



Fachhochschule Köln
Cologne University of Applied Sciences



UNIVERSIDAD AUTÓNOMA DE SAN LUIS POTOSÍ
FACULTADES DE CIENCIAS QUÍMICAS, INGENIERÍA Y MEDICINA
PROGRAMAS MULTIDISCIPLINARIOS DE POSGRADO EN CIENCIAS AMBIENTALES
AND
COLOGNE UNIVERSITY OF APPLIED SCIENCES
INSTITUTE FOR TECHNOLOGY AND RESOURCES MANAGEMENT IN THE TROPICS AND SUBTROPICS

**Analysis of the Spillover Effects of Climate Change Mitigation Policies in the Panamanian
Energy Matrix**

THESIS TO OBTAIN THE DEGREE OF
MAESTRÍA EN CIENCIAS AMBIENTALES
DEGREE AWARDED BY
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AND
MASTER OF SCIENCE
“TECHNOLOGY AND RESOURCES MANAGEMENT IN THE TROPICS AND SUBTROPICS
FOCUS AREA “ENVIRONMENTAL AND RESOURCES MANAGEMENT”
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ITT/ PMPCA

INSTITUTO O FACULTAD

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CON EL APOYO DE:

**DEUTSCHER AKADEMISCHER AUSTAUSCH DIENST (DAAD)
CONSEJO NACIONAL DE CIENCIA Y TECNOLOGÍA (CONACYT)**

**LA MAESTRÍA EN CIENCIAS AMBIENTALES RECIBE APOYO A TRAVÉS DEL PROGRAMA NACIONAL
DE POSGRADOS (PNPC - CONACYT)**

Erklärung / Declaración

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1. Executive Summary

Climate Change is the biggest challenge for the planet, not only for the earth but also for all developing countries who struggle to find the way to a sustainable society.

The United Nations Framework Convention on Climate Change has been working since 1992 to bring all countries together against this global fight. But along the road the UNFCCC has taken decisions to mitigate climate change that not only will decrease GHG but also has other impacts that could be positive or negative in the different economies. Those impacts are called spillover effects.

A spillover effect takes place when a Climate Change Mitigation Measure (CCMM) made in a region or country affect the wellbeing of another country, whether for the better or for the worse, and are not paid by the country or group of countries that generated it because they are not obliged by any regulation to do so.

Panama does not escape from it. To understand better how mitigation policies, taken as decisions in UNFCCC, can affect the Panamanian energy matrix, this research analyzed how the Implementation of Nationally Appropriate Mitigation Activities (NAMA) in the Panamanian energy sector could impact current and future energy matrix in order to determinate possible paths to avoid and/or improve the spillover effects in the electricity generation sub-sector.

To make the analysis, the research proceed to make a description of current situation of Climate Change and Energy Policies, at national, regional and global level, in order to evaluate the consistency of national and regional policies linked to UNFCCC, determining the feasibility of including renewable energy policies NAMAs and a definition of possible scenarios that could create spillover effects on the energy matrix.

After understanding the way that Panama has built its energy sector, recognizing how UNFCCC Mitigation Policies have been developed and applied, noting the complexity of building laws and regulations that meet national and international standards, having in mind that the globe is sharing the responsibility to mitigate climate change in every way possible to assure temperature raise until 2 ° C, accepting that all decisions and actions made in a global market affect the economical behavior in every other country, it is undeniable to affirm that the Global decision agreed in the Bali Action Plan of develop Nationally Appropriate Mitigation Actions will have important spillover effects on the Panamanian Energy Matrix. The spillover effects will be lived if Panama implement the measure and if Panama does not implement it. The suffered spillover effects will be positive and negative, but Panama has de capacity to manage them.

Implementation of NAMAs in the energy sector could produce spillover effects such as Increment of Electricity Generation Investment and Operational Cost, increment of fiscal incentives percentage, increment of Private Sector Revenues, Increment quality of life of local communities, Increment of Capacity Building in governmental and private sector, increment of Panama's Role in NAMAs negotiations, increment of North-South and South-South Cooperation, Increment of Renewable Energies % in the Energy Matrix, decrease CO₂ emissions of Generation Scenarios. But one of the most important effects is the possible disappearance of CDM renewable energy Market if NAMA is not properly addressed.

A deeper research is necessary in order to define the co-existence boundary between NAMAs and Clean Development Mechanism.

Resumen Ejecutivo

El cambio climático es el desafío más grande para el planeta, no sólo para el mundo, sino también para todos los países en desarrollo que luchan por encontrar el camino hacia una sociedad sostenible.

La Convención Marco de las Naciones Unidas sobre el Cambio Climático ha estado trabajando desde 1992 para facilitar el consenso mundial en contra sobre cómo abordar esta lucha mundial. Pero en el camino la CMNUCC ha tomado decisiones para mitigar el cambio climático que no sólo reducirán gases de efecto invernadero, si no también generarán otros impactos que podrían ser positivos o negativos en las diferentes economías. Estos impactos son llamados efectos indirectos o de derrame.

Un efecto indirecto se implementa cuando una medida de mitigación contra el cambio climático (CCMM) en un región o país afectan el bienestar de otro país, ya sea para bien o para mal, y no son pagados por el país o grupo de países que lo generó, ya que no están obligados a ello, porque no existe ninguna regulación que lo exija.

Panamá no escapa de esta realidad. Para comprender mejor cómo las políticas de mitigación, consideradas en las decisiones de la CMNUCC pueden afectar la matriz energética de Panamá, esta investigación analizó la forma en la ejecución de actividades de mitigación apropiadas a nivel nacional (NAMA) pueden afectar la matriz energética de Panamá, actual y futura, con el fin de determinar posibles caminos para evitar y / o mejorar los efectos de derrame en la generación de electricidad.

Para hacer el análisis, la investigación procederá a realizar una descripción de la situación actual del cambio climático y políticas energéticas, a nivel nacional, regional y mundial, con el fin de hacer un análisis de la coherencia de las políticas nacionales y regionales con respecto a la CMNUCC, además de un análisis de la viabilidad para incluir como NAMA las políticas fomento de energías renovables y una definición de los posibles escenarios que podrían crear efectos secundarios en la matriz energética del país.

Después de comprender la manera en que Panamá ha desarrollado su sector energético, de comprender cómo la CMNUCC ha elaborado y aplicado las políticas mitigación, teniendo en cuenta la complejidad la construcción las leyes reglamentos y normas nacionales e internacionales, entendiendo que el mundo comparte la responsabilidad de mitigar el cambio climático y debe hacer en todo lo posible para asegurar que el aumento de la temperatura no sobrepase 2 ° C, y aceptando que todas las decisiones y acciones realizadas en un mercado mundial afectan el comportamiento económico en cualquier otro país, es innegable que afirmar que la decisión global acordada en el Plan de Acción de Bali de implementar NAMAs tendrá importantes efectos secundarios sobre la matriz energética panameña.

La investigación determina los efectos indirectos que vivirá Panamá si implementa NAMAs al igual que identifica que pasará si no los pone en práctica. Los efectos indirectos sufridos serán positivos y negativos, pero Panamá tiene la capacidad de gestionarlos.

Aplicación de NAMAs en el sector energético puede producir efectos secundarios tales como Incremento del costo de la inversión y la generación operativa, el incremento de porcentaje de los incentivos fiscales, incremento de los ingresos del sector privado, incremento de la calidad de vida de las comunidades locales, Incremento de la creación de capacidades en el sector privado y gubernamental, mejoras en el desempeño de Panamá en Negociaciones sobre NAMA en la UNFCCC, incremento de la cooperación Norte-Sur y la cooperación Sur-Sur, de incremento de porcentaje de energías renovables en la matriz energética y la disminución de las emisiones de CO2 escenarios de generación.

Pero uno de los efectos más importantes es la posible desaparición del Mecanismo de Desarrollo Limpio en el sector de energías renovables si los NAMAs no son implementados en la dirección correcta.

Es necesaria una investigación más profunda sobre el tema con el fin de definir la coexistencia frontera entre NAMAs y el Mecanismo de Desarrollo Limpio.

Zusammenfassung

Der Klimawandel ist die größte Herausforderung für unseren Planeten, und zwar nicht nur für die Erde, sondern auch für all die Entwicklungsländer, die sich bemühen den Weg zu einer Nachhaltigen Gesellschaft zu finden.

In der Klimarahmenkonvention der Vereinten Nationen (UNFCCC) arbeitet man seit 1992 darauf hin, alle Nationen für diesen globalen Kampf zusammenzubringen. Aber in dieser Zeit traf die UNFCCC die Entscheidung, der globalen Erwärmung entgegenzuwirken, was nicht nur zu einer THG-Reduktion führt, sondern was auch Auswirkungen – positive oder auch negative – auf die einzelnen Volkswirtschaften hat. Diese Auswirkungen nennt man Übertragungseffekte oder auch Spillover-Effekte.

Ein Spillover-Effekt ereignet sich, wenn Klimaschutzmaßnahmen (CCMM), die für eine Region oder ein Land getroffen werden, das Wohlbefinden einer anderen Region oder eines Landes beeinflussen – sei es zum Besseren oder zum Schlechteren – diese Maßnahmen aber nicht von den Ländern bezahlt werden, die diesen Effekt verursachen, da sie gesetzlich nicht dazu verpflichtet sind.

Panama ist hier keine Ausnahme. Um besser zu verstehen, wie von der UNFCCC beschlossene Richtlinien für die THG-Reduktion die panamaische Energiematrix beeinflussen, wurden, im Rahmen dieser Untersuchung, die Einwirkungen analysiert, die eine Umsetzung von Nationally Appropriate Mitigation Activities (NAMAs) im panamaischen Energiesektor auf heutige und zukünftige Energiematrizen haben könnte. Ziel dieser Analyse war es, mögliche Wege zu ergründen, Spillover-Effekte auf den Stromerzeugungs-Teilektor zu verbessern oder gar zu verhindern.

Für diese Analyse wurde eine Beschreibung der aktuellen Lage des Klimawandels und der Energie-Richtlinien auf nationaler, regionaler und globaler Ebene erstellt. Dabei wurden die Vereinbarkeit nationaler und regionaler Richtlinien mit denen der UNFCCC und die Durchführbarkeit der NAMAs (Richtlinien für erneuerbare Energien) geprüft und die möglichen Szenarios definiert, die Spillover-Effekte auf die Energiematrix haben könnten.

Nachdem die Struktur des Energiesektors von Panama verstanden wurde; nachdem erkannt wurde, wie UNFCCC-Verminderungsrichtlinien (mitigation policies) entwickelt und angewendet werden; nachdem man sich der Schwierigkeit bewusst geworden ist, Gesetze und Vorschriften verabschieden zu können, die den nationalen und internationalen Standards entsprechen; nachdem man sich vor Augen geführt hat, dass die Welt die Verantwortung teilt, der Erderwärmung auf jede erdenkliche Weise entgegenzuwirken, um den Temperaturanstieg unter 2°C zu halten; nachdem man akzeptiert hat, dass alle Entscheidungen und Handlungen auf dem Weltmarkt das Wirtschaftsverhalten aller Nationen beeinflussen; dann ist es eine unbestreitbare Tatsache, dass die weltpolitische Entscheidung, die im Bali Action Plan getroffen wurde, die Nationally Appropriate Mitigation Actions zu entwickeln, bedeutende Spillover-Effekte auf die panamaische Energiematrix haben wird. Diese Spillover-Effekte werden eintreten obgleich Panama die NAMAs anwendet oder nicht. Sie werden positiv und negativ ausfallen, doch Panama hat die Fähigkeit sie zu leiten und richten.

Die Anwendung der NAMAs im Energiesektor könnte Spillover-Effekte verursachen wie einen Zuwachs an Investitionen in der Stromerzeugung und an operativen Kosten; einen prozentuellen Zuwachs von Subventionen; einen Zuwachs an Einnahmen im privatwirtschaftlichen Sektor; eine Verbesserung der Lebensqualität einheimischer Gemeinschaften; einen Zuwachs an Hilfe zur Selbsthilfe sowohl im Regierungs- als auch im privaten Sektor; eine Vergrößerung der Rolle Panamas in den Verhandlungen der NAMAs; eine Zunahme der Nord-Süd- und Süd-Süd-Kooperationen; einen prozentuellen Zuwachs erneuerbarer Energien in der Energiematrix; eine Abnahme der CO₂-Emissionen in der Stromerzeugung; uvm. Eine der wichtigsten Spillover-Effekte jedoch ist das mögliche Verschwinden des CDM-Marktes für erneuerbare Energien, wenn die NAMAs nicht angemessen angegangen werden.

Um die Koexistenz-Grenze zwischen NAMAs und dem Mechanismus für umweltverträgliche Entwicklung (CDM) zu ermitteln, ist eine tiefer reichende Untersuchung in diesem Fachgebiet ist notwendig.

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6. Nomenclature

1. CO₂: Carbon Dioxide
2. CH₄: Methane
3. N₂O: Nitrous oxide
4. HFCs: Hydro fluorocarbons
5. PFCs: Per-fluorocarbons
6. SF₆: Sulphur-hexafluoride

7. List of Acronyms

- ANAM: Environmental National Authority (Autoridad Nacional del Ambiente)
- AOSIS : Alliance of Small Island States
- AWG KP: Ad Hoc Working Group on Kyoto Protocol
- AWG LCA: Ad Hoc Working Group on Long Cooperation Activities
- BAP: Bali Action Plan
- CACAM Central Asia, Caucasus, Albania and Moldova (negotiating coalition)
- CC: Climate Change
- CDM: Clean Development Mechanism
- CER: Certified emission reduction (generated through the CDM)
- CGE: Consultative Group of Experts on National Communications from Non-
- CO₂: Carbon Dioxide
- COP/MOP Conference of the Parties serving as the meeting of the Parties to the
- COP: Conference of the Parties
- ERU: Emission reduction unit (generated though joint implementation projects)
- GDP : Gross Domestic Product
- GEF: Global Environmental Fund
- GHG: Green House Gases
- GRULAC Group of Latin America and the Caribbean states (UN regional group)
- IEA: International Energy Agency
- INC: Intergovernmental Negotiating Committee for the UNFCCC
- IPCC: Intergovernmental Panel on Climate Change
- KP: Kyoto Protocol
- LDC Least developed country
- MEF: Ministry of Economy and Finance (Ministerio de Economía y Finanzas)
- MEP: Meeting of the Parties
- MICI: Ministry of Trade and Industry (Ministerio de Comercio e Industrias)
- NAMAs: Nationally Appropriate Mitigation Activities
- NGO: Non-governmental organization
- OECD: Organization for Economic Co-operation and Development
- OPEC: Organization of Petroleum Exporting Countries
- SBI: Subsidiary Body for Implementation
- SBSTA: Subsidiary Body for Scientific and Technological Advice
- UNCCD: United Nations Convention to Combat Desertification
- UNCED: United Nations Conference on Environment and Development

- _ UNDP: United Nations Development Programme
- _ UNEP: United Nations Environment Programme
- _ UNFCCC: United Nation Convention on Climate Change
- _ UNIDO: United Nations Industrial Development Organization

8. Introduction:

Climate Change is the biggest challenge of our era, the world is not only facing a time of change but also a change of times, mostly developing countries, who struggle to find the way through a sustainable society.

The United Nations Framework Convention on Climate Change (UNFCCC) has been working since 1992 to bring all countries together against this global fight. But along the road UNFCCC parties have taken decisions to mitigate climate change that not only will decrease GHG but also generate other impacts which could be positive or negative in different economies. Those impacts are called spillover effects.

The world is seeking to deliver a real binding Climate Change Architecture which shall include a vary type of commitments depending on the country possibilities and responsibilities. It is clear that there are big differences between the Parties, and especially between developed and developing countries, in all the sections and issues. There is where the challenge of Post Kyoto negotiations rest: we need to find a basis for negotiations that contribute to not have an increment of temperature above 2 °C.

In the negotiations, many countries and observers are calling for a “legally-binding” outcome, often referring to a treaty outcome. Some countries would like agreement or a clear mandate in Cancun that a new legally binding treaty/agreement/instrument will be concluded as the outcome of negotiation taking in to consideration Bali action plan and Copenhagen Accord which no are in the same page.

Panama does not escape from it. To understand better how mitigation policies, taken as decisions within UNFCCC, could affect the Panamanian energy matrix, this research analyzed how the renewable energy incentives law (Law # 45, 2004) by participating as National Appropriate Mitigation Actions (NAMAs) could impact current and future energy matrix, in order to determinate possible spillover effects of UNFCCC mitigation policies.

The energy matrix is been affect by climate change and the variables linked to it. Is structured by national policies and influenced by global and regional energy policies, putting pressure to attain globalized standards.

But from them the mayor challenge is to include in the matrix environmental sound technology aiming to define sustainable energy development that can adapt, has access to finance and be part of a Climate Change Regime that is under constant building, considering UNFCCC mitigation policies as the main contributor to this Regime.

This work analyze which NAMA category fits best to the existing voluntary mitigation policy action that Panama has develop in the law 45, and determine the spillover effects of presenting each category, as a possible technology penetration program NAMA and/or law and Regulation NAMA.

Because of the complexity of the referred subject, and the lack of time, the research will only identify the possible spillover effects generated by the interrelation between the Law 45 as National Energy Policy, NAMAs and CDM.

The general objective is identifying potentials for spillover effect of climate change mitigation policies in the energy matrix of the Republic of Panama.

As specific objective the research analyze NAMA categories in relation to Panama 's Renewable Energy Legislation and define which category is more appropriate to national circumstances; it also detect overlap between CDM and NAMAs as possible implementation strategy.

From the chosen more appropriate NAMA Category, the research identify the possible spillover effects (economic and environmental aspects) on the Panamanian Energy Matrix and identify possible paths to maximize positive spillover effects of implementing NAMAs related strategies into Panamanian Energy Matrix.

The research used the empiric and descriptive method to organize and classify the information in order to evaluate its properties, relations and tendencies in order to facilitate the analysis and synthesis. The model SDDP and OptGen will help me to represent the possible environmental and economic impact on the energy matrix.

The key followed were Renewable Energy Panamanian CDM activities, Renewable energy Panamanian law, Energy Sector CO2 equivalent emissions, Technologies implementation cost, NAMAs.

As the investigation provides knowledge to complement the climate change strategy is important to acknowledge that "the more alternative, the more difficult the choice" NAMAs are a great opportunity to reduce GHG, but decision makers and scientists have the responsibility to make the correct choice, and this research intent to contribute to it.

9. Background

9.1. Development of Climate Change Mitigation Policies

9.1.1. UNFCCC

The international concerns about how the relationship developed between humans and the environment began to take prominence during the fifties. The motivation to become aware of it grew over the years encouraged by books and articles referring to congenital deformities of thalidomide use, oil spills at sea and its consequences on marine life. This information started to raise awareness in the West during the age of 60 and 70 was discussed on the causes of environmental degradation as ambition and pursuit of economic growth and population growth (UNEP, 2002).

In the past 35 years the fight to protect the environment has advanced greatly, particularly in the establishment of organizations, programs and arrangements for the protection of different facets of the environment, both governmental and civil society which generate relevant information for decision making at the international level.

The link between humans and climate system, plus the growing public concern of global environmental issues, created the conditions to include climate change on the most important global challenges during the eighties.

As one of the most important requirements to establish international cooperation to contra rest CC is scientific information. The World Meteorological Organization (WMO) and the UN Environment *Programme* (UNEP) formed the Intergovernmental Panel on Climate Change (IPCC) in 1988, and also in this year the United Nations

General Assembly took up the issue of climate change for the first time and includes in one of its goal the “Protection of global climate for present and future generations”. The IPCC in 1990 give birth to its First Assessment Report, where was conferment the responsibility of humans in the change of climate and they ask in the report for an international action. Then with a resolution UN launched negotiations on a framework convention on climate change and after 15 months, on 9 May 1992, the INC adopted by consensus the United Nations Framework Convention on Climate Change (UNEP, 2002) making available intergovernmental efforts to tackle Climate Change.

This international environmental treaty, originated at the United Nations Conference on Environment and Development held in Rio de Janeiro from 3 to 14 June of 1992, has as ultimate objective to stabilize Greenhouse Gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system and by doing so bringing sustainable development as a common practice (UNFCCC, 1992). Such non quantified level should be achieved in a period which provide the necessary time for ecosystems to adapt naturally to climate change, helping to reduce the possible treat to food production and restricting a future economic sustainable development.

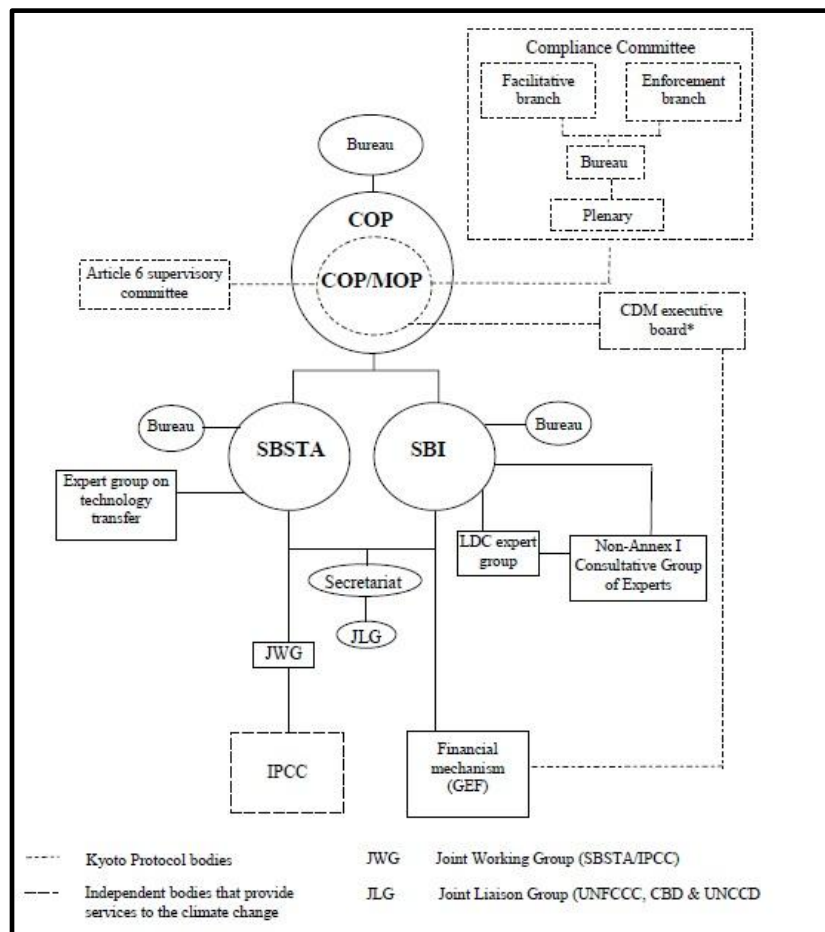
The Parties to the Convention (countries which ratified, accepted, approved, or acceded to the treaty) are subject to an important set of general commitments which place a fundamental obligation on both industrialized and developing countries to respond to climate change (UNEP, 2002).

