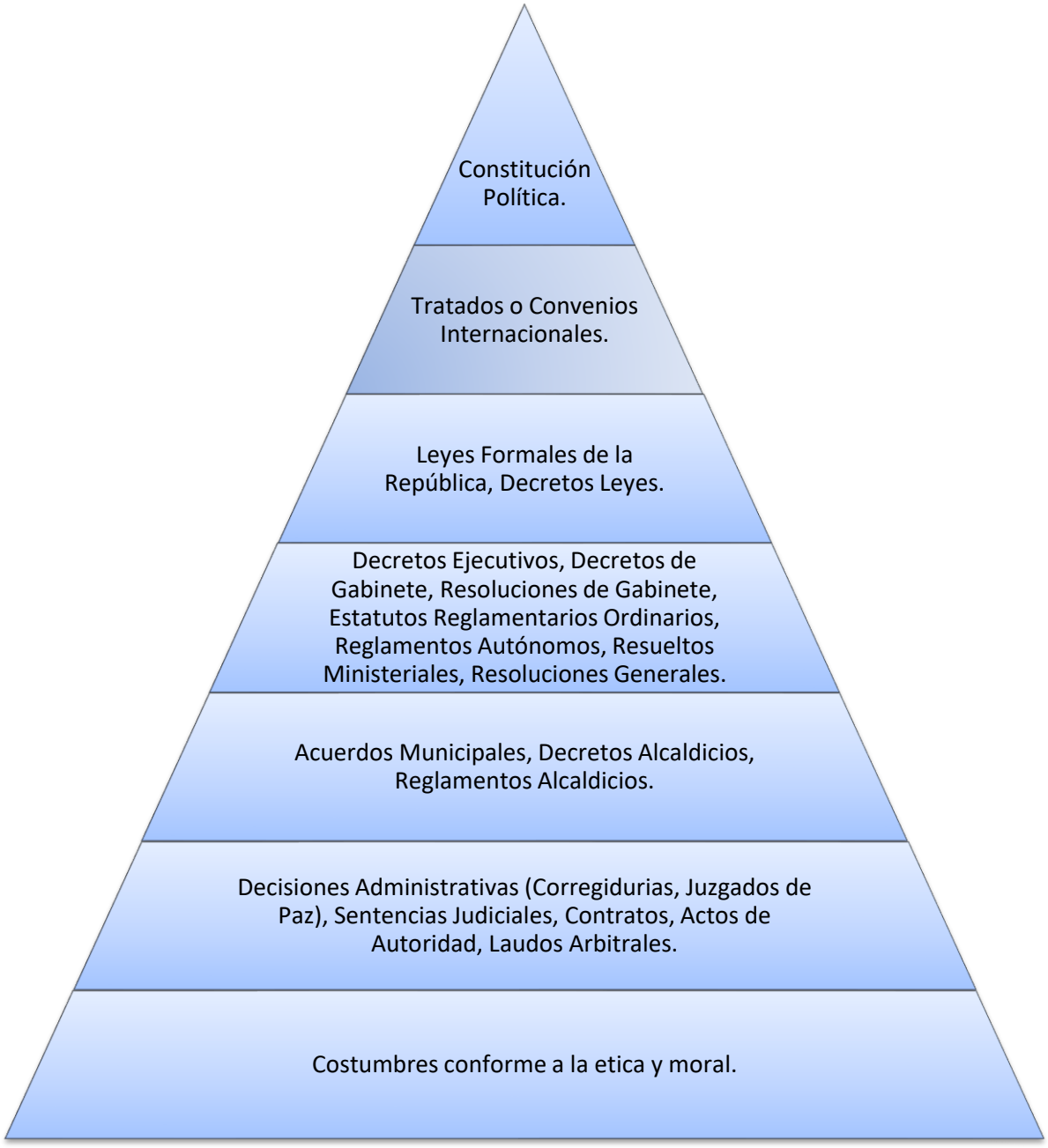

Figure 18: Hierarchy of judicial norms in Panama

On top of the pyramid the highest level of hierarchy is found in the national constitution of the Republic of Panama, followed by international treaties or international conventions or agreements that are ratified by Panama and in force internationally. Next in authority are the national laws or decree laws that are approved by national parliament. Usually, laws are implemented or regulated

by the next set of normative instruments, which are executive decrees, cabinet decrees, resolutions, regulations or settlements. All the above instruments have national validity. At the bottom of the hierarchy pyramid, local norms and decisions are found at municipality level, followed by the administrative level of norms or decisions, e.g. by districts or localities, contracts, mediation and judicial sentences.