UNFCCC is the result of hard work by the international community to identify new models of development (Sustainable Development, Green Economy), leading to the search for tools to implement them on the globe.

UNFCCC recognize explicitly the importance of natural ecosystems, food production and sustainable economic development, determining whether there is a “dangerous anthropogenic interference in climate system” (UNFCCC, 1992), and also discusses possible ways of action that can incorporate in decisions about stabilization objectives as well as information about potential climate change impacts around the world.

UNFCCC has also recognized that climate change mitigation policies could generate diverse positive and negative impacts among countries societies.

Figure # 1- UNFCCC Institutions. Source: UNFCCC, 2002



It sets no mandatory limits on GHG emissions for individual countries and contains no enforcement mechanisms. In that sense, is considered a non-legally binding agreement, but provides for updates that would set mandatory emission limits. The principal update is the Kyoto Protocol, which has become much better known than the UNFCCC itself.

The Conference of the Parties (COP) is the supreme body of the Convention as showed in figure # 1; it's the highest decision-making authority that in association of all Parties to the Convention are responsible for keeping international efforts to address climate change (Climate Change Secretariat, 2007).

Parties have met annually in the Conference of the Parties (COP) to monitor the application of the Climate Change Convention (UNEP, 2002) and continue talks to develop global mitigation and adaptation policies and strategies.

Under UNFCCC, governments are able to collect and share information on GHG emissions and national policies; launch national strategies for reduce GHG emissions and adapting to probable impacts, comprising the provision of financial and technological funding to developing countries and cooperate in organizing for adaptation to climate change impacts (UNFCCC, 1992)

Every single Party to the Convention is represented at sessions of the Convention bodies by a national delegation. They are organized into five regional groups, to be precise: Africa, Asia, Central and Eastern Europe, Latin America and the Caribbean states, and the Western Europe and Others Group (it includes Australia, Canada, Iceland, New Zealand, Norway, Switzerland and US) (UNFCCC, 2002).

Developing countries mostly work aggregated within the Group 77 and China (G-77) in order to cultivate stronger negotiating positions. It was founded in 1964 in the context of the UN Conference on Trade and Development (UNCTAD) and since then functions throughout the UN system, comprising over 134 members (Muller, 2009). Every year a country has to take the presidency of the G-77.. Nevertheless, as the G-77 and China is a diverse group with differing interests on climate change issues, individual members of the group also intervenes in debates, as also groups within the G-77.

The Climate Change Convention acknowledge that climate change adverse effects are a humankind concern but also recognize that some environmental legislation and standards applied in some countries could be inappropriate and unwarranted economic and social cost to other countries, particularly developing countries; also recognize the special difficulties for countries with an oil dependent economies (UNFCCC, 1992)

9.1.2. Kyoto Protocol

When Parties adopted the Convention, governments knew that its commitments were not be sufficient to tackle climate change. At COP 1 on 1995 in Berlin, Parties (Countries who signed and ratified the Climate Change Convention) decided in the Berlin Mandate to create talk looking for stronger and further detailed commitments for industrialized countries. After two and a half years of intense negotiations, the Kyoto Protocol was approved at COP 3 in Kyoto, Japan, on 11 December 1997 (UNEP, 2002).

The Kyoto Protocol is the first binding instrument to set emission reduction targets through flexible mechanisms specifically through Emission Trading Schemes, Joint implementation and Clean Development Mechanism (UNFCCC, 1997).

Negotiations among parties was extreme complex as every decision was linked to a financial need, therefore many important issues were not included on the discussion and set aside for further discussion after the Kyoto Protocol Adoption. KP bordered elementary features of its “mechanisms” and compliance system, but did not include operational rules which brought doubts to several countries who wanted to have a clear picture of what KP could mean to their Nations (UNEP, 2002).

KP has the same objective, principles and institutions as UNFCCC. The difference lies in the way and strength of Annex I Commitments. Every Annex I Party has legally-binding targets to limit or reduce their greenhouse gas emissions at minimum 5 % of 1990 levels dependent on its historical GHG emission responsibility during the first commitment period (2008-2012) (UNFCCC, 1997). The GHGs that have to be reduced during the first commitment period are 6: Carbon dioxide (CO₂); Methane (CH₄); Nitrous oxide (N₂O); Hydro fluorocarbons (HFCs); Per-fluorocarbons (PFCs) and Sulphur-hexafluoride (SF₆).

Now Parties are negotiating if more gases should be included as HFC-245fa, PFC-9, NF₃, HFEs (Simeonova, 2007; UNFCCC, 2007).

The major distinction between the Protocol and the Convention is that while the Convention encouraged industrialized countries to stabilize GHG emissions, the Protocol commits them to do so.

Recognizing developed countries as principal responsible for the current high levels of GHG emissions in the atmosphere, as a result of more than 150 years of industrial activity, the Protocol places a heavier burden on developed nations under the principle of "common but differentiated responsibilities" (UNFCCC, 1997)

KP also contemplated the need to review and develop further rules and definition on features over the time. It established that negotiations on targets for the second commitment period should start in 2005; Annex I Parties must have demonstrated progress on National Emission Reductions. Also KP is being reviewed since the second session of the COP, every 2 years of its entrance into force (UNFCCC, 2002).

Parties have the possibility to offset their emission by a suggestive policy list which includes mitigation measures as increasing carbon sinks (afforestation, reforestation, forest management, cropland management, grazing land); or by utilizing one of its flexible mechanisms created to facilitate the achievement of GHG reductions and reduce its cost:

- Emission Trading: Annex I Parties might attain Assigned Amount Units (AAUs) from other Annex I Parties who has more advantages to reduce its emissions to meet their emissions targets. This mechanism allows Parties to make use of lower cost opportunities and reduce the overall cost of mitigating climate change (Climate Change Secretariat, 2002).
- Joint Implementation: permits Annex I Parties to implement projects that reduce emissions and increase sinks in territories of other Annex I Parties. These projects generate Emission Reduction Units (ERUs) that could also be used by financing Annex I Parties to help meet their emissions targets (Climate Change Secretariat, 2002).
- Clean Development Mechanism: Annex I Parties have the possibility to implement projects in non-Annex I Parties that reduce emissions. This activity generates Certified Emission Reductions (CERs) that countries are able to use to meet their own emission targets. The CDM is a tool to benefit non-Annex I Parties by creating an opportunity to achieve sustainable development (Climate Change Secretariat, 2002). CDM is the only flexible mechanism of the KP that allows developing countries participation.

It's the intention of the protocol to distinguish the specific needs and concerns of developing countries, particularly the most vulnerable among them and facilitate Annex I Parties provide information on not only how they reduce their emission but also how they diminish adverse impacts on developing countries.

The COP serves as the meeting of the Parties to the Kyoto Protocol (see figure # 1). The COP/MOP, meets during the same period as the COP. Parties to the Convention

that are not Parties to the Protocol but they are able to participate in the COP/MOP as observers and are not allowed to participate as decision makers.

The KP made specific mention of the participation of developing countries in four of its twenty-seven articles. In article 2.3 and 3.14 is explicit the need of support for developing countries to implement policies to minimize adverse effects and its possible social, environmental and economic impacts. In its article 10, Parties should cooperate in the promotion of effective modalities for the development, application and diffusion of, and take all practicable steps to promote, facilitate and finance, as appropriate, the transfer of, or access to, environmentally sound technologies, know-how, practices and processes pertinent to climate change, in particular to developing countries, including the formulation of policies and programmes for the effective transfer of environmentally sound technologies that are publicly owned or in the public domain and the creation of an enabling environment for the private sector, to promote and enhance the transfer of, and access to, environmentally sound technologies. This article facilitates the future mitigation policy development in Non Annex I countries as also do article 12 which defined Clean Development Mechanism (CDM).

9.1.3. First Meeting of the Parties, Montreal:

After KP began to be active on February 17th 2005 the first meeting to the parties (MOP) took place in December of the same year. Within this meeting the Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol (AWG-KP) was launched with the mandate defined in Article 3.9 that is to consider further commitments of developed countries under the Kyoto Protocol for the period beyond 2012. The COP/MOP 1 agrees that the AWG-KP shall aim to complete its work and have its results adopted by the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol as early as possible and in time to ensure that there is no gap between the first and second commitment periods. This mandate generated a big pressure on developing countries because Annex I countries wanted a greater commitment from developing countries to reduce emissions.

The AWG-KP should have completed its work at Copenhagen in 2009, but as the industrialized countries were not in the negotiation mood in order to move forward the work of the AWG-KP should complete its work at South Africa 2011.

9.1.4. Bali Action Plan

After 2 years for the first COP/MOP the Mandate of the Bali Action Plan took place by framing the 5 basic columns of the climate change architecture:

- a. A shared vision,
- b. Mitigation,
- c. Adaptation,
- d. Technology and
- e. Financing

The Bali Action Plan launched the Ad hoc Working Group on Long-term Cooperative Action under the Convention (AWG-LCA), which is "... a comprehensive process to enable the full, effective and sustained implementation of the Convention through long-term cooperative action, now, up to and beyond 2012, in order to reach an agreed outcome and adopt a decision at its fifteenth session..." (UNFCCC, 2007).

One new concept was born that year: Nationally Appropriate Mitigation Activities (NAMA). It was created to facilitate the adoption of voluntary mitigation actions not only from developed countries but also developing countries if they want to.

NAMA is a set of policies and actions that countries undertake as part of a commitment to reduce greenhouse gas emissions. It also emphasizes financial assistance from developed countries to developing countries to reduce emissions (Center for Clean Air policies, 2009).

The Bali Action plan has become the reference base to determine which level of commitment Parties will accept and one of the most important key instruments are ANMAs. Annex I countries are looking very carefully on how developing countries will reduce its emissions. IF Climate change regime will succeed is only by the success of NAMAs structure, because it will encourage develop countries to commit to greater emission reduction targets.

The legal outcome mandated by this decision of the Conference of the Parties (COP) is to reach an agreed outcome and adopt a decision at COP 15 (Now extended to COP 17, in December 2011). The nature of this outcome is not specified, because countries could not agree it in Bali.

9.1.5. Copenhagen Accord

The Copenhagen Accord took place on December 2009 and agreed that severe cuts in global emissions are necessary in accordance with science, as has been documented by the Fourth Report of the IPCC. Additionally it recognizes that the temperature of the Earth cannot exceed 2 ° C. Correspondingly countries must submit, mitigation measures to which they commit and the timetable for implementation. The agreement was only sign by 141 of the 192 countries arguing that the paper of the agreement was created in a non-transparent way. They sum the 87,5 % of total global emissions (USCAN, 2010) and more than 80 countries provided information on their emission reduction targets and other mitigation actions.

The conference was marked by disagreements about transparency and process. Delegates debated the Accord at length, with many supporting its adoption as a COP decision as a step towards securing a superior future agreement, while others opposed it due to the absence of transparency and violation of UN procedures. In the long run, the COP agreed to take note of the Copenhagen Accord.

Developing countries wanted a 40% reduction in emissions of greenhouse gases by 2020 over a 1990 baseline and 80% by 2050. It should be noted that these numbers should be comparable (all on the same baseline) and must have a system of measurement, review and verification (MRV) (UNFCCC, 2009) but the consensus among develop nations is still under discussion as the inquire for a stronger system of measurement, reporting and verification under a new compliance regime. Some developed countries proposed a global target of 50% by 2050 (UNFCCC, 2009)

In the Copenhagen Accord Annex I countries commit to implement individually or collectively "economy wide targets (targets which cover all sectors of the economy) for 2020, which should be reported in the annex of the agreement. Non-Annex I countries commit deliver if national mitigation schedules.

The measurement system agreed was voluntary reporting and verification for non-Annex I countries where mitigation should be seen through NAMAS. In Copenhagen was established that NAMAS must be voluntary, and should have funded technology transfer.

The sticking point is referred to whether the NAMAS measurements are also subject to registration and verification and how to internationalize the accounting of these actions.

The result of the measurement, reporting and verification will be reported to the convention (UNFCCC, 2009).

In the Bali Action Plan (BAP) mitigation for developing countries was a possibility and in Copenhagen became a requirement. 81 Nations were not agreeing with the new requiring therefore, they do not ratify the Copenhagen Accord (UNFCCC, 2010). But the document brought more clarity on Future Developing Countries participation on climate change mitigation activities.

9.1.6. Cancun Agreements

The Cancun Agreements were settled in Cancun, Mexico, at the 2010 United Nations Climate Change Conference. They are a set of significant decisions to address the long-term climate change within a global framework in order to find worldwide common ways to tackle it (UNFCCC, 2011).

It not only establish clear goals for reducing anthropogenic GHG emissions to maintain the global average temperature rise below two degrees but also encourage the country participation to decrease emissions, in accordance with each country's different responsibilities and capabilities by assembling the development and transfer of sound technology to improve efforts to address climate change in an appropriate time (UNFCCC, 2011)

The main focus of this agreement is to help developing nations deal with climate change, taking in to consideration their national circumstances. It includes finance, technology and capacity-building support in order to facilitate the adaptation process and accelerate a green economy development with tools as REDD+, MRV and international consultation and analysis.

It was decided that developing countries will do NAMAs to aimed at achieving a deviation in emissions relative to business-as-usual by 2020 but with support of develop nations (UNFCCC, 2010).

The Cancun decisions provided an approved international registry for NAMAs. If countries ask for international support (technology, finance, capacity-building) will be recorded in a registry maintained by the UNFCCC secretariat which will serve as a tool for develop countries to find where to provide the requested support and if are not asking for support it will be included in a separate registry (UNFCCC, 2011).

The main achievement is developing countries will provide information on their mitigation actions and supported actions will be measured, reported and verified internationally, although for domestically maintained actions this will be subject of national MRVs (UNFCCC, 2010).

As one of the transparency successes of the agreement is that developing countries will intensify reporting of progress on the road to their mitigation objectives but not as developed countries do, and they are being encouraged to define low-carbon development strategies or plans (UNFCCC, 2010).

9.2. Spillover Effects Concept

To understand what a spillover effect is, first it is necessary to understand what externalities are. Externalities are the result of activities and conditions whose benefits and costs are not reflected in the market price of goods and services. It is the side effect on an individual or entity due to the actions of another individual or entity. It could also be described as a “situation in which the private cost or benefits to the producers or purchaser of a good or service differs from the total social cost of benefits entailed in its production and consumption” (Johnson P., 2005)

The primary feature of externalities is that one entity’s action directly or indirectly changes the options available to other entities.

So if we see the concept of externalities taking as activities the mitigation policies, spillover effects could be defined as the effect of mitigation policies and measures that one country or group of countries have on sectors in their countries or in other countries (IPCC, 2007).

A spillover effect takes place when a Climate Change Mitigation Measure (CCMM) made in a region or country affects the wellbeing of another country, whether for the better or for the worse, and are not paid by the country or group of countries that generated it because they are not obliged by any regulation to do so.

In a world where economies are linked by international trade and capital flows, abatement of one economy will have welfare impacts on other abating or non-abating economies. These impacts are also called spillover effects, and include effects on trade, carbon leakage, transfer and diffusion of environmentally sound technology, as well as other issues (IPCC, 2007).

Spillover effects from mitigation strategies are effects that these strategies have on other countries affecting trade, carbon leakage transfer and diffusion of environmentally sound technology, and other issues depending on economic activities of each country.

Spillover effects could be positive or negative. A negative spillover effect is produced when part of the value of implementing a CCMM realized in a specific territory is acquired by a different country other than the nation who introduces it. A positive spillover effect is when a portion of the welfare of the CCMM is shared not only within the specific territory where the CCMM took place but also other nation(s).

Spillover effects of mitigation measures, negative or positive, create difficulties for the effective operation of a Climate Change Architecture because they are not easy to identify where, when and in which intensity they will take place.

There is no commitment for Non Annex I Parties to undertake mitigation actions under the Convention but if they registered a list of NAMAs under the UNFCCC, in order to maintain its credibility, it is better to do so. But developing countries do have a commitment on

formulated impact assessments and try to reduce adverse effects of mitigation and adaptation projects and measures.

If a party does not have to bear with the external cost of its CCMM it will tend to maximize the application of an specific measure giving as a result a maximization of spillover effects and will tend to be far away from the socially optimal level of implementation. If one country design a new Renewable Energy Law the neighboring countries will be also benefit from this law if they decide to implement it but they won't be paying the total cost of the creation of the Law, so it will generate a positive spillover effect from them, but a negative spillover effect for the country that design it as they create benefit not only for them but for the other countries who also apply it and they will not receive a share of the benefits of the other countries.

A way to compensate this inequality of the market is by the conception of contracts who help to "internalize potential externalities" (Johnson P., 2005) in a way that all parties could profit. But in many cases a contractual solution could become extremely expensive. In the case of CCMM a way that UNFCCC has found to "compensate" the parties affected is by obligation Parties who ratified the Convention to identify and provide support to countries who suffers from negative spillover effects, understanding by support: financial, technological, capacity building activities.

Spillover effects are an important consideration in climate change cost-benefit analysis, therefore since the beginning of the CCC the subject came in to surface.

Spillover effect can be more easily understood when analyze as a pool game when assuming that pockets are mitigation impact areas; color balls are positive and negative impacts, the white ball is a Party, in our case Panama and decision makers are pool players (see figure # 2).

Figure # 2- Spillover effect possible actors

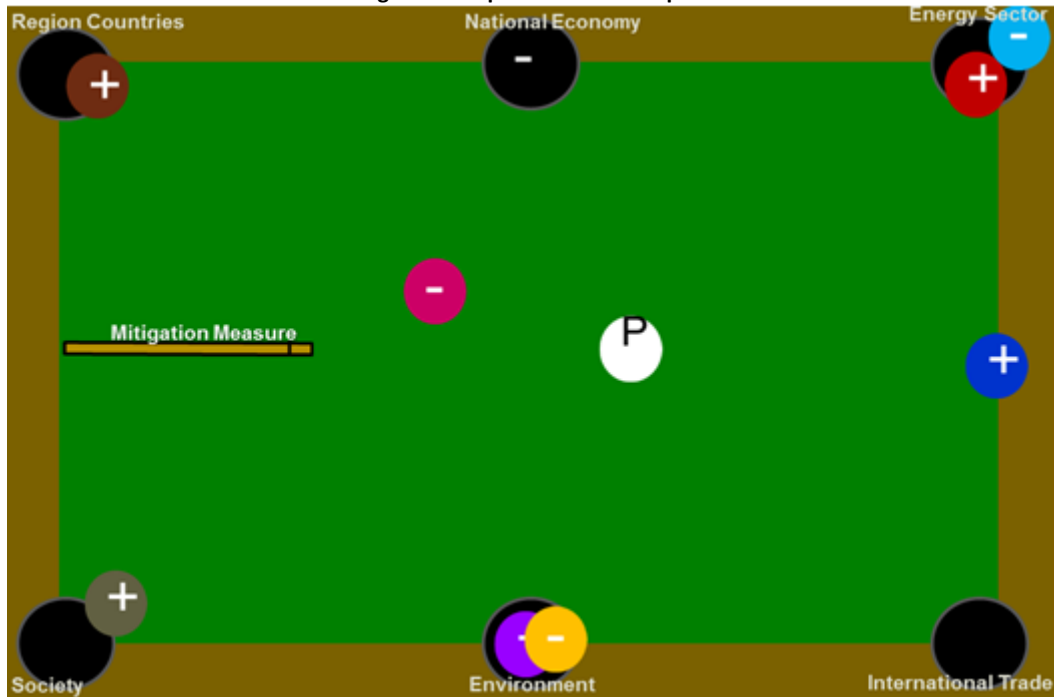


They use UNFCCC mitigation measures as a cue stick to push forward low carbon economy development.

Taking as statement that Panama wants to increase renewable energy projects, this action could have different impacts not only locally but worldwide. It will diversify the energy matrix so it will be a direct positive impact on that sector. But also with time will created more positives impacts that are no so obvious. An obvious one is the reduction of emissions as an environmental positive impact.

This measure could drive thermal power plants out of the market and if this companies do not adapt to an efficient energy production they could not be competitive and disappear = Negative for the economy and for the sector too. That could also move another negative impact that we cannot surely define in what pocket will fall. Other countries may want to follow Panama example, generating a positive impact and also society could begin to ask for clean energies but it could impact negatively the environment if projects are built in protected areas or when the technology is created somewhere else in the planet adding CO₂ emissions (see figure # 3). Those are spillover effects.

Figure # 3 - Spillover effects impact



Looking this effect at a pool game normal speed is not possible to define exactly where each ball goes. By spillover effects is important to recognize that when a mitigation measure it's been implemented things happen simultaneously and is not clear to see what a consequence of which action is.

The convention introduce an early "version" of what spillover effects will be in 1992 by contemplating in its article 4.1-f that appropriate flexible methods will be necessary by making social, economic and environmental policies and actions in order to minimize adverse effects on the economy, on public health and on the quality of the environment, of projects or measures undertaken by Parties to mitigate or adapt to climate change as a legal strategy for correcting externalities.

But in order to work it right countries involve must know that they are suffering from spillover effects, and to do so, they need to invest in several governmental actions as gathering information, costs of debating and making policy decisions and costs of administration of policies and measures. Therefore in some cases society may well be healthier by leaving the externality in place, unless the third-party effects of the externality are truthfully substantial.

Taking that into consideration the UNFCCC affirmed that responses to climate change should be coordinated with social and economic development in an integrated manner with a view to avoiding adverse impacts on the latter, taking into full account the legitimate priority needs of developing countries for the achievement of sustained economic growth and the eradication of poverty (UNFCCC, 1992).

Also the Kyoto Protocol in 1997 mention it in its article 2.3 that Parties included in that "Annex I shall strive to implement policies and measures under this Article in such a way as to minimize adverse effects, including the adverse effects of climate change, effects on international trade, and social, environmental and economic impacts on other Parties,

especially developing country Parties and in particular those identified in Article 4, paragraphs 8 and 9, of the Convention, taking into account Article 3 of the Convention". It also underline that "The Conference of the Parties serving as the meeting of the Parties to this Protocol may take further action, as appropriate, to promote the implementation of the provisions of this paragraph".

The Kyoto Protocol likewise says in its article3.14 that at its first session it will consider what actions are necessary to minimize the adverse effects of climate change and/or the impacts of response measures on Parties in order to establish a fund, insurance and transfer of technology.

In a planet's globalized economy context, this research wants to address concerns related to spillover effects, a broadly defined phenomenon which requires further clarification as to its real character and scope. The choice of specific instruments, policies, measures and methodologies available to Annex I Parties in their fight to curb climate change could have potentially significant side effects on the economies, livelihoods, and social networks, amongst others, of developing countries (IPCC, 2007). At a time of economic instability, developing countries are increasingly suffering the impact of climate change, negative spillover effects would increase their difficulties to respond to it and add economic burdens on our limited resources.

In a climate change context, cost estimates must consider how carbon taxes affect trade flows in the short and long runs. The "leakage effect" reflects the extent to which cuts in domestic emissions are offset by shifts in production and therefore increases in emissions abroad (IPCC, 2007). The question is whether nations that are a net exporter in fossil fuel intensive products gain under Annex I-only carbon policies. Other developing nations, as Panama, might not gain because less capital will be available as income in developed nation's drops, and it becomes more costly to import from developed nations capital goods that promote growth (fuels, transportation equipment, food).

Mainly vulnerable developing countries have explicit necessities and concerns in this regard. Some unindustrialized countries, as low-lying island nations, have high risks from the adverse effects of climate change itself, meanwhile, oil exporting states, are threatened by the potential economic outcomes of response measures. The Convention recognizes both these dimensions of vulnerability, alongside with the special circumstances of 48 countries defined as least developed countries (LDCs) by the United Nations (IPCC, 2007).

The 2001 Marrakesh Accords procured important steps forwards on defending countries with special circumstances. It set an extension of scope of activities eligible for funding under the GEF, in the area of adaptation to climate change and capacity building. Two Convention funds were also established and one operation under the Kyoto Protocol:

- a) A special climate change fund sponsoring projects in the following areas: capacity building; adaptation; technology transfer; climate change mitigation; and economic diversification just for countries greatly dependent on income from fossil fuels; and
- b) A least developed countries fund that support a special work programme to assist LDCs, including the preparation of national adaptation programmes of action to respond to their urgent adaptation needs.

During the COP/MOP 16 in Cancun, Governments decided to establish a Green Climate Fund that will function under the guidance of the Conference of the Parties (COP). It will provide long-term financial support to concrete mitigation actions by developing countries that are implemented in a transparent way. The fund will rise up to USD 100 billion per year by 2020 by industrialized countries from a mix of public and private sources. This means that developing countries will have access to the necessary economical support not only to identify spillover effects but also implement mitigation measures and adapt to climate change.

Due to spillover effects, it is difficult to determine precisely the net mitigation potential for sectors and regions, and the effects of policies. An added complication is that the effects may be displaced over time. The measurement of the effects is also complex because effects are often indirect and secondary, although they can also accumulate to make local or regional mitigation action either ineffective or the source of global transformation. Much of the literature recognizes the existence of spillover effects. However, uncertainty and disagreement about time scale, cost, technology development, modeling approaches, policy and investment pathways lead to uncertainty about their extent and therefore the overall mitigation potentials (IPCC, 2007).

In considering the way forward to build a Climate Change Regime that work either under Kyoto or beyond it, an important question that has to be made is how mitigation measures and policies could impact the development of nations. Should international climate policy strike out in a different direction if adopted measures are creating more damages? What does de Climate Change Regime will need to avoid or reduce spillover effect? I plan to contribute to answer a piece of that question by analyzing how a specific mitigation measure could impact the national energy matrix of Panama.

9.3. NAMAs Concept

During 2010, many developing countries submitted their plans to limit the growth of their emissions, as agreed in the Copenhagen Accord. These plans will only take place through appropriate and adequate support from industrialized countries in the form of technology cooperation, finance and help in capacity-building. These plans are known as NAMAs.

NAMA is a set of policies and actions that countries undertake as part of a commitment to reduce greenhouse gas emissions. It also emphasizes financial assistance from developed countries to developing countries to reduce emissions (Center for Clean Air policies, 2009).

This concept has its origins in 2007 when the Bali Action Plan called for “Nationally appropriate mitigation actions’ by developing country Parties in the context of sustainable development, supported and enabled by technology, financing and capacity building, in a measurable, reportable and verifiable manner”.

The Bali Action Plan is centered on four main building blocks: Mitigation, Adaptation, Technology, and Financing, with NAMA forming an important part of the mitigation constituent as it contribute not only to mitigate but also to adapt nations to climate change.

The Copenhagen Accord included NAMAs as the solution of many open enquiries and several different interpretations of what the term actually define. Until today, there is not a specific definition for NAMAs agreed within negotiations. It will be subject to differ on the

institutional structure necessary for providing support to NAMAs as well as means to measure, report and verify actions (UNFCCC, 2010). The negotiations surrounding NAMAs are still general, making it challenging to work on tangible implementation issues.

NAMAs can be appliances for mitigation that could match all actions in all Non Annex I Parties with suitable support, adaptation and capacity building. Adaptation is a key component to ensure that mitigation won't worsen ecosystems and populations as result of a spillover effect.

At international level NAMAs have been categorized in four (4) different manners:

- Unilateral NAMAs: mitigation actions undertaken by developing countries on their own with their own resources. Is when country intends to reduce emissions but at low cost or cost effective (example: health benefits, energy security).
- Supported or Conditional NAMAs: mitigation actions in developing countries supported by direct climate finance from Annex I countries. NAMAs that require financial or technology support from developed countries that could include those with higher costs or requiring specific assistance (example: development and deployment of low-emissions, advanced technologies). They play a key role on Non annex I mitigation contribution to the CCC ultimate objective. They are able to find strong technology finance incentives in sector as steel, cement, electricity by safeguarding the implementation of low or no cost mitigation actions that can't be part of the Carbon Market
- Credited NAMAs: mitigation actions in developing countries, which generate credits to be sold on the carbon market. Are NAMAs based on an ambitious crediting baseline for their actions (such as emissions intensity or technology penetration ratio)
- Hybrid NAMAs: encompass more than one category (example: sector wide NAMA) (Center for Clean Air Policies, 2009).

NAMAs could be also being established depending of the economy sector where it will be implemented. Therefore sector-wide NAMAs could constitute sector-wide policies, standards, technology programs and objectives in a specific emitting sector in a particular country. Sector-wide activities need to achieve a specific Sectoral objective. Sector-wide NAMAs have as variables to measure either energy or emissions intensity targets or penetration technology targets of improved technologies across an entire sector (UNEP, 2010).

To create a Technology Target NAMA is important in make a current description of the technology situation in the country and explain how and at what level could this technology penetrate the market. Approaching it in this manner make it easier to develop an appropriate MRV.

When talking about renewable Energy one of the most important paths to follow is the RE policies. Defining in a Policy the correct national penetration technology strategy is a perfect option for a NAMA in countries that have the political will to do so, and helps to cultivate a RE private sector. Countries could define what will be the government and private sector role and establish the road to achieve and specific penetration target. Therefore is necessary to invest time and count with capacitated professionals and information that smooth decision making processes and NAMAs could be part of it. This will facilitate the construction of low carbon emission pathways.

A NAMA could include laws and regulations, standards, technology penetration programs, financial instruments like taxes, incentives and cap and trade programs, energy efficiency measures, research and development, technology demonstration projects, Sustainable Development Programs and Measures, capacity building and data-gathering activities (Center for Clean Air Policies, 2009).

The commitments of developing country parties related to financial resources and technology transfer are proportionally linked with the level of mitigation actions that developing countries will be able to achieve.

Countries could ask for support in 3 different areas:

- 1) Preparation and Readiness: includes strategies preparation and capacity-building. These actions could have access to public and private support including multilateral and bilateral grant schemes.
- 2) Intermediate: encompasses establishment or strengthening of strategies and procedures to allow putting into practice. These categories could be funded by voluntary contributions from governments, taxes, multilateral concessional financing sources, bilateral and private funding including early market payments.
- 3) Final: comprises verification of emission reductions or sinks removal. Activities could be funded by carbon market and fund-based. Entry into all phases would be different for each country (UNEP, 2010)

Capacity building NAMA might consist of enabling policy tools design, public awareness, and best practice dissemination, among others.

NAMAs will be implemented by developed and developing countries. Developed countries will have reportable and verifiable nationally appropriate mitigation commitments or actions and developing countries will realize those actions with supported and enabled by technology, financing and capacity-building, in a measurable, reportable and verifiable manner in order to prepare low-carbon growth paths.

In a broader perspective NAMAs in developing countries give the chance to change unsustainable development paths on the road to a Green Economy.

The Copenhagen Accord interpreted the concept of NAMA in a finer definition only applying to Non-Annex 1 countries. Therefore Developing Nations will implement mitigation actions consistent with Article 4.1 and Article 4.7 of the CCC and in the context of sustainable development.

The NAMAs that want to ask for support will have to be registered along with the support type they are looking for: technology, finance and capacity building. Those actions supported will be added to a list in appendix II in UNFCCC. They are based on guaranteeing sustainable development, and its goal is to accomplish a deviation in "business as usual" GHG emissions by 2020 (UNFCCC, 2010).

The NAMAs interpretation is extremely linked to national circumstances of the country that will implement it in equity bases and capabilities. They are also linked to each country's priority as economic, social development and poverty eradication. Developing countries ask for a voluntary basis to do so but industrialized countries want it to be a legally binding commitment.

NAMAs could also be interpreted as integrating climate change policy with economic development (UNFCCC, 2010).

It could help to ensure a clear and equitable distribution of the benefits of NAMAs activities (IISD, 2011) but it is more difficult to guarantee that national frameworks do not obstruct opportunities for local communities to self-manage or opportunities created by other mitigation measures.

Most developing countries believe if NAMAs are well managed and negotiated it will create a context that can reveal the huge potential for greenhouse gas mitigation that they have been doing and they will continue exploring and deploying if global standards that facilitate national interpretation into national context.

To succeed in maintaining the world average temperature below 2 °C challenging actions are necessary. NAMAs can provide the immediately needed support for mitigation actions in developing countries as good bottom-up private sector mechanisms to support top-down policy implementation in all economy sectors. (UNEP, 2010)

As NAMAs are still under negotiation the registration process is not already established. Countries have suggested that all policy assessment needs should be realized at national level. It is important for countries to decide what their priorities are in order to have a greater idea on which and how priorities could be supported by UNFCCC funds. Then, the registry at international level could start smoothly by determining which of the listed activities will need any kind of support and if those are eligible or not. To accomplish it, the UNFCCC has to set a process for NAMAs. This one could be complicated by different NAMAs proposals and means depend of each national circumstance and how the country has planned to develop the mitigation activity (UNEP, 2010).

UNFCCC have the task of outlining which supporting mechanisms will be available depending of the type of NAMA that has been registered and also the kind of support needed. The support could be also obtained in early phases. Capacity building for policy assessment, formulation and NAMA registration could also need assistance and financing (UNEP, 2010).

A long term perspective is fundamental when defining a NAMA. It must include specific plans and objectives that, as well, allow a step by step implementation in order to assess the results during the process and adapt the approaches if necessary.

It has to be developed in a transparent, efficient and timely manner specifying the kind of support required and, if the case, the probable level of mitigation resulting from NAMA.

NAMAs are an innovative way to achieve GHG emission reduction because it will suitable up-front financing it diminish risks in event of an impossibility to acquire support after application of the mitigation measure which is a benefit that current market mechanism are not able to supply. NAMA focuses on actions with quantifiable and immediate mitigation benefits, emphasizing actions with cumulative mitigation benefits, which are not possible to account on Current Schemes.

One of the biggest issues of NAMA negotiation is to define how developing countries will prove that their mitigation activities are contributing to GHG emission reduction. Therefore the BAP stipulates different ways to measure, report and verify (MRV) mitigation activities. It includes three MRV requirements:

- MRV of the mitigation commitment of Annex I countries,
- MRV of the mitigation actions of Non Annex I, and
- MRV of the support associated to these activities (UNFCCC, 2007).

The MRV that will be used by countries developing NAMAs should try to support sustainable development policies and measures in Non Annex I countries and help to reduce climate change. Therefore, the selected MRV system must please both parts (UNEP, 2007).

Countries have common but differentiated responsibilities regarding their national development priorities, objectives and conditions. Therefore only NAMAs that are supported and enabled in a measurable, reportable and verifiable manner could be subject to MRV but what are subject to MRV are the activities themselves, and not essentially the results of these activities (UNEP, 2010).

The principal actor and responsible for the development of a NAMA are developing countries governments who are in charge of apply to the required support and of the NAMA registration at international level (UNEP,2007). The only way to register a NAMA is been UNFCCC Parties and governments, private sector has neither the power nor the Authority to do so.

Non Annex I Parties might voluntarily indicate future actions to undertake with their national resources, but for which they are not looking for international support. These activities will be registered simply for acknowledgment (Unilateral NAMAs) as a way for Non-Annex I countries to achieve recognition for their independent and current mitigation efforts. If a country wants also to ask for support with this kind of activities it will has to build a very strong NAMA and prove a support is required.

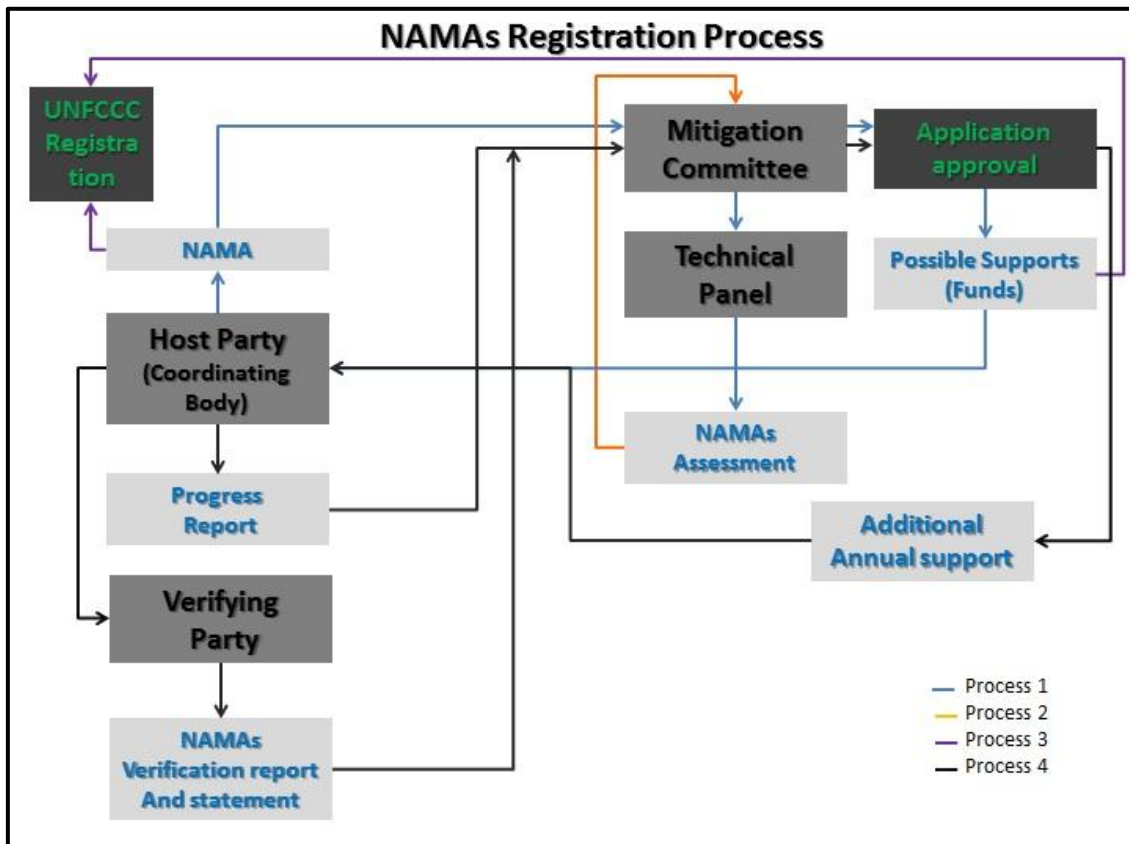
In order NAMAs to be registered they have to be send to the mitigation committee and a technical panel has to be created. This panel will be in charge of review and assess the application and send their assessment views to the mitigation committee. This committee has to approve the NAMA and then coordinate what are the possible funding opportunities for an up-front support (UNFCCC, 2010).

Then the NAMA could be implemented and registered with sustenance of UNFCCC secretariat under the mitigation committee registry.

The host country has to prepare a progress report every year that most include the progress of the activities and an explanation of the received support. This process should be verified by a third Party invited by the host country. The verification report should be also submitted with a verification statement to the mitigation committee and then the host Party could receive another additional support to continue with those actions (See figure # 4)

Every country will have to establish a coordinating body to organize NAMAs within the host country. The coordinating body will be in charge of submitting the application to the mitigation committee, prepare progress reports, receive the support delivered and to invite a third party for verification.

Figure # 4 – NAMAs registration Process. Source UNFCCC, Lindo, 2011



The coordinating entity will be responsible for defining in what way benefits attained as a result of these activities would be distributed to sector participants.

The mitigation committee has to develop a document that include all supported actions and report to the COP every year. The COP has to adopt the report and correct policies, priorities and eligibility criteria (UNEP, 2010).

If a Party finances a NAMA with funds that are not coming through a financial mechanism of the Convention the MRV is neither necessary nor obligatory.

Developing countries are engaged to contribute in worldwide GHG mitigation efforts. This engagement is not only an opportunity to fight climate change but also to develop green economy business.

The basic information that a NAMA needs to include is:

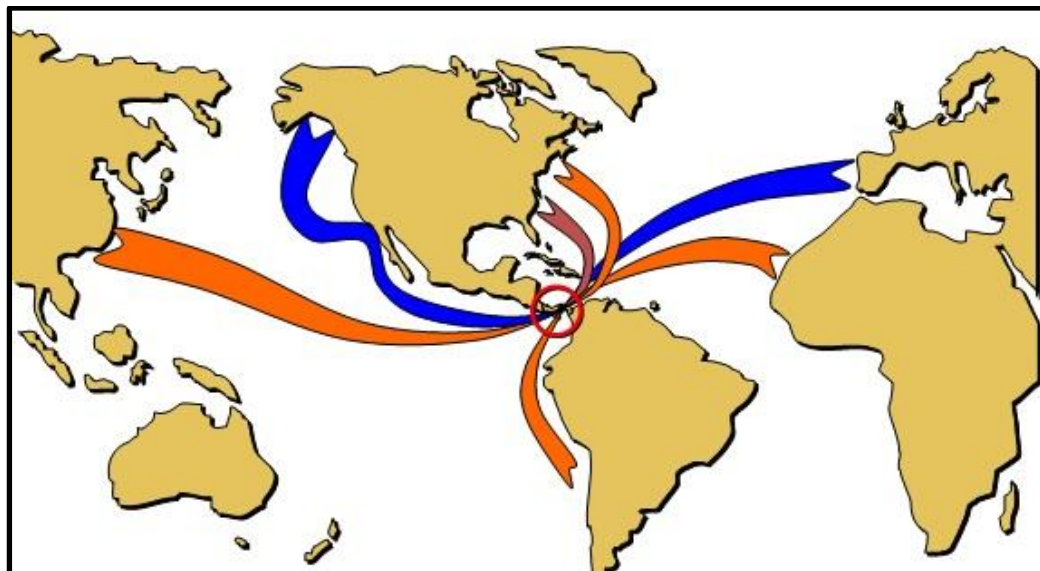
- ✓ Mitigation action description
- ✓ Timeline
- ✓ An estimate of mitigation benefits or including emission reductions (when applicable)
- ✓ Baseline scenarios
- ✓ Full or incremental cost estimate
- ✓ Monitoring
- ✓ Sustainable Development impacts
- ✓ Requested funding or assistance
- ✓ The anticipated timeframe for NAMA implementation
 - ✓ A definition of the applicable MRV

The NAMA that it's intended to be delineated in this thesis has to be seen as an economic development opening that rather that could create spillover effects on the Panamanian energy matrix, but this spillover effects can be compensated if the NAMA is design implemented with precaution.