Table 5 explains how and whom have to interfere in the above-mentioned hierarchy pyramid to show the decision-making process.

Judicial Norms	Decision making process
National Political Constitution	Promoted, created, reformed and actualized by a national constituent, which is designed and approved by the President of the Republic
International Treaties or Conventions	Proposed and subscribed by various states under international law. Adopted by a state through approval and ratification by the different organs of the state
Laws and Decree Laws	Promulgated, approved, reformed and sanctioned by the national parliament.
Executive Decrees, Cabinet Decrees, Cabinet Resolutions, Regulations, Ministerial Decisions	Emitted, approved and reformed by the President of the Republic together with each of its ministers, administrators or directors of each governmental institution.
Municipal Agreements, Decrees and Regulations	Approved by the mayor of the municipality together with its city or district council
Administrative decisions, judicial sentences, contracts, authority decisions, mediation settlements.	Judges, Councilors, Notaries or Members of the Police Force
Customs conform ethics and morality	Proper of every individual according to its beliefs, traditions and educations

Table 5: Decision making process of judicial norms and regulations

As shown in table 5, the national parliament has to discuss and approve laws or decree laws, whereas executive decrees, resolutions or regulations can be prepared and approved at ministerial or governmental level needing the signature of the correspondent minister and the president.

7.1 Analysis

Approval of national laws is competence of the national parliament, although preparation and elaboration can be initiated from government and civil society as well. For a future law on climate change discussion and approval by national parliament is compulsory. This can be a long process in which (not intended in the original law proposal) changes or modifications can be included in the final approved law. If a broad support can be gained at all levels of society, political and private

institutions, approval might be achieved easier and more importantly, essence and spirit of the climate law might be conserved during the discussions in parliament.

However, a more direct implementation of an obligatory reporting of GHG emissions for the registry can be achieved also by modification of already existing resolutions or decrees, for example on mobile and stationary emissions, to include mandatory reporting on GHG emissions of private companies and institutions. Therefore, only governmental approval is needed, mainly by the minister of the corresponding ministry that has the competence of the matter.

For voluntary reporting of GHG emissions no modifications of legal norms are necessary.

7.2 Análisis

La aprobación de las leyes nacionales es competencia del parlamento nacional, aunque la preparación y la elaboración también pueden iniciarse desde el gobierno y la sociedad civil. Para una futura ley sobre cambio climático, la discusión y aprobación por parte del parlamento nacional es obligatoria. Este puede ser un proceso largo en el que (no está previsto en la propuesta original de la ley) los cambios o modificaciones pueden incluirse en la ley final aprobada. Si se puede obtener un amplio apoyo en todos los niveles de la sociedad, las instituciones políticas y privadas, la aprobación podría lograrse más fácilmente y, lo que es más importante, la esencia y el espíritu de la ley del clima podrían conservarse durante las discusiones en el parlamento.

Sin embargo, también se puede lograr una implementación más directa de un informe obligatorio de emisiones de GEI para el registro mediante la modificación de resoluciones o decretos ya existentes, por ejemplo, sobre emisiones móviles y estacionarias, para incluir informes obligatorios sobre emisiones de GEI de empresas e instituciones privadas. Por lo tanto, solo se necesita la aprobación del gobierno, principalmente por el ministro del ministerio correspondiente que tiene la competencia del asunto.

Para la notificación voluntaria de las emisiones de GEI no es necesario modificar las normas legales.

8. Environmental Regulation Instruments

In this section the most important environmental regulation systems present within the country will be summarized and analyzed in the light of possible data gathering for the national emissions registry and mitigation actions.

The general environmental regulation systems within MiAmbiente are the Environmental Impact Studies (EIA), together with its Environmental Management Plan (PMA) for new activities or projects and the Environmental Audits (AA) with its Environmental Adjustments and Management Plan (PAMA) for existing companies or activities. These instruments were implemented around the year 2000 and have gathered (and still gather) a huge amount of mandatory environmental data on company level, e.g. on water discharges, air emissions, waste production and other areas. GHG emissions are not reported in these systems and as described earlier there exists no legal basis to request such reports, according to Legal Affairs of MiAmbiente. However, this data can be made available on a (anonymous) sectorial basis. Evaluation of the data available should be done to determine if useful GHG activity data can be obtained from these databases.