9.4. Current Climate Change Mitigation Options for Panama

The Republic of Panama is located in the center of the Western Hemisphere, in 7°12'07" and 9°38'46" of North Latitude and the 77°09'24" and 83°03'07" of Western Length. As showed in figure # 1, Panama has at North the Caribbean Sea, at East the Republic of Colombia, at South the Pacific Ocean and at West the Republic of Costa Rica, connecting Central America and South America. It has an area of 75,517 square kilometers were 34.6 % are Protected Areas; 3.405.813 million people inhabit the country (Censo Nacional de Panama, 2010).

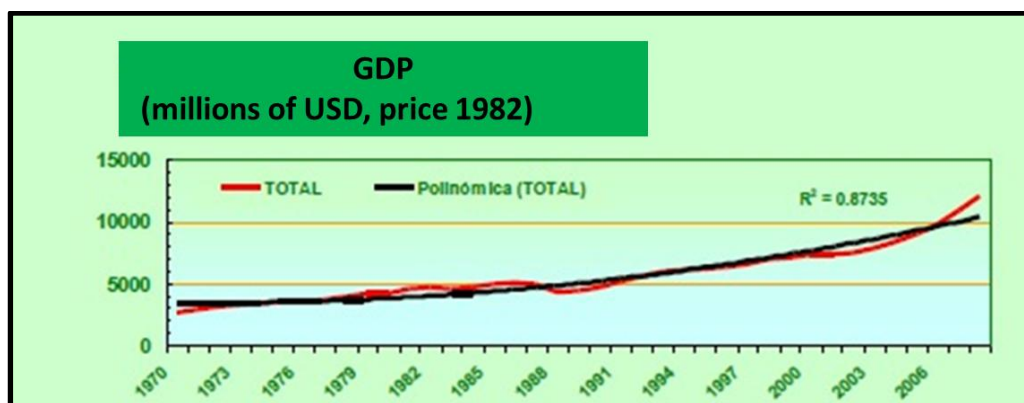
Figure # 5 - Panama's Location. Source ACP, 2008



Panama is a small country with 3.4 inhabitants where 78 % of GDP come from the service sector 75 % of the GDP is from the Panama Canal. Currently the canal infrastructure is under expansion; with the purpose of create a third lock for Post Panama ships. The construction will take 6 years, situation that will require the increase of energy production because of the increment of activities in the construction sector. That means greater energy requirements, greater energy challenges as is estimated to need 200 GWh during the construction (ACP 2007).

The high rate of economic growth, resulting from direct foreign investment and significant investment in public and private infrastructure has become the hallmark of recent years has contributed to poverty reduction and has bring more access to energy to all population at national level, but high levels of inequality has not been eradicated, especially in indigenous areas of the country. This situation opens a variety of investment opportunities that can be accomplish with NAMAs if they are implemented correctly. Graphic # 1 shows the GDP growth during the last 40 years.

Graphic # 1- Panamanian GDP Evolution. Source ETESA, 2010



Panama face several environmental treats and the most relevant environmental pressures in the last 20 years are: land use change, pollution in all its forms and urban sprawl that prevails primarily in the metropolitan region, and the vulnerability produced by extreme events caused my climate change.

Panamanian natural environment has historically been severely affected by economic forces and local and international social, begins to show an early recovery and a general improvement in almost all areas, but the threats posed by globalization and anthropogenic emissions are still current.

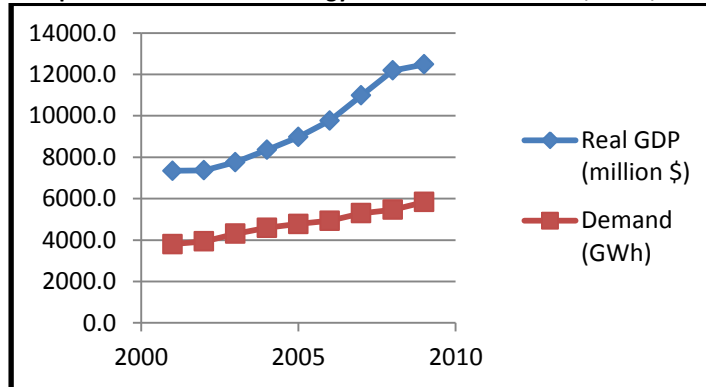
The current Panamanian Government believes that Panama is able to make a transition to an environmentally sustainable society; however, a certain level of institutional weakness combined with global economic complications and increasing social problems and public insecurity may affect human development prospects and the establishment of green economy (Indicadores, 2010)

The Panamanian State has as a priority to expand environmental knowledge management that incorporates sustainable practices in business sector and to effectively cross environmental management to all levels of state's functioning and operation.

Even being a low intensity Carbon emission country with 0.44 CO₂ equivalent tons per capita (ANAM, 2000) the primary energy generation was 87.4 % of fossil fuels and 12.5 % hydropower in 2009 (MICI, 2010), demonstrating a high fossil fuel dependency.

The Energy intensity has been decreasing during the last 10 years, showing a decoupling of the energy demand from the GDP as show in Graphic # 2.

Graphic # 2 - GDP & Total Energy Demand. Source ETESA, Lindo, 2011



As show in table # 1 the relation within Gross Domestic Product and the energy used to produce it demonstrate that the amount of energy need to produce one USD of the GDP is decreasing.

Table # 1 -GDP Evolution & Relation with energy demand. Data Source ETESA, 2010

GDP & ENERGY DEMAND										
YEAR	2001	2002	2003	2004	2005	2006	2007	2008	2009	RATES
Real GDP (million \$)	7345.7	7365.2	7758.7	8358.6	8972.3	9771.1	10981.9	12188.1	12484.0	6.1
Demand (GWh)	3801.1	3933.9	4306.9	4595.2	4780.8	4933.5	5297.9	5462.1	5834.9	4.9
GDP/Demand (\$/kWh)	1.9	1.9	1.8	1.8	1.9	2.0	2.1	2.2	2.1	1.1

Panama has been strongly affected by climate changes impacts, change of rain patterns that generated flooding and created losses in several sectors of the economy. NAMAs represent a chance to assess progress at all levels and take effective action in finding solutions to new challenges of sustainable development and climate change when including as part of the current mitigations activities that has been taking place at national level.

9.4.1. Conformation of Panama Electric Energy Sector

To better understand how and why those policies were created it is necessary to explain how the electricity market works.

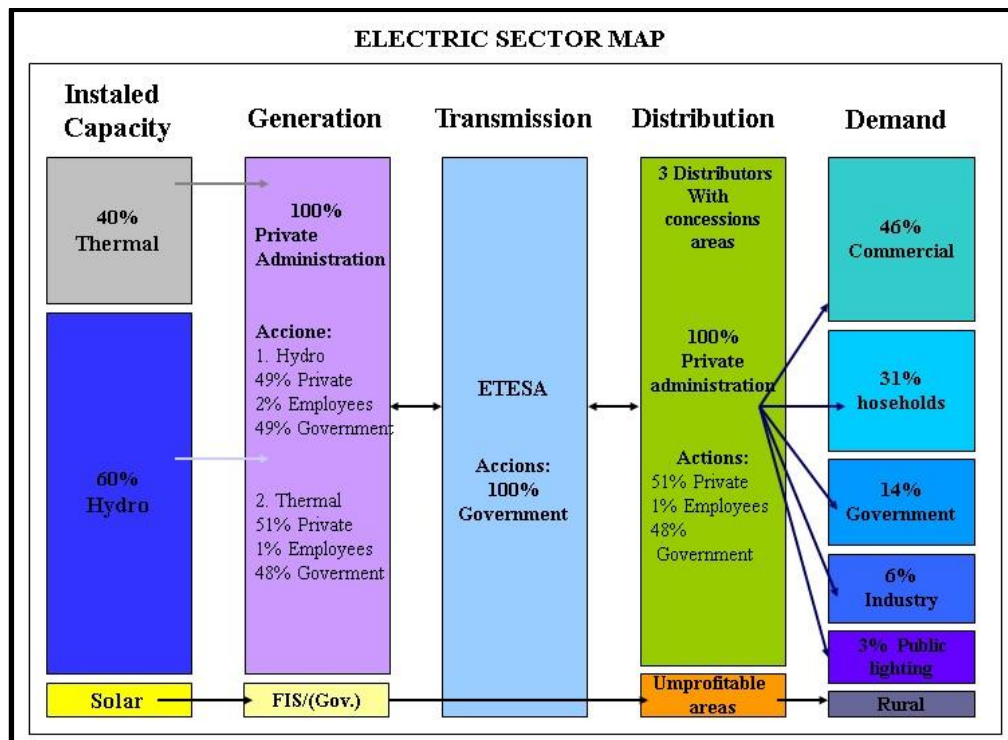
Law 6 of February 3, 1997, makes the regulatory and institutional framework for the Provision of Public Electricity, leading to a restructuring in 1998 of the former Institute of Hydraulic Resources and Electrification (IHRE), given the privatization of the sector which was born is called the wholesale electricity market, comprising producing agents (generators, self-powered and co-generators) and consumers (distributors and large customers) to transact business of buying and selling of energy and power

The Panama electric sector provides for purchase and sale of capacity and energy through an organized spot market and bilateral contracting, as well as the provision

of, and compensation for additional services. The Spot market is operated by ETESA (Transmitter company), through its National Dispatch Center (CDN).

The market function is based on power supply contracts which consist of agreements between distribution companies and generators that are developed by the distribution company as part of the competitive bidding process, approved by Public Services National Authority (ASEP), and finally subjected to detailed negotiation between the successful generator bidding and the contracting distributor upon the award of the bid. The following image shows us how the Market is compound.

Figure # 6 – Electric Sector Map. Source ETESA, 2007



The regulatory system requires actual operation of the generating plants on a merit-order dispatch. Within this system, a generating plant’s dispatch to meet a given load depends on its variable costs, with the plants with lower variable operating costs running first based on their audited (not declared) variable operating costs. As a general rule, in any hour the last unit dispatched to meet load, and therefore the highest variable cost plant of those in operation, establishes the short-term marginal cost of the system and determines the “clearing price” for the sale of energy in that hour. This clearing price is then credited to all plants in operation during the hour in question supplying spot energy. The regulatory system has also established a payment settlement process to reconcile the compensation due the generation companies under the contracts with amounts due them based on actual generation and spot market clearing prices.

Finally, the system calculates a “shadow price” for the use of water by hydroelectric plants for inclusion of the hydro generating plants in the merit-order dispatch of power plants. Limitations in the storage capacity of Panama’s hydroelectric facilities coupled with a pronounced seasonal pattern of rainfall have led to operation of the hydroelectric facilities with storage as peak-shaving facilities. The shadow price calculated for water use has historically conformed and is anticipated to conform in the future to this method of dispatch,

generally valuing the variable cost of water usage above of thermal plants. Where water storage capacity is available, the shadow pricing of water has the intended purpose, using forecast system parameters, of maximizing the overall economic benefit of the hydro reserve resource (ETESA, 2005).

Under the market structure, distribution companies are obligated to contract for 100% of their peak system capacity needs (as determined by each company's DMG [Peak Demand]) or 85% if a distribution company has elected to participate in the ownership of up to its 15% self-generation capacity rights.

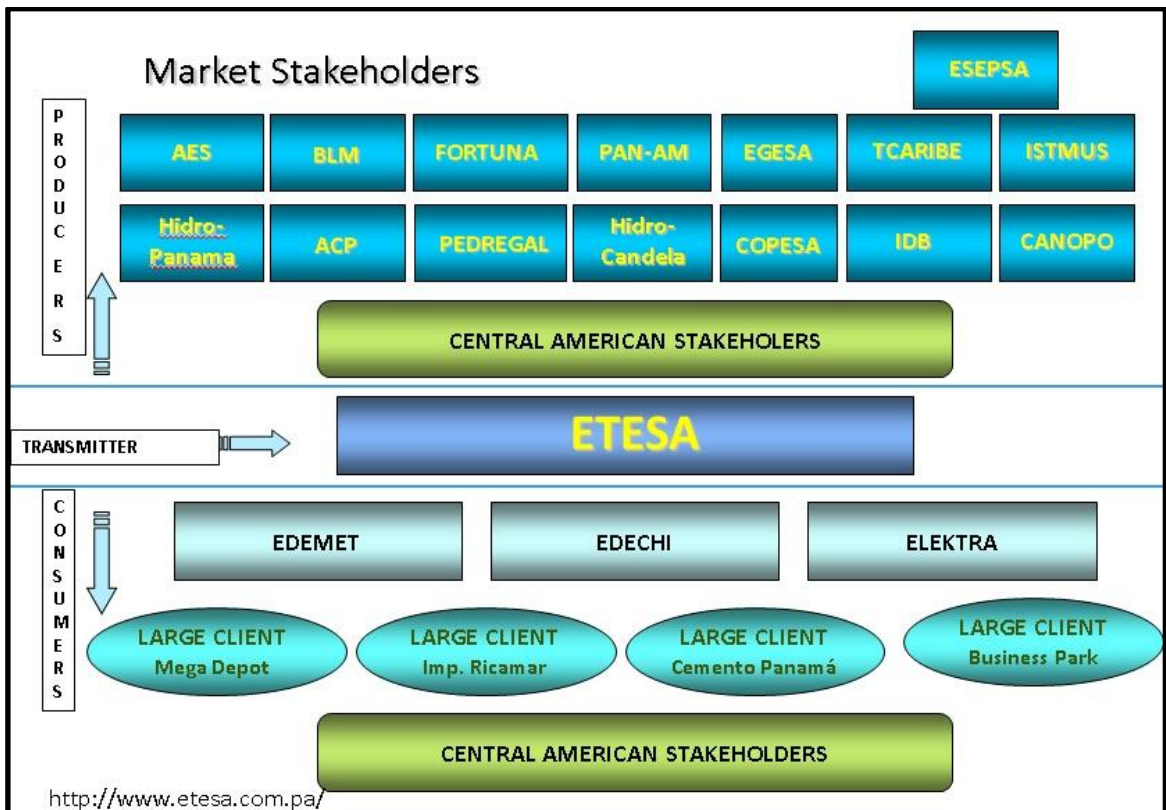
Distribution companies must purchase any excess capacity requirements not met by their power supply contracts from a spot capacity market, organized by the CND, at the prices offered by generators for capacity not already committed by contract. Generators may enter into several firm capacity contracts for portions of plant capacity, and may offer any excess capacity available, and not already committed by contract, on a daily basis to the spot market for capacity sales. Generators deficient in their own capacity to meet their commitments under contract to the distribution companies must purchase such capacity deficiency in the spot market from other available, at offered prices.

Distribution companies are penalized by the market rules for failure to comply with this obligation in the following ways:

- Capacity purchases over and above capacity covered by firm contracts require distribution companies to pay the rate charged by the highest incremental cost generator dispatched at the time the need for incremental capacity occurs.
- Energy purchases for power consumed by the distribution companies over and above their firm contract amounts are assumed to be provided by the spot market at the then current highest variable price dispatched during that hour.
- Premium prices paid for spot market purchases, at values above the average of contract pricing, may not be fully recovered in the retail tariffs.

The electric market has several stakeholders: Producers which are mostly hydro and thermal power plants and also energy producers from Central America, mainly Costa Rica. The only transmitter company with the country is ETESA, company 100 % of the government. The distribution companies in the country are EDEMET, EDECHI and ELEKTRA. They classify the consumers by large or small clients. The figure # 7 will give you better idea of how the stakeholders interact between each other.

Figure # 7: Market stakeholders. Source ETESA, 2010



9.4.2. National Energy Policies

The Panamanian Energy Policies have evolved strongly due to incremental economy development that forced the State to build up a strength policy framework in order to continue providing the country with energy resources.

Grounded on the provisions of Law No. 8 of June 16, 1987, the Ministry of Commerce and Industry (MICI) in conjunction with the Environmental National Authority and the Energy Secretariat prepared in 2005 the National Energy Policy identified fundamental aspects to be considered for the implementation of Panama's energy policy, regarding oil and alternative energy sectors.

The guidelines of the Oil and Alternative Energy National Policy were designed to make the energy system more efficient, less dependent from external suppliers, more equitable, and less GHG emitter. It promotes the use of natural resources more regularly to ensure access to energy continuously.

The National Energy Policy Guidelines has seven forming pillars which set the scenario to achieve future needs and interactions of the energy system with the economy, society and the environment. Those pillars are the following:

- Diversification of energy balance
- Energy independence and sustainability
- Rationalization of energy consumption
- Potentiate the geographical position of Panama as a regional powerhouse
- Introduction and promotion of new technologies
- Promote environmental conservation
- Promoting a competitive environment

It was developed to assure sufficient energy resources, not only to meet the basic needs of society, but also to develop economic and commercial potential, avoiding the vulnerability that causes dependence on external energy sources.

The institution in charge of developing energy policies currently is the Energy Secretariat that was founded by the Decree 52 of July 30 of 2008, who merged in due course, in a single administrative entity to the Commission on Energy Policy (Ministry of Economy and Finance) and the Department of Hydrocarbons and Alternative Energy from the Ministry of Trade and Industry (MICI). It was reorganized by the National Assembly with the approval of Decree # 316, in 2010.

The mission of the Energy Secretariat is to promote National Energy Policy in order to ensure security of supply, rational and efficient use of resources and energy in a sustainable way, according to the national development plan and within economic parameters, competitive and environmental quality. It has to formulate, plan and establish the energy sector policies, ensure compliance, advising in matters of its competence and propose the necessary legislation for the proper enforcement of energy policies.

Energy Secretariat is in charge of assessing and analyzing national policy options on electricity, hydrocarbons, rational use of energy and comprehensive utilization of natural resources and all country's energy sources in conjunction with overall development plans, as well as organizing and maintaining the National Energy Information System and to inform and promote plans and policies for public sector entities, private sector companies, financial organizations, foreign and domestic investors and consumers.

Today it is conformed by seven institutions:

- ACODECO –Consumer Protection and Competition Authority (Autoridad de Protección al Consumidor y Defensa de la Competencia)
- AMP – Panama Maritime Authority (Autoridad Marítima de Panamá)
- ANAM – Environmental National Authority (Autoridad Nacional del Ambiente)
- ASEP – Public Services National Authority (Autoridad Nacional de los Servicios Públicos)
- CND – National Dispatch Center (Centro Nacional de Despacho)
- EGESA – National Electric Generation Company (Empresa de Generación Eléctrica, S.A.)
- ETESA – Electric Transmission Company (Empresa de Transmisión Eléctrica, S.A.)
- OER – Rural Electrification Office (Oficina de Electrificación Rural)

For the reason above, the state has an inescapable responsibility to design and implement an active energy policy. In order to maintain it this way, is necessary to take into consideration the new possible changes of global energy policies and climate change mitigations instruments that could help Panama to move forward a green economy.

Nationwide 19 % of energy use comes from firewood. It affects negatively the environment and human health in Panama. Therefore governmental efforts will focus on finding mechanisms to ensure greater coverage of the system, increase awareness of rural areas on the effects of logging and deforestation, present alternatives and options to improve the efficient use of energy by these communities, and incorporate new energy that involve minor environmental pollution. NAMAs could contribute to this goal.

Within the policies laws regulate the energy market in Panama; and one of the most beneficial for the development of renewable energies is Law No. 45. It is the object of study in this research at following it will be describe deeply.

Law No. 45

The Law No. 45 of August 4 of 2004, through which benefits are provided for the incorporation of renewables to the national energy matrix encourage and promote actions which contribute to diversify energy balance and sustainability of the system by adding clean energy that produce less impact to the environment and incorporate new technologies (Law 45, 2004)

It established an Incentives Schemes for the promotion of Quality Hydroelectric Generation and other New, Renewable and Clean Energy, and other provisions. This law makes the state as promoter of renewable energy, which develops behaviors attached to the environment and renewable energy generation, contributing to GHG reduction, which decline fuel dependency through an incentives scale related to the generation of project linked to energy generation. It is classify by 3 schemes: Direct Contract, transaction and fiscal benefits (See Annex # 1)

1. *Direct Contract transaction:*

- a. Mini hydroelectric power station systems and other new, renewable and clean sources power stations systems with an installed capacity up to 10 MW will be able to contract directly with the distribution companies, and not exceeding the limit of 15 % of maximum generation demand in the concession area of the distributor. They will not be subject of neither distribution nor transmission charge when sell directly or to the market spot, and this cost will not be transfer to the end user.
- b. Small hydroelectric power station systems, geothermal electric power station systems and other new renewable and clean sources power station systems of more than 10 MW up to 20 MW of new installed capacity will not pay neither distribution nor transmission charge for the first 10 years of commercial operation and this cost will not be transfer to the end user.

2. *Fiscal benefits:* Any natural person or legal persons who develop a mini hydroelectric power station system, small hydroelectric power station

systems, hydroelectric power station system, geothermal electric power station systems, particular power stations of new, renewable and clean resources and other new, renewable and clean sources power stations systems will have the following benefits:

- a. Exoneration of Import Tax, customs duties, contributions and burdens, as well as the Transfer of Movables goods and Rendered Services Tax, that could be caused due import of equipment, machines, materials, spare parts and others that are necessary for the construction, operation and maintenance of particular power stations (as described above) up to 500 kW of installed capacity as well as the increase of power capacity in those types of power plants
 - b. The company that develops new renewable energy projects or that increases the energy production capacity up to 10 MW will be able to acquire from the Panamanian state an equivalent fiscal incentive up to 25 % of the direct investment cost of the project. If the project receives benefits from the Clean Development Mechanism the benefits from the sale of CERs will be discount from the 25 % of tax deduction. Will be applicable during the first 10 years counted from the entrance in to commercial operation of the project.
 - c. The company that develops new projects or that increase energy production capacity of power station types described above of more than 10 MW of installed capacity will be able to choose an equivalent fiscal incentive up to 25 % of the direct investment cost of the project, that could only be applied as payment of up to 50 % of the Income Tax derived from this activity. If the project receives benefits from the Clean Development Mechanism the benefits from the sale of CERs will be discount from the 25 % of tax deduction. Will be applicable during the first 10 years counted from the entrance in to commercial operation of the project.
 - d. To calculate the total amount of the fiscal incentive the reference CO₂ price will be 10 Euros per CO₂ eq. reduced emission, and will be use the national approved baseline of the current analyzed year.
3. A minimum of 5 % of the total direct investment value has to become public structure (highways, roads, bridges, sewage systems, schools, health centers, and other from similar nature)
 4. If a natural person of legal person wants to receive benefits from this law it has to collaborate with the official improvement and conservation programs and plans of the river basins of respective area of influence with activities like reforestation, efforts against erosion and desertification. They will also have to contemplate suitable mitigation of social aspects.

Law 45 Regimentation

Through the Executive Decree No. 45 of June 10 of 2009 The Republic of Panama regiment the incentive to the hydroelectric power systems generation and other new renewable and clean sources as contemplate in Law No. 45 of 2004.

In its article 5 established the procedure to determine how the fiscal incentives will be calculated. Each legal responsible of the project has to track the following steps:

- a) Estimate the total MWh to be generated during the period under licensing for each new project or a project that increased generation capacity of electric generation plants that qualify for alluded incentives according to Law 45 of 2004.
- b) Apply the baseline for the electricity sector established by the National Secretariat of Energy, in tons of CO₂ equivalent per MWh.
- c) Apply a reference price established in coordination with the National Environmental Authority in U.S. dollars per ton of carbon dioxide (CO₂) equivalent, estimated exclusively for the calculation of relevant tax incentives.
- d) Establish the reference direct investment per kW of installed power generation capacity and / or increase generation in kWh per type of technology. It is considered that incurred direct investment in engineering, supply and installation of civil works and electro to commercial operation of the project without including construction and administrative costs. The determination of tax incentive does not cover disbursements replacement, rebuilding or restructuring assets that not serve to increase the installed power generation capacity and / or increase the generation kWh per type of technology.
- e) Determine the amount of the tax incentive of up to 25% of direct investment to be applied during the first 10 years of operation of corresponding project.
- f) Submit to the Department of Revenue, Ministry of Finance the Project Technical Report formulary, indicating whether or not the recognition of the tax incentive for due process.

After receiving the technical report the General Direction of Revenues shall issue the appropriate tax incentives to recognize exclusively for the payment of income tax paid in the activity as follows:

- a. In the case of developing new projects or increase production capacity of energy systems as Mini-hydropower plants and development of new projects or increase the production capacity of central power systems and other renewable resources up to 10 MW, the credit application will be made for a period of 10 years after operation entry. At this point, the fiscal credit arising from direct investment may be applied to one hundred percent (100%) of the balance resulting from subtracting the caused tax less dragging credit as a result of taxes paid in advance.
- b. In the case of developing new projects or increase the energy production capacity systems as small hydro power plants, hydroelectric systems and the development of new projects or increase the production capacity of power plant systems and other renewable resources of over 10 MW, referenced credit application will be held for a period of 10 years after the operation entry. At this point, the fiscal credit arising from direct investment may apply up to fifty percent (50%) of balance resulting from subtracting the caused fiscal credit less dragging credit as a result of taxes paid in advance.

The regulation establish that depreciation will be applied to balance resulting from subtracting 100% of the total direct investment made in civil and electromechanical work, 25% of the amount of fixed assets recognized as tax incentives.

The grantee or licensee undertakes to carry out all procedures to register the project(s) as CDM projects, which will be presented by ANAM as part of the Panama CDM project portfolio. The General Direction of Revenue, Ministry of Economy and Finance, will follow a control of credits that are recognized and / or apply, as well as Certify Emission Reduction of Equivalent Carbon Dioxide sold by the licensee before or after entering into force law 45, in which case will deduct the amount of sales of these certificates from the balance of the tax incentive in each project. Below we can appreciate the inventory table of hydroelectric plants in the Republic of Panama.

Table # 2- Hydroelectric Plants in Panama. Source ETESA, 2010; Lindo, 2011

Installed Capacity and Total Gross Generation by company and plant type 2010				
Enterprise	INSTALLED CAPACITY (MW)	%	GROSS GENERATION (GWh)	%
Hydro power plants				
Enel fortuna	300	15.1	1756.77	23.47
AES Panama	481.96	24.26	1903.13	25.43
ESEPSA	22.46	1.13	117.59	1.57
Hidro Panama	4.2	0.21	19.19	0.26
Arkopal	0.67	0.03	2.52	0.03
Isthmus	10	0.5	40.03	0.53
Grupo Melo	1.47	0.07	2.78	0.04
Café de Eleta	0.53	0.03	1.38	0.02
ACP	60	3.02	244.7	3.27
Suez Energy Bontex	25	1.26	0.06	0
Paso Ancho	5	0.25	6.1	0.08
Macano	3.5	0.18	21.47	0.29
Caldera Energy	20	1.01	74.37	0.99
Total	934.79	47.05	4190.09	55.98

The country counts currently with 13 Hydropower plants that provide 934.79 MW during 2010 and 8 of them are receiving benefits from Law 45. This plants will receive a total of 50.354.720,00 USD during 10 years (Estimation are in chapter 13, table #17).

Laws related to electricity generation

Panama has different and several laws to promote and regulate the electricity generation. For the porpoise of the present research only the Law 45 will be analyze but is also important to mention that the country counts with the Law No. 6 that regulates and provide the institutional framework for the provision of Public Electricity Services (See annex # 2). Recently Law 44 enters into force to create incentives to construct and operate wind power plants (see annex # 3).

- *Law No. 6 of February 3, 1997* began to rule through its publication in the Official Gazette No. 23,220 of Wednesday February 5, 1997 establishing the Regulatory and Institutional Framework for the Provision of Public Electricity Service. It meant to assure the electric energy supply and community access to them applying the rational and efficient use of the energy resources within the country. It promotes the economic efficiency in the generation, transmission and distribution of electricity and also promotes competition and participation of private sector as basic instruments to raise public service efficacy. In June 19, 1998 was established the regulatory and institutional framework for the provision of Public Electricity Supply regulating Law No. 6.
- *Law 44 of April 5, 2011*, creates the incentive scheme for construction and operation of wind power plants that provide electricity. The law consists in five chapters, that intent to redirect the investment on renewable energy from hydroelectric power plants to wind power plants, it promote relief from water shortages and excessive use of thermal energy. The newly adopted system of incentives will encourage the diversification of the country's energy supply and demand and get a step forward as Law 45. The law 44 created an exemption from import duties, tariffs, taxes, contributions and taxes, transfer tax goods (see Annex # 3). Also the wind parks subscribed under this Law will not pay all national tax levies for a 15 year period (See annex # 1).

9.4.3 Energy Expansion Plan 2010-2024

It state in its Article 19 that the Transmission Company shall prepare the plan of expansion, according to the criteria and policies established by the National Secretariat of Energy and in accordance with development plans energy sector adopted by the State.

It includes the following basic studies:

- Forecast Demand
- Supply Scenarios and Planning Criteria
- Cost-technology standards and Transmission Components
- Diagnosis of the operating conditions of the Transmission System within a Short Term
- Reliability-levels
- Performance-Analysis of the Main Transmission System, to ensure compliance with safety criteria N – 1

For the purpose of this research only the Forecast Demand, supply scenarios and cost technology standards will be describe.

The Demand projections for the period 2010-2024, indicates that electrical energy consumption of the National Interconnected System could present growth rates, in the order of 5.9 to 6.1% annual average for the entire period of analysis, 2010 - 2024, while the maximum power required from the system could grow between 5.3 to 5.5% for the same period (ETESA, 2010).

For the short term (2010-2013), the calculations show higher growth rates, between 6.0 and 6.4%, according to the occurrence of moderate scenarios, optimistic or pessimistic, respectively. In the long term (2014-2024), the expected growth rates are slightly lower, 5.8 and 5.9%, responding to more conservative scenarios regarding economic parameters (ETESA 2010) as the next table shows.

The forecast of electricity demand, primary element for the annual updates of the plans Transmission Expansion, is based on the behavior of the socio-economic indicators that affect the consumption electric sector and the assumptions of the scenarios projection, in accordance with the provisions in the Transmission Regulation. With this estimated information is possible to estimate the energy growth rate

Table # 3 - Energy growth rate. Source ETESA, 2010

PERIOD	MODERATE (%)		OPTIMISTIC (%)		PESSIMISM (%)	
	Energy	Power	Energy	Power	Energy	Power
Short Term (2010-2013)	6.19	4.17	6.35	4.33	6.01	4
Long Term (2014-2024)	5.79	5.78	5.89	5.88	5.79	5.79
Average (2010-2024)	5.93	5.35	6.05	5.46	5.9	5.31

The Energy Expansion Plan determined for the long term (2014-2024) that the estimated average annual growth of the economy will fluctuate between 4.5 to 6.1%. Although the global financial and economic crisis is considered in the analysis and it introduced in the short term, significant uncertainties in the process of forecasting the national economy in the subsequent years 2010-2013 therefore it foresaw lower energy growth rates for those years. The Panama canal expansion, the implementation of state projects for infrastructure and other dynamic forces to the internal environment are factors that also drive the energy growth.

Within the forecast are identified some indicators. It's possible to say that the relation

\$GDP/kWh consumed is growing. It is hoped that in the short and medium term the prices of power supply system will continue rising as well. Industrial demand will decline while increasing business and government consumption in peak hours.

One of the main conclusion of the energy expansion plan is that if the expansions in the Transmission System do not take place in the short term, taking in to current demand projections Panama will confront restrictions on the Transmission System in 2012; that will increase operating costs and the system will not be able to carry all of the hydro generation in the west of the country, forcing the National Dispatch Center to meet the demand load with thermal generation, which is the closest to the sector.

The energy expansion plan was design for each of the following scenarios established by the National Secretariat of Energy:

- a) Case 1: Average demand considering hydro-thermal considering coal in a regional setting (REGMHTCB10).
- b) Case N ° 2: average demand hydro-thermal with coal plus the addition of wind power in a regional setting (REGMHTCBEO10).

c) Case No. 3: average demand hydro-thermal with coal, wind power and considering the introduction of liquefied natural gas from 2013 in a regional setting (REGMHTTLA10).

In order to define which project will be include in the different generation plans ETESA in conjunction with the Energy Secretariat evaluate the progress and development of each project that has begun with legal procedures and construction; it also consider if the project developer has submitted relevant generation production and cost of each project. In Case # 2 and # 3 some possible plants (not related to any possible project) are modeled to identify what is the cheapest option that can cover in long term the estimated demand.

Table # 4 shows the 3 expansion plans scenarios:

Table # 4 - Energy Expansion Plan 2010. Source ETESA

EXPANSION PLAN 2010-2014 PROPOSE BY ETESA																									
DEMAND					Case # 1					Case # 2					Case # 3										
Moderate Medium Scenario					Capacity MW					Capacity MW					Capacity MW										
Year	Energy GWh	Growth %	Power	Growth %	Month	Project	Hydro	Thermal	Eolic	Total MW	Install Capacity MW	Month	Project	Hydro	Thermal	Eolic	Total MW	Install Capacity MW	Month	Project	Hydro	Thermal	Eolic	Total MW	Install Capacity MW
Current Install Capacity MW (2010)																									
2010	7076.9	0	1142.6	0	May	Paso Ancho	5			94.38	1753.5	May	Paso Ancho	5			94.38	1753.5	May	Paso Ancho	5			94.38	1753.5
					June	Los Planetas I	4.76					June	Los Planetas I	4.76					June	Los Planetas I	4.76				
					August	Macano	3.43					August	Macano	3.43					August	Macano	3.43				
					August	BLM (Carbon)		120				August	BLM (Carbon)		120				August	BLM (Carbon)		120			
					September	Bajo de Mina	56					September	Bajo de Mina	56					September	Bajo de Mina	56				
2011	7495.3	5.91	1210.1	5.91	September	Gualaca	25.2			500.96	2254.46	September	Gualaca	25.2			500.96	2254.46	September	Gualaca	25.2			500.96	2254.46
					January	Lorena	33.8					January	Lorena	33.8					January	Lorena	33.8				
					May	Chan I	222.46					May	Chan I	222.46					May	Chan I	222.46				
					July	Prudencia	56					July	Prudencia	56					July	Prudencia	56				
					August	Pedregalito	20					August	Pedregalito	20					August	Pedregalito	20				
2012	7931.7	5.82	1279.8	5.76	October	Eólico El			80	55.75	2310.21	October	Eólico El			80	160.75	2415.21	October	Eólico El			80	160.75	2415.21
					December	Baitún	88.7					December	Baitún	88.7					December	Baitún	88.7				
					January	Cochea	12.5					January	Cochea	12.5					January	Cochea	12.5				
					October	San Bartolo	15.25					October	San Bartolo	15.25					October	San Bartolo	15.25				
					October	Las Perlas Norte	10					October	Las Perlas Norte	10					October	Las Perlas Norte	10				
2013	8428.3	6.26	1359	6.19	October	Las Perlas Sur	10			315.4	2625.61	October	Las Perlas Sur	10			385.4	2800.61	October	Las Perlas Sur	10			585.4	3000.61
					December	Mendre II	8					December	Mendre II	8					December	Mendre II	8				
					January	Bonyic	31.3					January	Bonyic	31.3					January	Bonyic	31.3				
					January	Pando	32.6					January	Pando	32.6					January	Pando	32.6				
					January	Monte Lirio	51.6					January	Monte Lirio	51.6					January	Monte Lirio	51.6				
					January	El Alto	68					January	El Alto	68					January	El Alto	68				
					January	Caldera	4					January	Caldera	4					January	Caldera	4				
					January	Las Cruces	9.17					January	Las Cruces	9.17					January	Las Cruces	9.17				
					January	Los Estrechos	10					January	Los Estrechos	10					January	Los Estrechos	10				
					January	La Laguna	9.3					January	La Laguna	9.3					January	La Laguna	9.3				
					February	RP-490	9.95					February	RP-490	9.95					February	RP-490	9.95				
					April	Eólico I E2			70			April	Eólico I E2			70			April	Eólico I E2			70		
					May	Bajo Frío	56					May	Bajo Frío	56					May	Bajo Frío	56				
					June	Tizingal	4.64					June	Tizingal	4.64					June	Tizingal	4.64				
					July	Barro Blanco	28.84					July	Barro Blanco	28.84					July	Barro Blanco	28.84				
2014	8968.4	6.41	1445.2	6.34	January	San Lorenzo	8.12			12.29	2637.9	January	San Lorenzo	8.12			12.29	2812.9	January	San Lorenzo	8.12			12.29	3012.9
					December	Potreriillo	4.17					December	Potreriillo	4.17					December	Potreriillo	4.17				
2015	9583.5	6.86	1543.3	6.79	January	Pedregalito II	13			47.53	2685.43	January	Pedregalito II	13			47.53	2860.43	January	Pedregalito II	13			47.53	3060.43
					April	Tabasará II	34.53					April	Tabasará II	34.53					April	Tabasará II	34.53				
2016	10153.7	5.95	1634.1	5.88	January	El Síndigo	10			10	2695.43	January	El Síndigo	10			10	2870.43	January	El Síndigo	10			10	3070.43
2017	10750.5	5.88	1729	5.81	January	Chan II	214			214	2695.43	January	Chan II	214			214	3084.43	January	Chan II	214			214	3284.43
2018	11308.6	5.19	1817.6	5.12						0	2909.43						0	3084.43						0	3284.43
2019	11982.3	5.96	1924.6	5.89	January	CB 250 a		250		250	3159.43	January	CB 250 a		250		250	3334.43	January	CB 250 a		250		250	3234.43
2020	12692.1	5.92	2037.3	5.86	January	CB 250 b		250		250	3409.43	January	CB 250 b		250		250	3584.43	January	CB 250 b		250		250	3284.43
2021	13412.5	5.68	2151.6	5.61	January	CB 250 c		250		250	3659.43	January	CB 250 c		250		250	3834.43	January	CB 250 a		250		250	3534.43
2022	14147.3	5.48	2268	5.41						0	3659.43						0	3834.43	January	CB 250 b		250		250	3784.43
2023	14915.1	5.43	2389.5	5.36						0	3659.43						0	3834.43						0	3784.43
2024	15741.4	5.54	2520.3	5.47	January	CB 150 a		150		150	3809.43	January	CB 150 a		150		150	3984.43	January	CB 150 a		150		150	3934.43

Each different Scenario has a different implementation cost. Table # 5 shows that case # 1 has a lower total cost.

Table # 5 - Total cost of each expansion plan scenario. Source ETESA 2010

Cases	Investment Cost (mil \$)	Operation Cost (mil \$)	Deficit Cost (mil \$)	Total (mil \$)
Case #1	1916.79	1111.75	0	3028.54
Case # 2	2181.49	1043.6	0	3225.09
Case # 3	2211.52	1096.94	0	3308.46

As show above Case # 3 is the most expensive and the one how has a more diversify electricity matrix. The amount of CO₂ emissions will be explain within the results in chapter # 13.

9.4.4 Climate Change Policy

Climate change is an active phenomenon and an unquestionable reality, evident through a series of phenomena that contribute to increased vulnerability of natural systems, economic and social.

Through the Executive Decree No.35 (dated 26 February 2007) "On approving the National Policy on Climate Change, its principles, objectives and action lines" Panama builds on its action against the climate changing patterns that increase national vulnerability to extreme events.

The fight against climate change is carried out mainly in two major areas of action: mitigation and adaptation.

The challenge of the policy is to consolidate the progress made by Panama, especially since the initiatives taken by ANAM and Climate Change and Desertification Unit, which requires a specific policy guidance that integrate programs and activities that have been unfolding with other policies aimed at sustainable development.

The National Climate Change Policy is the guiding framework for the activities to be undertaken by the public, private and civil society in general, so that they consider climate change management, to contribute to the stabilization of greenhouse gases to promote adaptation measures and ensure sustainable development.

To expand and strengthen the implementation of a policy at inter institutional level was approved by Executive on National Climate Change Committee of Panama (CONACCP) composed of 17 government agencies Environment Agency System and the academic sector, in order to facilitate the generation and exchange of relevant information and design mitigation and adaptation measures at national level, contributing to the sustainable development of the country by incorporating the most vulnerable population and sector transversely the issue of climate change and watershed restoration.

In compliance with the policy, is still under development the National Climate Change Strategy with the aim of providing necessary tools to lead country's economy towards a less carbon-intensive economy, through processes that generate resources for strengthening investment in clean technology and facilitate society adaptation

to climate change inevitable impacts, which will have an action plan for the short, medium and long term.

It defines 6 principles which constitute its framework of action. The first one is to protect the climate system for present and future generations on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities. This principle is based in the United Nation Convention on Climate Change.

The second one is to fully take into account the specific needs and special circumstances of Parties in developing countries, especially those that are particularly vulnerable to the adverse effects of climate change. As expressed before Panama has included in its policy to work on adverse effects of climate change. This principle constitutes one of the bases of making this research focused in the Panamanian Energy Matrix.

The third principle recognize the commitment to implement measures to adapt and mitigate the adverse effects of climate change, especially considering the areas of poverty, so as not to jeopardize the economic, environmental and social development.

To achieve what expose above it is fundamental to Mainstream Climate Change in the national development strategy and economic growth and promote the informed participation of citizens, including gender equality in addition of current national policies initiative.

The principles also recognize that policy and issues related to climate change at national level should be coordinated through ANAM as the Designated National Authority and the UNFCCC focal point.

Climate Change Management that will be integrated and coordinated at the Sectoral, regional, local and national level, complemented with other instruments for environmental management and environmental education, land management, gender and environment, among others.

Its main Objective is to properly manage the national theme of climate change and the possible generated effects on the population and territory, in accordance with the provisions contained in the UN Framework Convention on Climate Change, the Kyoto Protocol, the Constitution the Republic of Panama and the General Law of Environment.

The policy has five (5) specific objectives as show as follows:

- Objective 1: At the institutional level. Develop mechanisms to coordinate intervention strategies through which the public sector and civil society contribute to the fulfillment of the agreements made by the Panamanian government in relation to climate change.
- Objective 2: In the Field of Environmental Management. Promote action on adaptation to climate change so that they are compatible the protection of the population and the fight against poverty, the conservation and recovery of natural resources and preservation of ecosystems.

- Objective 3: In the regulatory area. Promote action on mitigation of climate change so that economic activities are compatible with sustainable social and economic development clearly established in the Kyoto Protocol.
- Objective 4: In the Field of Citizen Participation. Raising awareness and promoting citizen participation, so that key stakeholders are involved in various processes related to management of climate change, honoring women for their proven role in the process.
- Objective5: In the Field of Training Research and Production Efficiency. Strengthening institutional capacities, both in infrastructure and access to current knowledge and scientific resources among the various actors involved in climate change. As result the country is able to cope with their effects.

A climate change policy as to be implemented through a Climate Change Strategy and NAMAS could be a very important part of the strategy, in Chapter # 13 within the result shows how NAMAS could be included to improve National Climate Change Policy and Strategies to reduce spillovers effects on the energy matrix.

9.4.5. Status and trends of primary energy production and GHG emissions

Currently, the Panamanian energy matrix shows a heightened dependence on a single energy-petroleum-which represents more than 80%, both the total supply and total energy consumption in the country. In this sense, the data for 2010 (Energy Secretariat, 2010) identifies that the primary energy consumption comes from oil derivatives such as: Gasoline, Liquefied Petroleum Gas (LPG), Kerosene, Diesel and Fuel Oil. None of them produced in the country. The significance of oil in energy consumption increases considerably when fuels used in thermal generation are primarily bunker, diesel and marine diesel (Energy Secretariat, 2010).