Within MiAmbiente, the PreFasia platform is set up, a digitalization of the presentation, reporting and evaluation of EIS and AA reports. It is initially designed to receive and emit documents. However, in a latter stadium after implementation, data collection might be made possible. Also, a VyDAH mapping application is being set up, using Google Earth for all EIS studies, which are public. No GHG emissions data or activity data on GHG emissions can be reported into these software systems at this moment, however in future this might be added. Linking of the national climate transparency platform and these Prefasia and VyDAH databases would be possible, to mutual benefit.

For the transport and industry sector, air pollution regulations such as Executive Decrees # 5 and # 38 both from 2009 that establish norms for stationary and mobile sources could be modified to include GHG emissions from the transport and industry sector that uses boilers.

In the AFOLU sector MiAmbiente is the permitting authority for any forest exploitation in the country and therefore have all relevant information on the number of hectares deforested yearly with its correspondent GHG emissions estimated. Also, the current implementation of the Alliance for the Million Hectares and other reforestation programs are coordinated by MiAmbiente and consequently the estimated GHG absorptions recorded. Finally, forest conservation programs are registered. The REDD+ system is the umbrella for all those AFOLU activities and is in an advanced state of implementation.

The energy sector is quite well regulated and detailed activity data is gathered on a mandatory monthly basis from all market agents and is consolidated / verified by the SNE. No GHG emissions are reported, however implementation would be relatively easy.

The agricultural sector reports voluntarily their activity data mainly by small and medium producers through the local promotion of agricultural development. This promotion program is a good opportunity to include these data into the national emissions registry for a start. Mandatory reporting of GHG emissions from the complete sector is not being considered yet by MIDA.

As mentioned in chapter 6, data of industry fuel consumption registered by the Secretary of Energy, is not segregated per type of usage, such as transport or energy use. Segregation of these consumptions is an important issue if GHG emissions from industry can be registered adequately.

Data on emissions from waste streams, such as waste water and solid wastes are not included in the national inventories for lack of data. There are no data reports available or gathered on solid waste streams from municipalities for instance, nor environmental regulations, except for the already mentioned EIS and AA/PAMA regulations. Data on waste water streams might become more readily available as several waste water projects (such as basic sanitation) are underway. However, estimations of both waste water and solid waste GHG sources can be made to get an impression of the amount of GHG gases emitted, using recent elaborated studies and inventories.

8.1 Analysis

Summarizing, through existing environmental regulations the main national sources of GHG emissions such as the AFOLU and energy sector (both electricity generation and transport) have data available on producers' level obtained both mandatory as voluntarily. These two sectors account for the vast majority of national GHG emissions. Data on industry and waste sectors are more difficult to obtain, however existing regulations such as the EIS and AA/PAMA reports do generate data on these sectors. Evaluation of the data available should be done to determine if useful GHG activity data can be obtained from these databases, managed within MiAmbiente.

The preliminary design of the national climate transparency platform contemplates that companies/projects/activities will voluntarily report their GHG emissions (according to a standard methodology) on an annual basis. MiAmbiente will verify and register reported data and elaborate tendential base lines.

Therefore, most data available through current environmental regulations as activity data within the respective governmental institutions can be used as a verification method for the voluntarily reports of GHG emissions of companies/projects/activities.

For mandatory reports from the different sectors, modifications of existing environmental regulations might be a short-term solution to gather GHG emission data, without having to elaborate a climate change law. A comprehensive climate change law is recommended though in the mid-term to regulate in an integral way all aspects related to climate change.

8.2 Analysis

Resumiendo, a través de las regulaciones ambientales existentes, las principales fuentes nacionales de emisiones de GEI, como AFOLU y el sector energético (tanto la generación de electricidad como el transporte), tienen datos disponibles a nivel de los productores, tanto obligatorios como voluntarios. Estos dos sectores representan la gran mayoría de las emisiones nacionales de GEI. Los datos sobre la industria y los sectores de desechos son más difíciles de obtener; sin embargo, las regulaciones existentes, como los informes EIS y AA / PAMA, generan datos sobre estos sectores. Se debe realizar una evaluación de los datos disponibles para determinar si se pueden obtener datos útiles de actividad de GEI de estas bases de datos, administradas dentro de MiAmbiente.