Table # 6 - National Fuel Consumption. Source National Energy Policy Commission, 2011

National Fuel Consumption					
Product	2006 (gallons)	2007 (gallons)	2008 (gallons)	2009 (gallons)	2010 (gallons)
Light Diesel	201027369.00	264538494.00	285124477.00	285786289.00	330023114.00
Marine Diesel	9295874.00	12050304.00	0.00	0.00	0.00
Gasoline	148338263.00	163694990.00	170181735.00	197475119.00	211606583.00
Lubricants	3606172.00	3782369.00	2265465.00	2259471.00	2182742.00
Blacks (Bunker and asphalt)	140486873.00	135119743.00	116190192.00	98983705.00	115787411.00
Kerosene	826267.00	602505.00	498725.00	873263.00	2573600.00
Jet Fuel	71365964.00	85620887.00	98944148.00	108790068.00	117770303.00
Av-Gas	424456.00	476499.00	422052.00	398106.00	408820.00
LPG Butane	47401275.00	45859155.00	48183841.00	48530690.00	48096971.00
LPG Propane	13491007.00	17673167.00	17713065.00	19025968.00	22250553.00
Total	636263519.00	729418114.00	739523699.00	762122408.00	850700097.00

Additionally, the supply of domestic energy sources has been decreasing, declining at an annual rate of 10.6%, while consumption has an average annual growth of 7.8% in the last 4 years. This illustrates the current Panamanian energy situation, dominated by the steady increase in the consumption of sources and external resources, mainly oil and derivatives. That means, every time population consumes, it becomes more and more dependent on external energy sources (Energy Secretariat, 2010).

Also the primary energy per habitant has increased from 7.73 BEP/ habitant in 1996 to 8.45 BEP/habitant in 2006.

Some of the reasons of the rising number of primary energy per habitant are: vehicle fleet of more than 10 years old, poorly maintained vehicle fleet, use of older and inefficient appliances, absence of regulation of a strict energy efficiency of products entering the country.

Generation

Panama had in 2010 an installed capacity of 1986.00 MW and from where 11.25 % where self-producers as a The Panama Canal Authority, Melo Group and Petroterminal de Panama; a 0.70 % belongs to the isolated system. The National grid has an emission factor of 667g/kWh (Energy Secretariat, 2010).

Energy demand in Panama reached a new record on 12 May of 2011, when the country required 10 % below maximum generation capacity, as reported by the National Dispatch Center of Electric Transmission Company (ETESA).

Within 2 years the maximum energy demand or amount of electricity required by the system increased 110 thousand MW.

One of the probabilities of this increase is the unstoppable use of air conditioning units due to high temperatures that were reported during summer 2011.

Panama was able to respond on time because the reservoirs of the hydroelectric power plant were at its maximum generation capacity (generation 60% hydroelectric plants and 40% thermal plants) but when climate variability does not allow raining pattern to be fulfilled, and then the country could confront an energy crisis.

The following table shows the power generation within the last 5 years.

Table # 7- Power Generations 2005-2010

Year	Power Generation		Producers	
	Available to consume (MW)	Gross Generation (MW)	Hydropower (MW)	Thermo power (MW)
2006	5498820	5024811	5196820	1827991
2007	5831944	5517172	3323638	2193534
2008	6025296	5562044	3712263	1849781
2009	6397150	5975586	3588368	2387218
2010	6902488	6535071	3929499	2605572

According to estimated data from 2010, Panama has a gross generation of about 653GWh, where 53 % was generated by fossil fuels, keeping electricity rates to the very instability of world oil prices.

Transport

The transport sector participation in the consumption of energy produced by oil-derived sources is led by Diesel (51.96%). Gasoline accounted for 31.98% of secondary energy consumption and kerosene holds a 15.91% (Energy Secretariat, 2010).

Industry

As for the secondary power industry uses a Fuel Oil 42.37%, electricity 25.09% and gasoline by 12.58 %. Also diesel fuel consumed in a 7.35%, liquefied gas in 2.56% and 0.92% kerosene (ETESA, 2010).

The industrial market is quite small compared to other Latin American markets. The main customers in this sector are cement plants as a group Holcim/Cement Panama and CEMEX.. The end use energy in this sector is on lighting equipment, air conditioning, Equipment process, Compressed Air Systems equipment, Pumping Equipment, refrigeration.

Commerce

The power consumption of this sector represented 45% of the total energy generated. This sector has an average consumption rate of 4.1% yearly growth and represents a wide range of the Panamanian economy (Energy Secretariat, 2010). The end use of energy is on electric fan, lighting equipment, air conditioning equipment, computer and office equipment, electric motors, pumping equipment, refrigeration.

Households

The residential sector consumes a high percentage of electricity (50.82%) and other energy products such as liquefied gas (44.71%), kerosene (3.74%) and charcoal (0.73%). Regarding power consumption, this sector consumed the equivalent in 2003 to 31.1% of total national consumption; demand has an average annual growth of 5.8%.

The most demanding electronic device in the country is air conditioning which consumes the 60 % of the total energy produced (BUNCA, 2005).

As you see in table # 7 above, the estimated peak load behavior, between 2009 and 2024, will be growing constantly 3% average; between years 2006-2007, 5.4% and between 2007-2008 3.3%.for the next 15 years.

The commercial sector, government and industry together account for 71 % of electricity consumption nationally, which highlights the importance of directing efforts to these sectors in terms of efficient use of energy, especially considering the high energy saving potential within those sectors.

The residential and commercial projects can represent savings of electrical energy with less time to recover the investments to be made because the price of electricity in 2000

On table number # 8 is possible to appreciate more clearly the Total primary energy use within the different sectors.

Table # 8 Sectoral Energy Demand. Source ETESA, 2010

Demand Side	2006 (%)	2007 (%)	2008 (%)	2009 (%)	2010 (%)
Households	31.1	30.7	30.19	31.82	31.7
Commerce	46.02	46.67	47.76	46.46	45.07
Industry	5.92	5.86	5.58	5.26	4.07
Government	15.64	15.41	15.03	14.69	13.99
Others	0.27	0.29	0.31	0.26	0.28
Big Clients	0.98	0.97	1	1.37	4.62
Energy Producers	10.84	10.69	11.74	10.83	11.73

As showed above the sector that increased significantly its energy consumption is Big Clients.

Renewable Energy Potential

There is a great potential for growth in the Panamanian electric power sector. Nineteen Percent (19%) of Panamanians still do not have access to electricity, especially in the rural areas (Energy Secretariat, 2010). It is estimated that a billion-dollar investment is needed in the power sector for the next few years. As Panama's maritime industry grows in importance as a container transshipment center, additional electric power will be required operate cranes and to run the refrigerated containers transporting perishables.

Panama has proven wind, water and solar resources that have not yet been exploited. The government is promoting alternative energy projects as part of its plan to reduce dependence on expensive imported diesel fuel. The outlook is positive for the construction of additional power plants as energy demand outpaces power. There is a large potential for hydroelectric power and a law has been proposed to promote mini-hydroelectric projects as a way to reduce oil imports required by thermal plants and promote the energy matrix transformation.

Hydropower

Panama is a country blessed with vast water resources which is distributed equitably. This resource has great potential yet to be exploited. The area of greatest potential is on the east side of the country, in Chiriqui Province where a single river has up to 24 potential projects under revision and construction. Most of this area is inhabited by indigenous populations.

An accounting was made to identify what are the hydropower plants that will be functioning in the near future. In 2010 were 41 projects asking for Hydro concessions with a total of 287.59.4 MW, 18 under construction that will provide 677.98 MW and 17 that have finalized the design phase adding 453 MW to hydro power potential. In Summary the country will count in the future with 1418.64 MW (see table # 9).

Table # 9 Hydropower plants under construction (Source ASEP,2010; Lindo 2011)

Hydroelectric Power Plants Concessions Under Construction		
#	Project	MW
1	Bonyic	30
2	Chan 75	211
3	Bajo Mina	56,8
4	Cochea	12,5
5	El Alto	60
6	El Síndigo	10
7	Gualaca	27
8	Lorena	35
9	Montelirio	51,6
10	Pando	32,6
11	Pedregalito	19,9
12	Prudencia	56
13	RP-490	10,5
14	San Lorenzo	9
15	Tabazará II	36,8
16	El Fraile	5,31
17	Río Piedra	9
18	La Huaca	4,97
	Total	677,98

Table # 10- Hydropower plants concessions on process. Source ASP, 2010; Lindo, 2011

Hydroelectric Power Plants Concessions on Process		
#	Project	MW
1	Acla I	1,5
2	Caña Blanca	5
3	Candela 2	0,62
4	India Vieja	2
5	El Recodo	9,94
6	Remigio Rojas	7,5
7	Bugaba 1	2
8	Bugaba 2	3
9	La Herradura	2,5
10	Potrerosillos	4,17
11	Boqueron 1	0,92
12	Boqueron 2	0,92
13	Boqueron 3	0,92
14	Cuesta de Piedra	6,78
15	Pedregalito II	10
16	La Garita	0,7
17	Gariché	6,47
18	Quebrada Jaramillo	1
19	Cotito	2
20	Colorado	3,7
21	Barriles	1
22	Gariché 2-3	8
23	Terra 5	1
24	Alto Caldera	7,8
25	Chorcha	3,9
26	Gualaquita	3,34
27	San Andres II	6,8
28	Guayabito	0,9
29	Las Cruces	17,4
30	San Barloto	15,67
31	Santa Fe (IHRE)	1,3
32	El Romance	Not defined
33	Cerro Mina	Not defined
34	Cerro Gordo	8,5
35	Santa María	26
36	Lalín III	25,4
37	Lalín II	38,6
38	Lalín I	19,5
39	La Cordillera	17,69
40	La Laguna	9,15
41	Cerro Viejo	4
	Total	287,59

Table # 11- Hydropower plant with final design. Source ASEP, Lindo, 2011

Hydroelectric Power Plants Concessions With Final Design		
#	Project	MW
1	Chan 140	213,6
2	Bajo Frío	58
3	Bajos del Totuma	5
4	Barro Blanco	28,84
5	Burica	50
6	Caldera	6,109
7	Las Perlas norte	6,43
8	Las Perlas Sur	6,43
9	Los Planetas	3,727
10	Mendre 2	8,294
11	San Andres	12,8
12	Terra4 -Tizingal	4,5
13	Ojo de Agua	5,8
14	Cañazas	5,94
15	La Palma	2,5
16	Los Estrechos	9,5
17	Santa María 82	25,6
	Total	453,07

Assuming that all hydropower plants could be build, and assuming also that they will be running around 8600 hours per year, using the Panamanian emission factor of 0,67 CO₂ tons / MWh, it is possible to say that this project will avoid 8.174.261,30 CO₂ tons per year.

A big part of the hydro high costs are usually foreign, small hydro plants are local investment said Rodrigo Rodriguez, director of the National Electricity ASEP.

The most expensive hydro power project is currently being built in Changuinola and is performed by the Company AES Changuinola SA with a value of worth 600 million dollars.

This project is 60% complete and is scheduled to begin operations in November 2011 and a generating capacity of 223.00 MW.

The second most expensive project is valued at 193.28 million dollars, located in Chiriqui Viejo River by the company Ideal SA,

The same will generate 85.90 MW and is proceeding to March 25%, and the timing of this bill provides that should begin operations in December 2011.

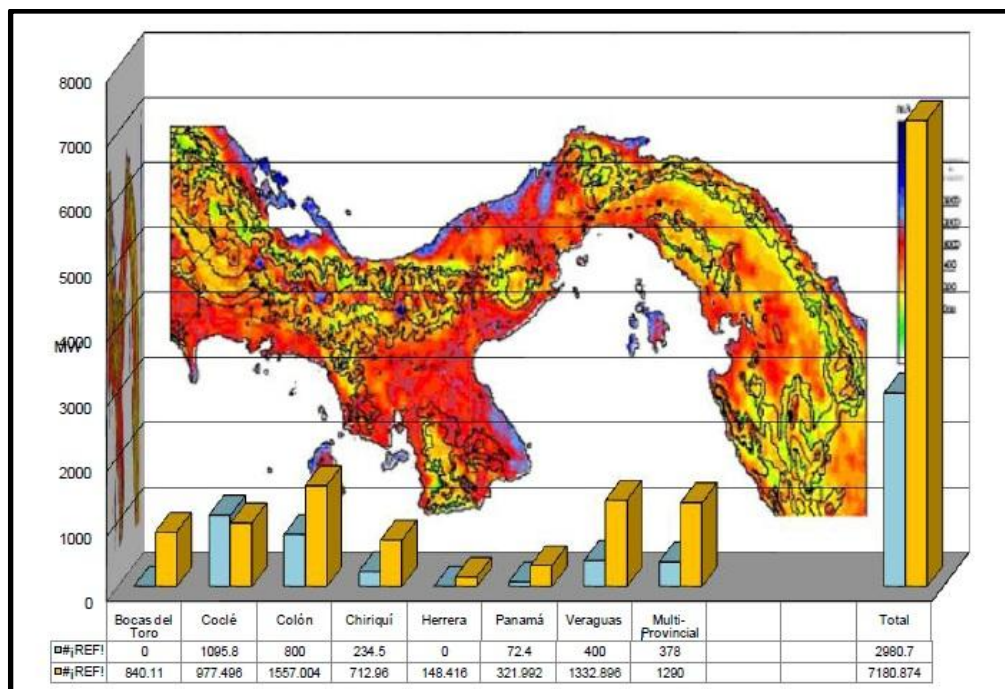
Meanwhile, with an investment of 127.80 million dollars, the company Ideal SA, also built a hydro power plant located in Rio Chiriqui Viejo.

Wind

Panama does not have any wind project in operation but has much potential. A preliminary assessment of wind resources in Panama, drafted in 1981, shows that areas with greater resources are on the Caribbean coast and in the steps of winds along the Cordillera Central. The Alisios winds flow across Panama, strong winds that feed the country's wind potential.

Lahmeyer consultant conducted a wind resource map which shows the possible sites for development, attracting so many foreign investors. The greater potential is on the Caribbean side and in the middle of the country in Central Mountain Chain.

Graphic # 3: Wind Energy Map. Source: LAMEYER INTERNATIONAL, 2002



The Figure shows yellow bars which represent the wind potential at 100 meters high and the light blue represents the potential at 50 meters high in each province. Within the map the highest potential is show in colored blue areas.

Panama has no wind power plant running today but are two (2) projects under construction that will be providing 330 MW to the grid (See Table # 12).

Table # 12 - Wind power plants concessions under construction. Source ASEP, 2010; Lindo, 2011

Wind Power Plants Concessions under Construction		
#	Project	MW
1	Toabre	225
2	Antón	105
	Total	330

Three (3) projects have its final design, that will be generating 234.8 MW per year and 12 projects begun the concession process adding 1240.3 MW to Panama's Eolic potential. In Total Panama could count with 1805.1 MW in the future. If this projects are build they will be avoiding 9.675336,0 CO₂ tons per year (Assuming function 8000 hours per year and a CO₂ emission factor of 0,67 CO₂ tons per MWh). See Table # 13 and Table # 14.

Table # 13- Wind power plants concessions with final design. Source ASEP, Lindo, 2011

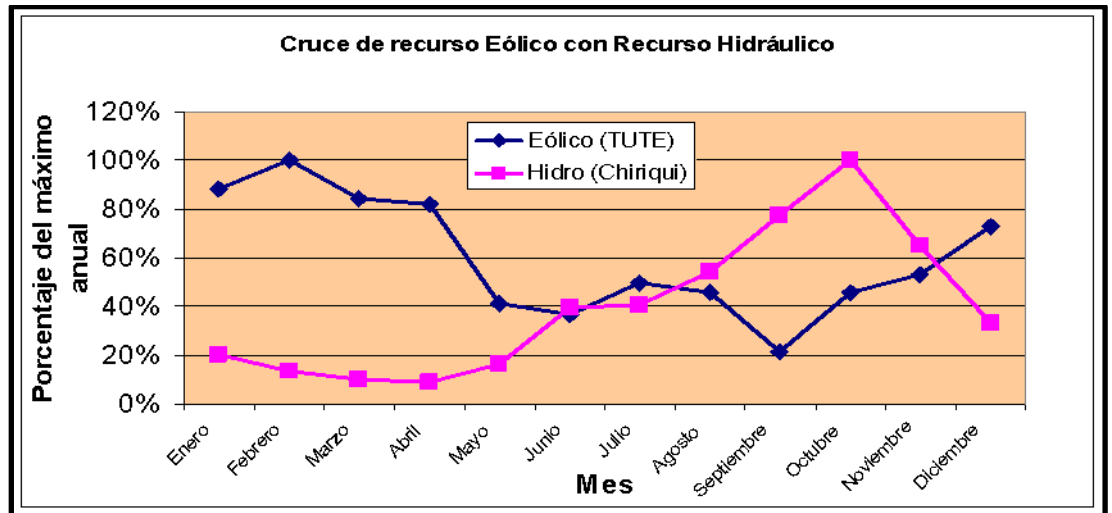
Wind Power Plants Concessions With Final Design		
#	Project	MW
1	Nuevo Chagres	168.8
2	Marañon	18
3	Portobelo	48
	Total	234.8

Table # 14 - Wind power plants concessions in process. Source ASEP, Lindo, 2011

Wind Power Plants Concessions in Process		
#	Project	MW
1	Boquete	100
2	Hornitos	34.5
3	Cabuya	54
4	La Rosa de los Vientos	194
5	La Colorada	160
6	Antón Sur	180
7	Cerro Azul	40.8
8	Tesoro	105
9	Escudero	50
10	Viento Sur	150
11	Veraguas I	91
12	La Vikinga	81
	Total	1240.3

The wind resource and the hydropower complement among each other because during summer when dams levels is reduce by the absence of rain, is when the wind blows strongly. The graphic # 3 shows how Cerro Tute project's potential can be seen as complementary to the existing hydro generation in Chiriquí Province.

Graphic # 4 - Cross of Wind and hydro resource. Source: Cerro Tute´s EIA, 2004



Biomass

Traditionally, wood has played an important role in power generation because it is the main fuel used in many economic activities on rural areas. Its use for domestic purposes and small-scale industries (bakeries, salt, lime kilns, brick kilns, mills, etc.) is fundamental for rural production in all countries of the area. Firewood, in most cases, is a byproduct agricultural process, so fuel is a relatively accessible and good quality that, until now, has a lower cost than substitutes (Energy Secretariat, 2009).

Other crops growing in the country and that could be used to generate fuel from biomass are: Energy Crops, Sugarcane, African Palm, Caribbean Pine Wood, Jatropha Curcas and Moringa. The Environmental National Authority made a study in 2008 that says that Panama could generate 1445 million BEP of Biodiesel and 703 million of BEP of Ethanol. Another possible source of biomass is solid waste, Crop Residues and Wood, animal waste and urban waste, but more research is needed in order to invest and develop on this technology (ANAM, 2008).

Solar

Panama counts with 130 photovoltaic Mini projects which produce around 5000 Kw. These projects are located on rural Schools, houses and farms mostly on indigenous lands (FIS, 2009).

There are also Thermal Low Solar Heat projects used to dry fruits like mango, bananas, papaya, water melon and Coffee beans but there are no estimated solar project potentials (Energy Secretariat, 2009).

The only official GHG emission inventory of the country was made in 2000 with a base year of 1994, it calculated a Total GHG emissions of 16.742.608,96 CO₂ Equivalent tons. The biggest emitter sector is the energy sector with 6.474.040,43 CO₂ equivalent tons (ANAM, 2000).

The Energy Secretariat in its Energy expansion plan of 2009 affirmed that CO₂ emissions from energy sector were 7.038.600,00 showing an increment of 8 % in the last 15 years. That make of believe that Panama has to take attention of how the energy sector is developing.

As appreciate above the main renewable energy potential in the country are hydropower plants and wind power plants. Therefore it is important to identify how to maximize not only the revenues from these activities but also the enormous sustainability potential that these projects could bring to the National Energy Matrix. Acknowledging it and identifying sensible paths to direct the national economy to a low carbon intensity economy Panama could become a renewable energy leader within the Central American Region.

9.4.6. Clean Development Mechanism (CDM) in Panama

The central feature of the Kyoto Protocol is its requirement that countries limit or reduce greenhouse gas emissions. Emitting GHG over a set limit involves a potential cost. On the other hand, emitters able to stay below their limit hold something of value: emission reductions. As carbon dioxide is the principal GHG, commonly general public refer to this activity as carbon trading. CDM allows emission-reduction projects in developing countries to earn certified emission reduction (CER) credits, each equivalent to one ton of CO₂. CERs can be traded and sold, and used by industrialized countries to meet a part of their targets under the Protocol.

The CDM assists countries in achieving sustainable development and emission reductions, while giving industrialized countries some flexibility in how they meet their emission targets (UNFCCC, 1998).

Projects are eligible through a difficult public process designed to ensure tangible, measurable and verifiable emission reductions that are additional to what would have occurred without the project.

The mechanism is overseen by the CDM Executive Board, answerable ultimately to the countries that have ratified the Kyoto Protocol.

To register a project, participants must first receive a letter of approval from the host country, stating that the project assists the host country in achieving its sustainable development goals.

Also a third-party must validate the project design, verify and certify the emission reductions.

According to KP and other agreements on the implementation of this protocol, under CDM:

- Projects should be consistent with host country sustainable development. The host government must agree this requirement.
- The involvement of stakeholders has to be voluntary.
- A substantial part of the fulfillment of the developed countries GHG reduction commitments must be in their own territories.
- For each project, the benefits obtained should be real measurable and long-term benefits related to climate change mitigation. The certified emission

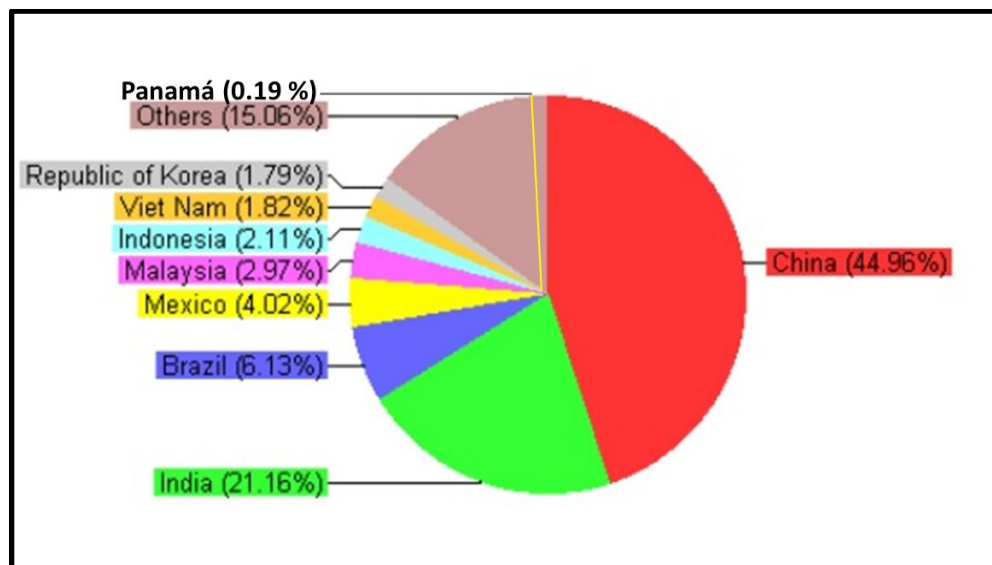
reductions must be additional to that would occur in the absence of the activity or project certificate.

- This would involve verification and reliable monitoring of the entire cycle the project.
- CDM revenues have to be shared within the most vulnerable countries in order to invest in adaptation measures.
- When receiving another type of international cooperation grant funds it is not eligible as CDM project.

CDM could facilitate access to environmentally sound technologies and certain financial resources in developing countries that will contribute to sustainable development. An appropriate price level for CERs is necessary to ensure flows of financial resources.

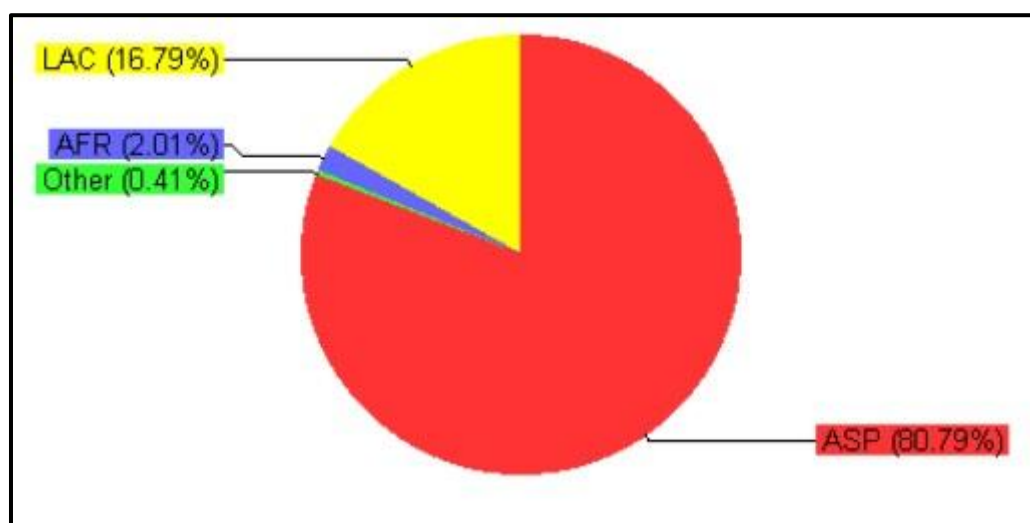
The process of validation, verification and certification has to protect consistency, feasibility and project correspondence with the objectives of the Convention and the KP. For the reason above, the process could become costly, reducing attractiveness of certain projects of interest to developing countries, as investments in renewable energy sources to replace fossil fuels use and reduce GHG emissions. Until today there are 3134 registered projects as CDM and they will reduce 621,685,012 CO₂ equivalent tons (UNFCCC, 2011). Panama has registered 6 projects (See Graphic # 5).

Graphic #5 -CDM Worldwide Projects Distribution. Source UNFCCC, May 2011



As regions the one leading CDM registered projects is Asia and de Pacific with 2536 project followed by Latin America and de Caribbean with 527 projects, and in third and fourth place are Eastern Europe and Africa respectively as show in graphic # 6

Graphic # 6 - CDM Regional Distribution. Source UNFCCC, 2011



Panama has registered 5 hydroelectric power plants and 1 wind project that together will reduce 291.579,00 CO2 eq. tons per year (See Table # 15).

Table # 15 - Panama CDM Projects. Source UNFCCC, Lindo 2011

Registered	Title	Host Parties	Other Parties	Reductions CO2 Tons/year	Reduction CO2 Ton/10 years
01-oct-05	Los Algarrobos	Panama	Spain	37213	372130
24-Dec-05	Dolega	Panama	Spain	12167	121670
24-Dec-05	Macho de Monte	Panama	Spain	10963	109630
21-oct-06	Concepción	Panama		36126	361260
10-mar-07	Paso Ancho	Panama	United Kingdom of Great Britain and Northern Ireland	22233	222330
23-feb-09	Santa Fe	Panama	United Kingdom of Great Britain and Northern Ireland	172877	1728770
TOTAL				291579	2915790

As established in Law 45 regulation, every project that wants to has access to the law incentives has to apply to CDM, therefore by taking in consideration all renewable projects under construction Panama has a renewable energy mitigation potential of 17.849.597.3 CO2 tons per year.

Until today 71 countries have CDM Projects. In addition to the 3.134.00 so far registered, there are around 2,600 projects in various stages of the examining process. The number of projects beginning validation in the first three months of 2011 was 17 percent higher than at the same moment in 2010 (UNFCCC, 2011).

To register a project as CDM is necessary to follow a national approval process and a UNFCCC registration process, and in order to be registered by UNFCCC the National process has to be successful. The following table shows the National process of approval.

Table # 16 - Panamanian CDM process of Approval. Source UNFCCC, 2003

Panamanian CDM process of Approval	
Activity	Responsible
1. Conception of the project	Project Developer
2. Processing of legal requirements for operation of the project activity to the appropriate authorities (ex. licensing, permits, concessions, environmental impact assessments, etc.).	Project Developer
3. Presentation to ANAM of the following requirements. Forms available on the website of ANAM: www.anam.gob.pa 3.1 PIN-Project Idea Note (World Bank version) 3.2 Community Benefits Questionnaire (version Community Development Carbon Fund) 3.3 Receipt of payment for the registration of the Project Impact Assessment and Environmental Auditing and PAMA	Project Developer
4. Issue of Letter of No Objection once enter the EIA or respective PAMA (15 days) (Letter of No Objection) Letter of No Objection	ANAM-DNA
Issue of Letter of complacency after approval of the EIA or the respective PAMA (5 days) (Letter of Complacency) Letter Complacency	ANAM-DNA
6. Presentation of Project Design Document (PDD by its acronym in English) accompanied by resolution approved EIA or EAP Validation Report	Project Developer
7. Issue of Letter of Approval (15 days), (LETTER OF APPROVAL) Approval Letter	ANAM-DNA

Every country has to has an entity responsible to lead the CDM subject at national level those entities are call Designated National Authorities, well knows as DNAs. The DNA is represented in the Ministries of Environment. In the case of Panama, ANAM recognizes the economic opportunities that these emerging markets offer and become the DNA of Panama.

Furthermore, in Panama the DNA ensures that projects actually contribute to long term sustainable development of locations where projects are established.

In order to register the project after elaborating a Project Design Document (PDD) the project developer should identify a Designated Operation Entity (DOE) that has to validate everything include on the PDD, being the only available channel of communication between project developer and the CDM Executive Board (EB). The DOE will ask for registration on behalf of the project developer guarantying the veracity of the presented PDD. The PDD will be published in the UNFCCC webpage for

8 weeks, and all the world has de possibility to comment on the document. If comments are made and project developer has include and solve relevant comments on the PDD, and if they comply with CDM requirement then the EB in its next meeting will emit a registration resolution.

But it does not mean that the project has generated CERs. After construction another DOE have to verify in the field if the project is really reducing the emissions calculated before. Then when the DOE make its report to the EB, the project developer will received a document that no the emission reduction for that year (CERs) and that will be activate on the transaction log (registration of emission reductions in the Carbon Market). Figure # 8 shows the CDM project Cycle.

Figure # 8 - CDM Project Cycle. Source UNFCC, 2010; Lindo, 2011



9.4.7 Panama point of view of Nationally Appropriate Mitigation Activities (NAMAs):

Currently, National Appropriate Mitigation Actions could impact current and future energy matrix, depending of which type Panama decide to design. The NAMA to analyze in this thesis correspond to a technology penetration program and laws and regulation type.

The object of research is the 2010-2024 Panama Energy Expansion Plan and the Decisions among the UNFCCC related to the implementation of National Appropriate Mitigation Activities, specifically Law 45 of 2004.

The IEA’s Energy Technology Perspectives 2008 (ETP) publication map out that energy sector emissions of greenhouse gases (GHGs) will increase by 130% over 2005 levels, by 2050, in the absence of new policies (IEA, 2008).

To address this increase will require an energy technology revolution involving a portfolio of solutions: greater energy efficiency, renewable energy, nuclear power and a de-carbonization of fossil fuels based power generation.

Panama has the potential to contribute to reduce GHG emissions using the existent policy framework, but the decision to implement it and how to implement it, has to be done knowing what are the advantages or disadvantages to do so.

Noting that Panama ratified the UNFCCC and the Kyoto Protocol is important to mention that in the Copenhagen Accord of 18 December 2009 Non-Annex I Parties agreed they will implement mitigation actions which will be subject to their domestic measurement, reporting and verification the result of which will be reported through their national communications. Panama presented a letter of agreement with the Copenhagen Accord but noted **a reserve on submitting NAMAs** (Ministerio de Relaciones Exteriores, 2010) as the country is already making voluntary mitigation activities.

Panama did not want to agree on this subject because the manner that the Copenhagen Accord is written brings a level of commitment that the country is not ready to take. Panama did accept the Cancun Agreement were the terms used referring to MRVs less binding.

Panama has to prioritize its efforts and concentrate first on a specific list of key sectors/NAMAs that produces significant emissions reductions as the energy sector does. It needs to think outside the box and look the opportunity cost that NAMAs could provide and then decide which way to go.

Currently, Panama is looking to calculate and clarify the accuracy of the GHG inventories in order to be sure what level of commitment they could agree to take for the nation, and how to mold the right NAMA for the nation.

The biggest emitter sector in Panama is the energy sector; therefore, the direction of the energy matrix development has an important role in the current and future mitigation actions that as a Party, Panama could submit in a short term to the Climate Change Convention. Is also important to acknowledge Panama is a low emitting economy, looking for the road to develop a low emission pathway.

The roads Panama could move along have several possibilities, with also several spillover effects, by means government and energy sector have to count with as many information as possible to place in a good track future energy developments.

This research plans to provide the Panamanian government with a tool to preserve its right to develop and its right to assure energy security, but also will be an opportunity to count with an instrument which can contribute in the review process of the Kyoto Protocol as is establish on its article 9.

9.6.8. Participation of Panama in negotiation groups within UNFCCC

UNFCCC opened for signature in 1992, Panama signed on March 1993 and it enter in to force on 1994, then Panama ratified it in May 1995. After, the Kyoto Protocol opened for signature in 1997, Panama signed it June 1998 and ratified in March 1999, it enter in to force in February 2005.

Panama is a member of United Nations and the member states of the United Nations are unofficially divided into five geopolitical regional groupings. First it began as an

informal means of sharing the distribution of markers for General Assembly committees, but then it became to play a more important character. Depending on the UN context, regional groups control elections to UN-related positions, dividing up the pie on the basis of geographic representation, as well as coordinate substantive policy, and form common fronts for negotiations and voting.

As of 2010, the 192 UN member states are divided into five groups as show in figure # 9.

- African Group (53 member states)
- Asian Group (53 member states)
- Eastern European Group (23 member states)
- Latin American and Caribbean Group (GRULAC) (33 member states)
- Western European and Others Group (WEOG) (28 member states, plus 1 observer).

Figure # 9 UNFCCC Regional Groups. Source UNFCCC, 2011



Panama belongs to GRULAC, but within the group, are also the Caribbean Group, and the Central American Group to which also Panama belongs.

But Panama also belongs to a biggest aggrupation named *Group 77 + China*.

G77 + china is the largest intergovernmental organization of developing countries in the United Nations, which provides the means for developing countries to articulate and promote their collective economic interests and enrich their joint negotiating capacity on all major worldwide economic issues within the United Nations system, and facilitate South-South cooperation for development.

“The functioning and operating modalities of the work of the G-77 in the various Chapters have certain minimal features in common such as a similarity in membership, decision-making and certain operating methods” (UNFCCC, 2011).

The Chairman represents the group and coordinates Group's action in every Chapter. The Chairmanship is the maximum political body within the administrative structure. It rotates on regional basis (between Africa, Asia and Latin America and the Caribbean) and is held for one year in each Chapter. In 2011, the Chairmanship of the Group of 77 + China in New York belongs to Argentina.

Panama also set positions about climate change within the Environment and Development Centro American Commission (CCAD) which is comprised by Central America and Dominican Republic.

The main subjects that Panama is negotiating under this groups are the following:

- Adaptation
- Mitigation
 - o Reducing Emissions from Deforestation and Forest Degradation (REDD)
 - o Clean Development Mechanisms (CDM)
 - o Nationally Appropriate Mitigation Actions (NAMAs)

Therefore for Panama is extremely relevant to find the way to make a link between what is possible under NAMAs not affecting the revenues of CDM.

10. Justification

Panama is a small country that produces no fossil fuels. Is a country where service sector plays a fundamental role in the economy, accounting the 76.8 % of GDP (Global Finance, 2009).

The challenge of supplying energy to the population during the next 20 years may be achieved depending on the choices taken today by energy sector and government.

Panama has Policy Guidelines which mandate the National Energy Diversification on energy balance, energy independence and sustainability, rationalization of energy consumption, to potentiate the geographical position of Panama as a regional energy provider, introduction and promotion of new technologies, promote environmental conservation and as well as promote a competitive environment.

Implementation of NAMAs is viewed by developing countries as a powerful solution for climate change mitigation beyond what has been achieved under the Kyoto Protocol. To undertake their common but differentiated responsibility for global emission reduction, developing countries need to significantly reduce emissions below their business-as-usual level with assistance from developed countries.

It is also important for developing countries to utilize critical financial resources from developed countries to spur mitigation actions in sectors which will create the strongest impact and need the most capacity building and technology assistance. A properly designed new NAMA mechanism could provide an enabling policy framework and necessary assistance and therefore, systematically foster and strengthen private sector GHG mitigation actions in sectors and countries lagging behind in the Kyoto Protocol regime.

Establishment of such comprehensive developing country supporting mechanisms is an important step to achieve global climate change mitigation goals and support sustainable development in developing countries in the Post-2012 regime.

The Panama challenge is how to create the right incentives to significantly up-scale mitigation actions within the country.

For the reason above, the state has an inescapable responsibility to design and implement an active energy policy. In order to make it a reality, it is necessary to take under consideration the new possible changes of global energy policies that will affect national energy development.

Institution as Energy Secretariat, Ministry of Commerce and Industry, Environmental National Authority, Ministry of Economy and Finance need a clear view of what decisions in the UNFCCC could mean to country energy matrix; therefore, develop coherent energy policies facing climate change challenges.

It is also significant to say that Panamanian negotiators' delegation is conform by employees coming from these institutions, which means that the research could also help to strength the capacity to negotiate within the Conference of the Parties/Meeting of the Parties.

The energy matrix suffers the direct effects of climate change as well as the variables linked to it like climatic factors, technological changes, land use, economic growth, and population growth, social and cultural trends. The energy matrix is also been influenced by global and regional energy policies (mostly from Central American policies) putting pressure to attain globalized standards. But from them, the mayor challenge is to include in the matrix environmental sound technology aiming to define sustainable energy development that can adapt to acquirable finance and to achieve the international standards that a Climate Change Regime under constant building dictate, considering UNFCCC mitigation policies as the main contributor to this Regime.

Noting that Panama ratified the UNFCCC and the Kyoto Protocol is important to mention that in the Copenhagen Accord of 18 December 2009 as a Non-Annex I Party agreed to implement mitigation actions that will be subject to their domestic measurement, reporting and verification and that will have to be reported through their national communications. Panama presented a letter of agreement with the Copenhagen Accord but noted a reserve on submitting NAMAs (Ministerio de Relaciones Exteriores, 2010) as the country is already making voluntary mitigation activities.

Panama decides not to participate of NAMAs because there were not sure of what it's imply. It generated benefits through the financing possibilities created by the Kyoto Protocol, which contribute and encourage the development of renewable energy projects, making the necessary investments and improving environmental conditions, labor also done with Clean Development Mechanism. As some of the activities that apply to CDM also apply to NAMAs, is important that panama choose and define the boundaries of what activity will participate in which mechanism in order to protect the local benefits of each instrument.

The Energy Expansion Plan goes hand to hand with the national development strategy which necessarily involves the protection of the environment as one of the point's main way of ensuring sustainability of our growth, ensuring the health and environmental quality, consequently, as NAMA is the perfect what to mitigate and to adapt to climate change and the environmental protection should be carried out in parallel with the implementation of a national energy policy panama must could with information that helps decision making to flow easily.

Panama shows a clear dependence and a high consumption of petroleum products in all national sectors, so our actions must be directed towards the reduction of this dependency, and the sensitivities it encompasses.

Therefore, it is necessary to create a balance between equity and import resources, where the desired orientation is directed towards the incorporation of elements within our energy mix in order to achieve a good balance between domestic resources and imported energy.

A key consequence of energy vulnerability is the difficulty to promote policies and measures that support mitigation and reduction of constant fluctuations in the international oil market. Therefore, greater energy independence improves the ability of the state to promote comprehensive policies to effectively cover the different energy technologies, allowing a higher level of competition in the domestic market, making possible to generate benefits in terms of price and quality through incentives and promotion of competing schemes, and that can be achieved with a well-designed NAMA.

Panama count with several voluntary mitigation measures, one of them is the renewable energy incentive law that could be submitted as a NAMA. The research determined the economic and environmental spillover effect of doing so.

Panama has to prioritize its efforts and concentrate first on a specific list of key sectors/NAMAs that produces significant emissions reductions as the energy sector does. It needs to think outside the box and look the opportunity cost that NAMAs could provide and then decide which way to go.

11. Scope and definition of research problem

11.1. Objectives

11.1.1. General

Identify spillover effect of climate change mitigation policies in the energy matrix of the Republic of Panama.

11.1.2. Specifics

- Analyze NAMA categories in relation to Panama´s Renewable Energy Legislation and define which category is more appropriate to national circumstances.
- Detect overlap between CDM and NAMAs as possible implementation strategy.
- Identify the possible spillover effects (economic and environmental aspects) on the Panamanian Energy Matrix.
- Identify possible paths to maximize positive spillover effects of implementing NAMAs related strategies into Panamanian energy matrix.

11.2. Research questions

11.2.1. Which is the NAMAs implementation Potential?

- What are the possible NAMAs categories to submit Law 45 as NAMA from Panama?
- Which category is more appropriate and why?
- Where are the overlap zones between NAMAs and CDM respecting renewable energy initiatives?

11.2.2. UNFCCC NAMAs produce a spillover effect over the Panamanian Energy Matrix?

- What is the possible spillover effect on economy and environment of the chosen more appropriate NAMA category in the Panamanian Energy Matrix?

11.2.3. What are the possible paths maximize positive spillover effects of implementing NAMAs related strategies into Panamanian Energy Matrix?