El diseño preliminar de la plataforma nacional de transparencia climática contempla que las compañías / proyectos / actividades informarán voluntariamente sus emisiones de GEI (según una metodología estándar) anualmente. MiAmbiente verificará y registrará los datos reportados y elaborará líneas de base tendenciales.

Por lo tanto, la mayoría de los datos disponibles a través de las regulaciones ambientales vigentes como datos de actividad dentro de las respectivas instituciones gubernamentales pueden utilizarse como un método de verificación para los informes voluntarios de emisiones de GEI de empresas / proyectos / actividades.

Para los informes obligatorios de los diferentes sectores, las modificaciones de las regulaciones ambientales existentes podrían ser una solución a corto plazo para recopilar datos de emisiones de GEI, sin tener que elaborar una ley de cambio climático. Sin embargo, a medio plazo se recomienda una ley integral sobre el cambio climático para regular de manera integral todos los aspectos relacionados con el cambio climático.

9. Conclusions and Recommendations

Political Framework and Policies:

The political framework in which MiAmbiente is the focal point for climate change and leading the national initiatives together with other ministries and governmental institutions is in place and considered adequate. Climate change issues are discussed within the national commission on climate change (CONACCP) which advises and coordinates with MiAmbiente. The CONACCP is well represented by all institutions related to climate change, especially after the 2013 modification of its composition. A new revision and modification of CONACCP is foreseen to include civil society and private enterprise counsels, which is strongly recommended.

The national climate change policy approved in 2007, has become out of date and a new policy is under development. All other existing strategies, plans or programs are still under development and not in place yet. The REDD+ strategy together with the Alliance for the Million developed by MiAmbiente is in a very advanced phase and recently the Ministry of Agricultural Development published its climate change plan as a first step. Only the national energy plan 2015 – 2050 of the Secretary of Energy is approved and in execution, however big private investments in LNG for energy purposes is causing a diversion of the ambitious alternative scenario, which is followed by government and where large scale up of solar and wind energy is needed and planned. Private investments in the latter technologies could fall behind because of a (future) strong participation of natural gas in the electricity matrix of Panama and its energy demand in general which would also affect the NDC goals presented by Panama.

GHG Inventories, Main sectors, Mitigation Programs:

From the most recent inventory reports it can be concluded, that national GHG emissions in Panama are on the rise and that the intended national strategy to develop a low carbon economy is very much needed. The first biannual update report (BUR1) with reference year 2013 demonstrates that the AFOLU sector has turned from a net sink of GHG to a net emitter of GHG. Total GHG emissions are 15876 Gg CO_2-eq. including the absorptions by the AFOLU sector. Improvements in data quality, transparency and integrity can be made, which makes a national emission and mitigation registry of GHG very relevant.

The 5 main subsectors of GHG emissions are i) deforestation, ii) transport, iii) enteric fermentation, iv) fossil fuel power plants, and v) industry (heat boilers), respectively. The National Climate Change Strategy and its plans and programs under development: REDD+, Alliance for the Million, Program for Urban Sustainable Mobility represent most of the priority GHG emission sectors and national priorities are in line with these mitigation actions.

Mitigation programs and projects include the REDD+, the national sustainable mobility program (NAMA) and CDM. The mitigation programs include deforestation, transport and fossil fuel power plants emissions. Other NAMAs do include enteric fermentation emissions, amongst other

agricultural emissions, and industry emissions, but are still in its idea phase. Also, the eco-state or green government strategic line within the national priority seems of less importance considering its contribution to total GHG emissions.

Main Governmental Actors:

The availability of GHG emissions and mitigation data within the main governmental actors can be improved significantly, which makes the national registry on GHG emissions very relevant to dispose of integral, reliable, precise and comparable data in the future. Six main governmental actors related to climate change are: i) Ministry of Environment (MiAmbiente), ii) Secretary of Energy (SNE), iii) Ministry of Agricultural Development (MIDA), iv) Civil Aviation Authority (AAC), v) Panama Maritime Authority (AMP), and vi) Panama Canal Authority (ACP). However, at least 15 governmental actors are related to climate change. The national commission on climate change (CONACCP) includes even 27 governmental institutions, which shows a very broad distribution of responsibilities and/or competences in governmental institutions. Therefore, it is considered of primordial importance that MiAmbiente takes a strong lead, that should be backed up by the entire cabinet led by the president of the Republic of Panama.

MiAmbiente as the focal point for the UNFCCC is, and should be, the leading authority on climate change issues. Both within the governmental structure as towards the private sector and society as a whole. MiAmbiente is taking on this responsibility and is actively working on the implementation of a national GHG emissions registry and mitigation actions. A lot of work has to be done still, and MiAmbiente is fully aware of this. Improvement of technical capacity in human resources and infrastructure is very much needed, within MiAmbiente as well as in all other governmental institutions and private companies, maybe with exception of the ACP who is very advanced in the measurement, reporting and verification of its GHG emissions and its mitigation actions. A leading role of MiAmbiente for awareness and capacity building is needed, not in the least to be able to create a broad support basis with the main stakeholders for implementation of, and actions needed for, a national registry and future carbon pricing. With regard to the actions needed, the current absence of specific GHG emissions data per company, project or activity, and more importantly, how to measure, report and verify those emissions (and mitigation actions) is considered the first priority needed for improvement. There do not exist clear rules on Measurement, Reporting and Verification, and those should be agreed upon and established together with the main stakeholders.

Technological and Legal Framework:

There is no law on climate change specifically, that establishes goals, (incentive) programs, national GHG emissions registry, mitigation actions, measurement, reporting and verification (MRV) programs. Such a law would be necessary in medium term when GHG emissions will have to be reported mandatory to the national emissions registry. For implementation of a voluntary reporting scheme of national GHG emissions registry, such a law is not required. Several laws and executive

decrees, that are regulating air pollution could offer the possibility of modification to regulate CO_2 emissions per km for example for mobile sources and include mandatory measurement and reporting of GHG emissions of the transport sector, as one of the main GHG emitters.

It should be mentioned that a great amount of activity data from the energy sector is available at SNE, which is obtained by mandatory information reported by each market agent. Improvements can still be made; however, the energy sector seems adequately organized to be able to report GHG emissions to a future registry. Although direct GHG emissions are not reported at this moment, including GHG emissions reporting would be relatively easy in the current legal framework of the energy sector.

With respect to the technological framework, MiAmbiente is in its initial phase of building a national platform on climate transparency, including the National Registry of GHG emissions and Mitigation Actions. Currently, MiAmbiente does not have any infrastructure or databases on emissions data yet, except for the forestry sector (REDD+). Infrastructure and human resources within the SNE are available but limited and some databases / platforms are saturated and out of date. Improvements are planned to modernize the platforms and databases.

Also, MIDA is gathering activity data on the agriculture sector, however here more improvements are considered necessary, as weaknesses are considered to be present in data recollection, consolidation, processing and analysis. AAC and ACP seem quite advanced in gathering activity data, where ACP already has its GHG emissions reported on a monthly basis. AMP possesses data with activity data from the national and international maritime activity, however no detailed information could be gathered on the data available.

National Decision-Making Process:

Approval of national laws is competence of the national parliament, although preparation and elaboration can be initiated from government and civil society as well. For a future law on climate change discussion and approval by national parliament is compulsory. This can be a long process in which changes or modifications can be included in the final approved law, which were not intended in the original law proposal. If a broad support can be gained at all levels of society, political and private institutions, approval might be achieved easier and more importantly, essence and spirit of the climate law might be conserved during the discussions in parliament.

However, a more direct implementation of an obligatory reporting of GHG emissions for the registry can be achieved by modification of already existing resolutions or decrees, for example on mobile and stationary emissions, to include mandatory reporting on GHG emissions of private companies and institutions. Therefore, only governmental approval is needed, mainly by the minister of the corresponding ministry that has the competence of the matter. For voluntary reporting of GHG emissions no modifications of legal norms are necessary.

Environmental Regulation Instruments:

Through existing environmental regulations, the main national sources of GHG emissions such as the AFOLU and energy sector (both electricity generation and transport) have data available on producers' level obtained both mandatory as voluntarily. These two sectors account for the vast majority of national GHG emissions. Data on industry and waste sectors are more difficult to obtain, however existing regulations such as the EIS and AA/PAMA reports do generate data on these sectors. Evaluation of the data available should be done to determine if useful GHG activity data can be obtained from these databases, managed within MiAmbiente.

The preliminary design of the national climate transparency platform contemplates that companies/projects/activities will voluntarily report their GHG emissions (according to a standard methodology) on an annual basis. MiAmbiente will verify and register reported data and elaborate tendential base lines. Therefore, most data available through current environmental regulations as activity data within the respective governmental institutions can be used as a verification method for the voluntarily reports of GHG emissions of companies/projects/activities. For mandatory reports from the different sectors, modifications of existing environmental regulations might be a short-term solution to gather GHG emission data, without having to elaborate a climate change law. A comprehensive climate change law is recommended in the mid-term to regulate in an integral way all aspects related to climate change.

Development of a national GHG emission and mitigation action registry and its implication on carbon pricing instruments.

Considering the country context as described in the previous analysis, it can be foreseen that the development of a national registry of GHG emissions and mitigation actions would be of a voluntary nature as starting point, since currently there is not a law/regulation that requires reporting of GHG. The development of a theoretical framework and technological platform are needed, in addition, documents such as guideline, directives with emissions factors and material for capacity building should be created. the development of the registry will need further discussion to define its scope, sectors and GHG to be included and reporting and verification requirements, etc. The voluntary national registry would serve as a portal to hold information on national emissions, as well as the mitigation actions taking place in Panama, it will help to put an adequate price on carbon and will lay the foundations for Panama to implement measures for the commercialization of emissions or create a carbon tax.

Conclusiones y Recomendaciones

Marco político y políticas:

El marco político en el que MiAMBIENTE es el punto focal para el cambio climático y el liderazgo de las iniciativas nacionales junto con otros ministerios e instituciones gubernamentales está en su lugar y se considera adecuado. Los problemas del cambio climático se discuten dentro de la comisión nacional sobre el cambio climático (CONACCP) que asesora y coordina con MiAmbiente. El CONACCP está bien representado por todas las instituciones relacionadas con el cambio

climático, especialmente después de la modificación de 2013 de su composición. Se prevé una nueva revisión y modificación de CONACCP para incluir consejos de la sociedad civil y de empresas privadas, lo que se recomienda encarecidamente.

Inventarios de GEI, Principales sectores, Programas de mitigación:

De los informes de inventario más recientes se puede concluir que las emisiones nacionales de GEI en Panamá están aumentando y que la estrategia nacional para desarrollar una economía baja en carbono es muy necesaria. El primer informe de actualización bianual (BUR1) con el año de referencia 2013 demuestra que el sector AFOLU ha pasado de un sumidero neto de GEI a un emisor neto de GEI. Las emisiones totales de GEI son 15876 Gg CO2-eq. Incluyendo las absorciones por parte del sector AFOLU. Se pueden realizar mejoras en la calidad de los datos, la transparencia y la integridad, lo que hace que un registro nacional de emisiones de GEI de emisiones y mitigación sea muy relevante.

Los 5 subsectores principales de las emisiones de GEI son i) deforestación, ii) transporte, iii) fermentación entérica, iv) centrales eléctricas de combustibles fósiles, yv) industria (calderas de calor), respectivamente. La Estrategia Nacional de Cambio Climático y sus planes y programas en desarrollo: REDD +, Allianza por el Millón, Programa de Movilidad Urbana Sostenible representan la mayoría de los sectores prioritarios de emisiones de GEI y las prioridades nacionales están en línea con estas acciones de mitigación.

Los programas y proyectos de mitigación incluyen REDD +, el programa nacional de movilidad sostenible (NAMA) y el MDL. Los programas de mitigación incluyen la deforestación, el transporte y las emisiones de las centrales eléctricas de combustibles fósiles. Otras NAMA incluyen emisiones de fermentación entérica, entre otras emisiones agrícolas y emisiones de la industria, pero aún están en su fase conceptual. Además, la línea estratégica del gobierno ecológico o verde dentro de la prioridad nacional parece ser menos importante si se considera su contribución a las emisiones totales de GEI.

Principales actores gubernamentales:

La disponibilidad de datos de emisiones de GEI y acciones de mitigación dentro de los principales actores gubernamentales pueden mejorarse significativamente, lo que hace que el registro nacional de emisiones de GEI sea muy relevante para disponer de datos integrales, confiables, precisos y comparables en el futuro. Los seis principales actores gubernamentales relacionados con el cambio climático son: i) Ministerio de Medio Ambiente (MiAmbiente), ii) Secretario de Energía (SNE), iii) Ministerio de Desarrollo Agrícola (MIDA), iv) Autoridad de Aviación Civil (AAC), v) Panamá Autoridad Marítima (AMP), y vi) Autoridad del Canal de Panamá (ACP). Sin embargo, al menos 15 actores gubernamentales están relacionados con el cambio climático. La comisión nacional sobre el cambio climático (CONACCP) incluye incluso 27 instituciones gubernamentales, lo que muestra una distribución muy amplia de responsabilidades y / o competencias en las instituciones gubernamentales. Por lo tanto, se considera de primordial importancia que MiAmbiente tome una fuerte ventaja, que debe ser respaldada por todo el gabinete encabezado por el presidente de la República de Panamá.

MiAmbiente como punto focal de la CMNUCC es, y debe ser, la autoridad líder en temas de cambio climático. Tanto dentro de la estructura gubernamental como hacia el sector privado y la sociedad en su conjunto. MiAmbiente asume esta responsabilidad y trabaja activamente en la implementación de un registro nacional de emisiones de GEI y acciones de mitigación. Aún queda mucho trabajo por hacer, y MiAmbiente es plenamente consciente de esto. La mejora de la capacidad técnica en recursos humanos e infraestructura es muy necesaria, tanto en MiAmbiente como en todas las demás instituciones gubernamentales y empresas privadas, tal vez con la excepción de la ACP que está muy avanzada en la medición, el informe y la verificación de sus emisiones de GEI. Sus acciones de mitigación. Se necesita un papel de liderazgo de MiAmbiente para crear conciencia y desarrollar capacidades, en particular para poder crear una base de apoyo amplia con los principales interesados para la implementación y las acciones necesarias para un registro nacional y una futura fijación de precios del carbono. Con respecto a las acciones necesarias, la ausencia actual de datos específicos de emisiones de GEI por empresa, proyecto o actividad y, lo que es más importante, cómo medir, informar y verificar esas emisiones (y acciones de mitigación) se considera la primera prioridad necesaria para la mejora. No existen reglas claras sobre Medición, Reporte y Verificación, y esas deben ser acordadas y establecidas junto con las principales partes interesadas.

Marco tecnológico y jurídico:

No existe una ley específica sobre el cambio climático que establezca objetivos, programas (de incentivos), registro nacional de emisiones de GEI, acciones de mitigación, programas de medición, informes y verificación (MRV). Tal ley sería necesaria en el mediano plazo cuando las emisiones de GEI deberán reportarse de manera obligatoria al registro nacional de emisiones. Para la implementación de un esquema de notificación voluntaria del registro nacional de emisiones de GEI, no se requiere tal ley. Varias leyes y decretos ejecutivos, que regulan la contaminación del aire, podrían ofrecer la posibilidad de modificar la regulación de las emisiones de CO2 por km, por ejemplo, para fuentes móviles e incluir mediciones y reportes obligatorios de las emisiones de GEI del sector del transporte, como uno de los principales emisores de GEI.

Cabe mencionar que una gran cantidad de datos de actividad del sector energético está disponible en SNE, que se obtiene mediante la información obligatoria reportada por cada agente del mercado. Todavía se pueden hacer mejoras; sin embargo, el sector de la energía parece estar adecuadamente organizado para poder reportar las emisiones de GEI a un registro futuro. Aunque las emisiones directas de GEI no se informan en este momento, incluir el informe de emisiones de GEI sería relativamente fácil en el marco legal actual del sector energético.

Con respecto al marco tecnológico, MiAmbiente se encuentra en su fase inicial de construcción de una plataforma nacional sobre la transparencia climática, incluido el Registro Nacional de Emisiones de GEI y Acciones de Mitigación. Actualmente, MiAmbiente todavía no tiene ninguna infraestructura o base de datos sobre datos de emisiones, excepto para el sector forestal (REDD +). La infraestructura y los recursos humanos dentro del SNE están disponibles, pero son limitados y algunas bases de datos / plataformas están saturadas y desactualizadas. Se planifican mejoras para modernizar las plataformas y bases de datos.

Además, MIDA está recopilando datos de actividad en el sector agrícola, sin embargo, aquí se consideran necesarias más mejoras, ya que se considera que las debilidades están presentes en la recolección, consolidación, procesamiento y análisis de datos. AAC y ACP parecen bastante avanzados en la recopilación de datos de actividad, donde ACP ya tiene sus emisiones de GEI informadas mensualmente. AMP posee datos con datos de actividad de la actividad marítima nacional e internacional, sin embargo, no se pudo recopilar información detallada sobre los datos disponibles.

Proceso nacional de toma de decisiones:

La aprobación de las leyes nacionales es competencia del parlamento nacional, aunque la preparación y la elaboración también pueden iniciarse desde el gobierno y la sociedad civil. Para una futura ley sobre cambio climático, la discusión y aprobación por parte del parlamento nacional es obligatoria. Este puede ser un proceso largo en el que los cambios o modificaciones pueden incluirse en la ley final aprobada, que no se pretendía en la propuesta original de la ley. Si se puede obtener un amplio apoyo en todos los niveles de la sociedad, las instituciones políticas y privadas, la aprobación podría lograrse más fácilmente y, lo que es más importante, la esencia y el espíritu de la ley de cambio climático podrían conservarse durante las discusiones en el parlamento.

Sin embargo, se puede lograr una implementación más directa de un informe obligatorio de las emisiones de GEI para el registro mediante la modificación de resoluciones o decretos ya existentes, por ejemplo, sobre emisiones móviles y estacionarias, para incluir informes obligatorios sobre las emisiones de GEI de empresas e instituciones privadas. Por lo tanto, solo se necesita la aprobación del gobierno, principalmente por el ministro del ministerio correspondiente que tiene la competencia del asunto. Para la notificación voluntaria de las emisiones de GEI no es necesario modificar las normas legales.

Instrumentos de Regulación Ambiental:

A través de las regulaciones ambientales existentes, las principales fuentes nacionales de emisiones de GEI, como el AFOLU y el sector energético (tanto la generación de electricidad como el transporte) tienen datos disponibles a nivel de los productores, tanto obligatorios como voluntarios. Estos dos sectores representan la gran mayoría de las emisiones nacionales de GEI. Los datos sobre la industria y los sectores de desechos son más difíciles de obtener; sin embargo, las regulaciones existentes, como los informes EIA y AA / PAMA, generan datos sobre estos sectores. Se debe realizar una evaluación de los datos disponibles para determinar si se pueden obtener datos útiles de actividad de GEI de estas bases de datos, administradas dentro de MiAmbiente.

El diseño preliminar de la plataforma nacional de transparencia climática contempla que las compañías / proyectos / actividades informarán voluntariamente sus emisiones de GEI (según una metodología estándar) anualmente. MiAmbiente verificará y registrará los datos reportados y elaborará líneas de base tendenciales. Por lo tanto, la mayoría de los datos disponibles a través de las regulaciones ambientales vigentes como datos de actividad dentro de las respectivas instituciones gubernamentales pueden utilizarse como un método de verificación para los informes voluntarios de emisiones de GEI de empresas / proyectos / actividades. Para los informes obligatorios de los diferentes sectores, las modificaciones de las regulaciones ambientales

existentes podrían ser una solución a corto plazo para recopilar datos de emisiones de GEI, sin tener que elaborar una ley de cambio climático. A medio plazo, se recomienda una ley integral sobre el cambio climático para regular de manera integral todos los aspectos relacionados con el cambio climático.

Desarrollo de un registro nacional de medidas de emisión y mitigación de GEI y su implicación en los instrumentos de fijación de precios del carbono.

Teniendo en cuenta el contexto del país como se describe en el análisis anterior, se puede prever que el desarrollo de un registro nacional de emisiones de GEI y las medidas de mitigación serían de carácter voluntario como punto de partida, ya que actualmente no existe una ley / regulación que requiera informes de GEI. Se necesita el desarrollo de un marco teórico y una plataforma tecnológica, además, se deben crear documentos como directrices, directivas con factores de emisiones y material para el desarrollo de capacidades. el desarrollo del registro requerirá una mayor discusión para definir su alcance, los sectores y los GEI que se incluirán y los requisitos de informe y verificación, etc. El registro nacional voluntario servirá como un portal para contener información sobre las emisiones nacionales, así como las acciones de mitigación que tendrá lugar en Panamá, ayudará a poner un precio adecuado al carbono y sentará las bases para que Panamá aplique medidas para la comercialización de emisiones o cree un impuesto al carbono.