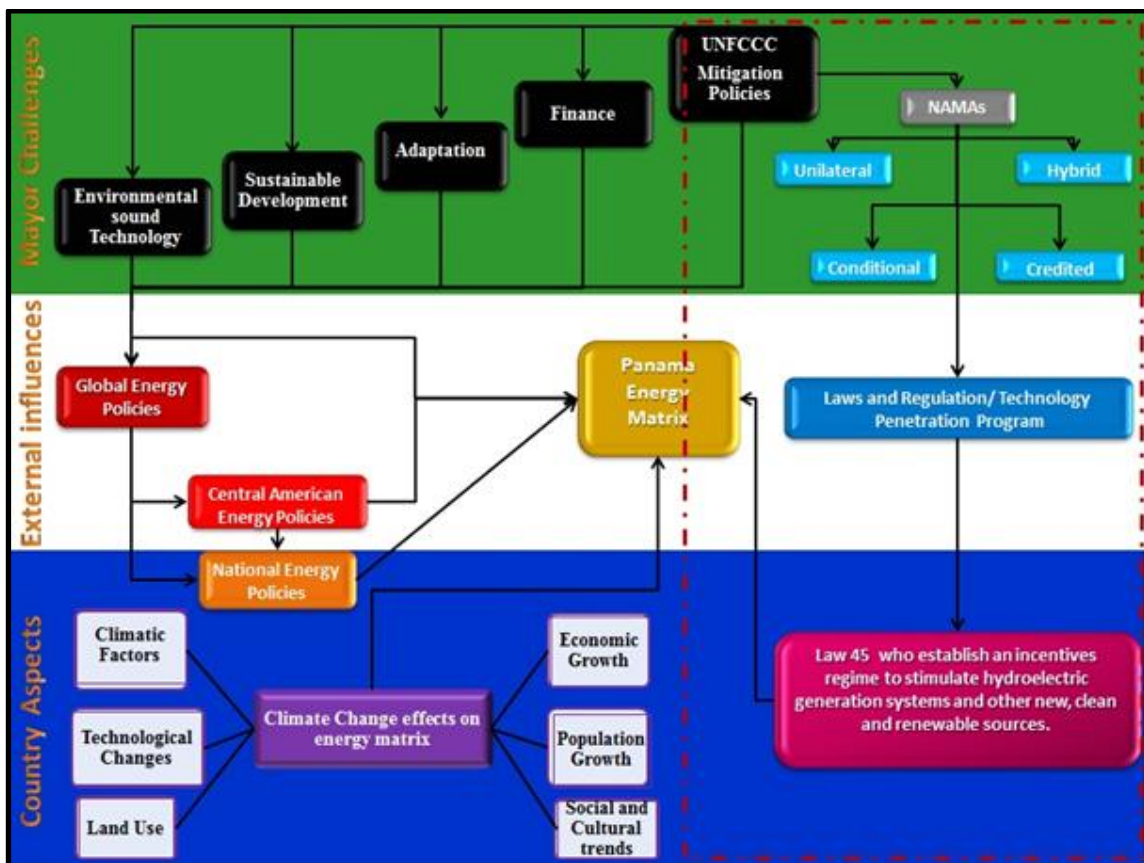
12. Research Methodology

Considering NAMAs a crucial voluntary measure for developing countries to show their level of common but differentiated responsibility, this work will analyze which NAMA category fits best to the existing voluntary mitigation policy action that Panama has developed in the law 45, and determine the spillover effects of presenting each category, considering law 45 as a possible technology penetration program NAMA and/or law and Regulation NAMA.

Because of the complexity of the referred subject, and the lack of time, the research will only identify the possible spillover effects generated by the interrelation between the Law 45 as National Energy Policy, NAMAs and the applicable Flexible Mechanism for developing Countries (CDM).

Figure # 10 shows thesis boundaries on a red rectangle within the thesis conceptual framework.

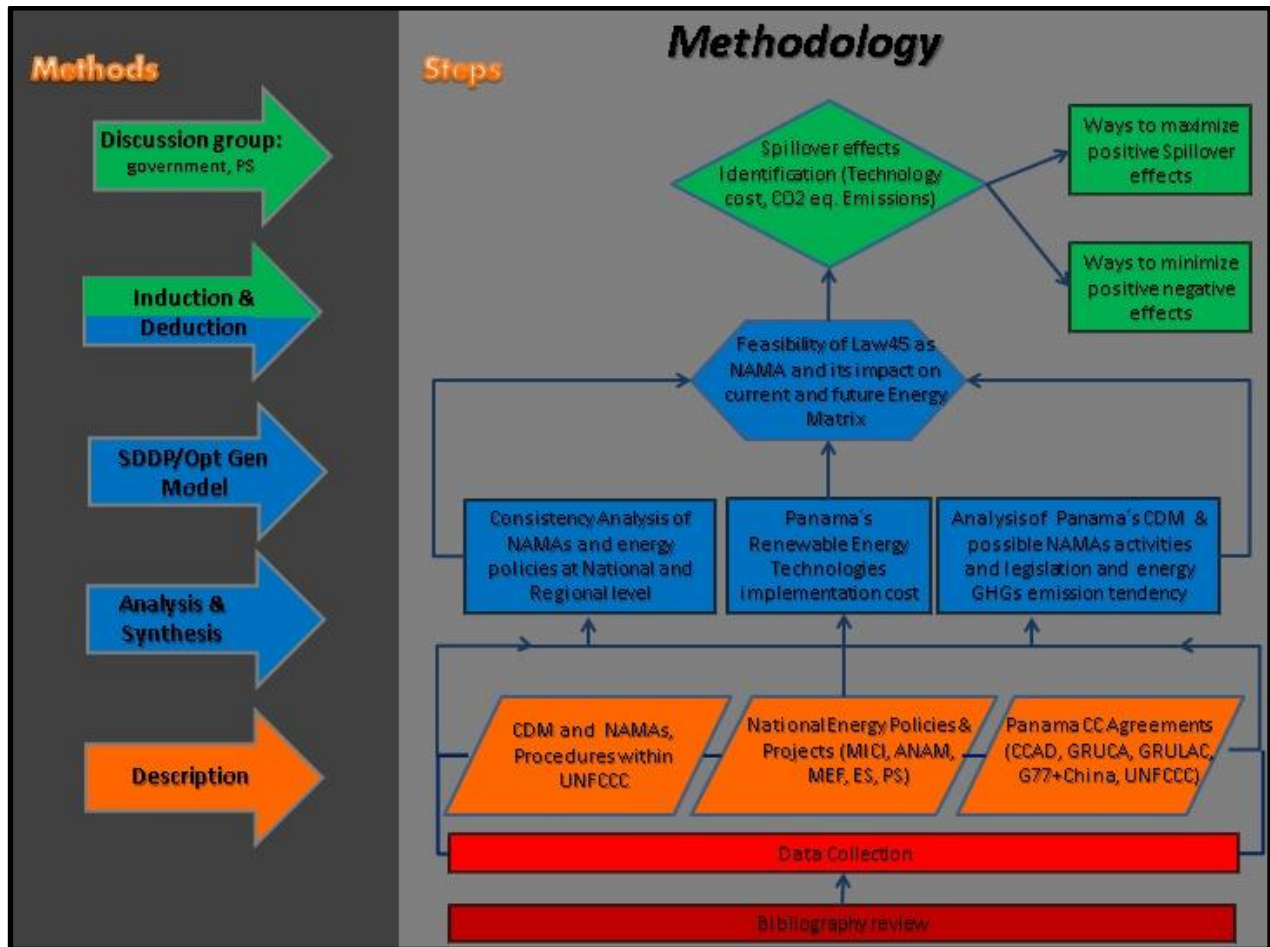
Figure # 10 - Thesis conceptual framework.



The research project has a description and analytical design. It pretends to generate knowledge about possible spillover effects of NAMAs implementation by constructing a bottom analysis tree. (See figure #11).

The analysis tree is structure on systematic, reliable, updated data founding the right path through which is possible to reaches a predetermined result applying the following Methods:

Figure #11 - Thesis Methodology



✚ Descriptive Method:

The gathered information represents and explain the qualities and characteristics of CDM, NAMAs, Panama Energy Policies, Energy Market Players and Climate Change Agreements. The information will be organized and classify in order to evaluate its properties, relations and tendencies through graphics and tables.

✚ Theorist method:

- ❖ Analysis and synthesis: will be applied to discover essential relations and general characteristics between NAMAs, CDM, the Energy Expansion Plan and how it could affect future energy development.
- ❖ Induction and Deduction: it will be utilize to define and/or confirm theoretic formulations to achieve new logic conclusions.

✚ SDDP /Opt Gen Model: are optimal generation and transmission models use to get the minimum investment program cost for renewable energy generation increment in combination with a dispatch model named SDDP. The model SDDP was also used to verify energy reliability criteria to obtain technical and economic dispatch parameters. Additionally, helped to observe if the alternative proposed fully comply with reliability criteria established by ETESA. The objective of the model is to minimize the sum of fuel and variable operation and maintenance costs, subject to constraints.

- ✚ Empiric method:
 - ❖ Discussion committee: the possible spillover effects were discussed with the Private Energy Sector, Energy Secretariat, and Environmental National Authority.

2. Variables:

The variables to evaluate are:

- ✚ Renewable Energy Panamanian CDM activities
- ✚ Renewable energy Panamanian law
- ✚ CO₂ equivalent emissions
- ✚ Technologies implementation cost

3. Sequence of activities: Taking into consideration the method explained above to develop the master thesis next steps will be follow:

- ✚ Bibliography review: In order to have a holistic panorama of what is needed to accomplish the research objectives it is plan to review literature.
- ✚ Data Collection:
 - ❖ Procedures and requirements of CDM and NAMAs and Panamas Renewable energy
 - ❖ National Energy Policies
 - COPE,
 - ANAM,
 - MICI,
 - Energy Secretariat,
 - Renewable Energy Private Sector
 - ❖ Current and expected Energy Consumption
 - ❖ Renewable Energy Panamanian CDM activities
 - ❖ NAMAs on laws and regulation
 - ❖ NAMAs on Technology Penetration Program
 - ❖ Renewable energy Panamanian law
 - ❖ GHG Emissions from Panamanian energy sector
 - ❖ Renewable Energy Technologies implementation costs
 - ❖ National Petroleum Import (% Panamanian global oil consumption)
 - ❖ Regional Import Oil (Regional% of global oil consumption)
 - ❖ % Of introduction of new electricity generation technologies at the National
 - ❖ % Of introduction of new electricity generation technologies at the Regional
 - ❖ NAMAs and CDM related agreements with Central American Group (GRUCA)
 - ❖ NAMAs and CDM related Agreements with Latin American Group (GRULAC)
 - ❖ NAMAs and CDM related Agreements with Group 77 (G 77) + China

The information will be captured trough official and non- governmental web sites, direct request to private sector and institutions.

3. Data Analysis:

- ❖ Documentary analysis of the consistency of national and regional policies with respect to the UNFCCC legislation related to NAMAs and energy policies.
 - COPE, ANAM, MICI, Energy Secretariat, Renewable Energy Private Sector
 - CCAD

- UNFCCC
- ❖ Analysis of Renewable Energy Panamanian CDM activities, NAMAs on laws and regulation, NAMAs on Technology Penetration Program, GHG Emissions from Panamanian energy sector
- ❖ Renewable Energy Technologies implementation costs in Panama.
- ❖ Other variables
 - National Petroleum Import
 - % Panamanian global oil consumption
 - Regional Import Oil
 - Regional% of global oil consumption
 - % Of introduction of new electricity generation technologies at the National
 - % Of introduction of new electricity generation technologies at the Regional
- ❖ Agreements with Central American Group (GRUCA) (Identification of common negotiating objectives related to the theme Energy, CDM, NAMAS, and possible disagreement)
- ❖ Agreements with Latin American Group (GRULAC) (Identification of common negotiating objectives related to the theme Energy, CDM, NAMAS, and possible disagreement)
- ❖ Agreements with Group 77 (G 77) + China (Identification of common negotiating objectives related to the theme Energy, CDM, NAMAS, and possible disagreement)
- ❖ Analyze the feasibility of submitting Law 45 as a NAMA and its impact on the Energy Expansion Plan 2009 – 2023.

4. Results:

- ✚ Determine spillover effects from the chosen NAMA category on environmental and economic aspects
- ✚ Determine steps to maximize positive spillover effects.

5. Director and assessors review: is expected to have a review every month during the last 4 months of work in order to determinate if the research if going in a good direction

13. Results

13.1. Analysis of the consistency of national and regional policies regarding UNFCCC

National Inconsistencies:

As explained in point # 9, energy policy and climate change policy in Panama are mostly consistent with the objectives of the UNFCCC.

The UNFCCC aims to reduce the amount of emissions of greenhouse gases and Panama, through the promotion of renewable energy projects, seeks to change the tendency to deploy wind, hydro, solar and biomass potential, and to reduce progressively its dependency on fossil fuels.

But even knowing that Panama is able and wants to cooperate to mitigate climate change and to participate and benefit from flexible mechanisms as CDM, there are some inconsistencies on national policies that could affect, in the near future, the development of mitigation instruments.

Inconsistency # 1: Relation between fiscal incentives and CERS revenues in Law 45

Law # 45 of August 4, 2004, establish that the company that develops new renewable energy projects or that increases the energy production capacity up to 10 MW will be able to acquire from the Panamanian state an equivalent fiscal incentive up to 25 % of the direct investment cost of the project. If the project receives benefits from the Clean Development Mechanism the benefits from the sale of CERs will be discount from the 25 % of tax deduction.

What the paragraph above means is if a person wants to receive the 25 % fiscal incentive, first have to apply to CDM and then the revenues that the project generate by CDM will count as part of the 25 % fiscal incentive. This situation creates a huge inconsistency because:

- If a project that apply to CDM do not apply voluntarily it might not be registered as a CDM project by the Executive Board of CDM because will not comply with CDM willfulness requirement.
- The project developer could not find attractive to apply and benefit from the fiscal incentive if depends from its participation in CDM, because the CDM registration process could last several months, more than a year, and the fiscal incentives formulary should be submitted yearly and is not retroactive.
- In some cases CDM revenues could be smaller than the fiscal incentive; therefore some projects will not be able to benefit from this law even if they fulfill will all what law 45 stipulates.

Inconsistency # 2: Overlap between Law 44 of April 5, 2011 and Law 45 of August 4, 2004

Law 44 means to promote wind projects over hydropower plants projects when law 45 promote all renewable energy generation. This could be understood by the private sector as a displacement of government interest on hydropower plants. When looking closely to wind potential and hydropower potential there are 76 hydropower plants that could be possibly build against 15 wind power plants. As a free market the generation offer will move to the activity that represent the highest cost opportunity price and as law 44 give a 100% fiscal incentive could be possible to see in the near future some hydropower projects non been built and instead changing to a wind generation plant.

Regional Inconsistencies

Within the Central American Region the majority of policies related to energy and climate change are made in the frame of the Environment and Development Central American Commission. Here, countries define and decide as States what are their common interests and how to accomplish their mutual goals. As proof of that they have been partners in the Agreement of cooperation related to the Energy and Environment Partnership with Central America where was invest around 1.8 million Euros. Another example is San Pedro Sula Declaration where Central American Countries reiterates the friendship relation and the cooperation in the environmental management, disasters mitigation, to promote sustainable strategies in 2008.

Although each country is in different states, regarding the development of policies to promote mitigation activities, it can be concluded that in Central America there are no significant inconsistencies that may affect the development of CDM projects or NAMAS. Moreover, informal meetings on these issues have facilitated the understanding and development of future plans. One of these successful plans was made by CCAD and the World Bank with the purpose to give grants to promote and facilitate Clean Development

Mechanism (CDM) activities for 5 to 10 executable projects up to the stage of Validation for the authorities of the Member Countries.

13.2. Analysis of the feasibility of including renewable energy policies NAMAs.

Having in mind that a NAMA could include laws and regulations, standards, technology penetration programs, financial instruments like taxes, incentives and cap and trade programs, energy efficiency measures, research and development, technology demonstration projects, sustainable development programs and measures, capacity building and data-gathering activities (Center for Clean Air Policies, 2009) among other activities the Law 45 NAMA that is define in this document correspond to a **Law and Regulation type compound with incentives and technology penetration program.**

As explain in point # 9.3 Nationally Appropriate Mitigation Activities at international level have been classified in four (4) different manners, as Unilateral, Supported or Conditional, as Credited or Hybrid NAMAs. At following will be enlighten why the Law 45 could or could not be define in one of these categories.

- ✚ Unilateral NAMAs: The definitions of Unilateral NAMAs are mitigation actions undertaken by developing countries on their own with their own resources. Is when a country intents to reduce emissions but at low cost or cost effective. Recalling the explanation of the components of law 45 in chapter number 9.4.2 it could be understood that since 2004 the Republic of Panama count with an Unilateral NAMA. The law has been under implementation for seven (7) years funded with State funds. The State is investing 50.354.720,00 USD on it (See table # 17). It is clear that the objective it's been accomplish because never in the history of the country the generation system had the entrance in operation of 1,5 hydropower plants per year (Fisher, 2011). It is also clear that the actual government has identified a need to stimulate deeply the wind power development with law 44 of 2011. One of the reasons of only incrementing the incentive to wind energy is the lack of governmental fund to support in the same way all renewables. For all mentioned before, to have a real change of electricity generation tendencies , to submit law 45 as a NAMA depends of the international support level that an unilateral NAMA cannot deliver.
- ✚ Credited NAMAs: A credited NAMA has to be able to generate credits to be sold on the carbon market. To generate credits a NAMA has to be grounded on very well documented baseline. And to build that baseline the country necessarily has to have official GHG inventories. Panama has just one official GHG inventory with data from 1994 that was report to UNFCCC. To overcome that obstacle panama will have to count with a more specific mitigation strategy that include the realization of at least 2 GHG inventories. Will be recommended to calculate those inventories for the years 2000 and 2006 because those years were fundamental on the Panamanian energy consumption patterns changes. Also to prepare a credited NAMA the MRV must be taking place at international level and count with an emissions intensity target (reduction of CO₂ emissions per capita) or and specific technology penetration ratio. Panama is far away of establishing a target like that. To pass from the current country situation to a credited NAMA the nation has to walk through several milestones. To prepare the scenario for the indispensable milestones a less

complicate NAMA must be built and using that NAMA as a base, in the future, with national and international support, the structure of a credited NAMA can be achieved. It is necessary to express that the government of Panama does not want to have any kind of binding commitment to reduce emissions. Panama wants to do it voluntarily and in accordance with its national circumstances. A Credited NAMA does not correspond to its national circumstances.

✚ Supported or Conditional NAMAs: This type of NAMA is the one that allows mitigation actions in developing countries with a direct finance support from Annex I countries. A Conditional NAMA includes the development of activities that require higher costs or specific assistance. As Panama has already the basic scenario that offers a unilateral NAMA, and is not far enough to implement a Credited NAMA, a Supported or conditional NAMA is the perfect combination to improve renewable energy generation and setting the bases for a green economy.

✚ Hybrid NAMAs: This type of NAMA, that encompasses more than one category, is the one that meets all requirements to define the **best** NAMA category to the research because it will not only bring national and international support that conditional NAMAs has, but also express the complexity of addressing the behavior of Panamanian electricity sector by applying a sector no-lose targets approach. They are compound by non-binding emission target that generate sector-wide emission reductions.

Reductions under BAU emissions generate reductions to the host country; nevertheless no penalties will take place if that allow MRV procedures. The MRV measure the activity not the accomplishment of the target.

To register a NAMA under the UNFCCC, Parties have to present basic information which provides clarification not only to the host country but also to possible Annex I Parties that potentially will give finance support. It has to include ten (10) parts:

✚ Mitigation Action Description: The Mitigation Activity to be present as NAMA is the increment of fiscal incentives up to 50 % of the direct investment cost of a renewable energy project with a production capacity up to 300 MW. If the project receives benefits from the Clean Development Mechanism the benefits from the sale of CERs will not be discount from the 50 % of tax deduction rather invest on sustainable development activities in the local communities. It will be applicable during the first 10 years counted from the entrance in to commercial operation of the project.

The Implementation of this action will facilitate the inclusion of more renewable energy projects on the energy generation plan, consequently, reducing GHG emissions (See Calculations in chapter 13.3.3)

✚ Timeline: The NAMA will function during 15 years and it will be open to 2 possible renovation periods of 15 years each, giving a possible duration of forty-five (45) years.

✚ An estimate of mitigation benefits of including emission reductions: The biggest benefits from this NAMA are

- By analyzing the 2010 renewable energy generation with the terms in the mitigation action description, the total fiscal incentive that private sector will

receive will go from 50.354.720,00 USD to 245.778.481,00 USD for the next 10 years. The increment will attract several national and international investors, increasing the employment rate of local communities.

- Local communities will also receive the total CDM revenues, equal to 280.736.030,00 in 10 years. Being a small country with 3.2 million inhabitants, incomes derivate from CDM will expand significantly the quality of life of Panamanian population.
- If the NAMA can change the renewable energy tendency reflected in the Energy Expansion Plan 2010 (See table # 4) the GHG emission could decrease from 22641.4 thousand CO₂ tons to 20472.9 – 21470.5 thousands CO₂ tons (See table # 17) depending on the chosen renewable energy scenario. The calculation of CO₂ emissions will be explained in chapter # 13.

To calculate the actual fiscal incentive and the prognosis by increasing it to a 50 % of the total investment the following data was use:

- Construction cost per generated MW = 2.100.000,00 USD
- Sale price per kWh = 0.12 USD
- % of Income Tax = 30 % of total income
- Additional % from income Tax for companies earning more than 1.500.000,00 USD per year = 4.67%
- 1 GWh = 1.000.000,00 kWh
- Grid CO₂ emission Factor = 0.67 CO₂ tons / MWh
- CERs Price = 10 USD/ CO₂ tons

First the investment cost (IC) was calculated multiplying the Install capacity (C) of each Hydropower plant (See table # 4) by the construction cost (CC) per generated MW

$$\text{Equation \# 1- } IC = C * CC$$

Then the Gross Generations in Kilowatts/hour (GGk) were calculated by multiplying the Gross Generation in Gigawats/hour (GGg) by the equivalent factor (EF) of 1.000.000,00

$$\text{Equation \# 2- } GGk = GGg * EF$$

Now the Generated Income (GI) is calculated with the multiplication of GGk by the kWh price in the market

$$\text{Equation \# 3- } GI = GGk * 0.12$$

The calculation of the Income Tax (IT) per year according with the Panamanian legislation varies depending on the income amount of each company. If a company earns per year less than 1.500.000,00 USD the IT is the multiplication of the GI by 30 %, but if a company earns more than 1.500.000,00 USD a 4.67 % must be added to the multiplication

$$\text{Equation \# 4- } IT = GI * 0.30$$

$$\text{Equation \# 5- } IT = GI * 0.3467$$

As law 45 establish that the incentive cannot be higher than the 25 % of the total investment cost (IC25) that also was calculated by multiplying IC by 25 %

$$\text{Equation \# 6- } IC25 = IC * 0.25$$

The proposed NAMA increment the incentive to 50 % of the total investment Cost (IC50) using the next equation

$$\text{Equation \# 7- } IC50 = IC * 0.50$$

The total amount of taxes that will be pay during the law effectiveness (IT10) is calculated multiplying IT by 10

$$\text{Equation \# 8- } IT10 = IT * 10$$

Having the IT10, the IC25 and IC50 is possible to define how much will be the Gross received incentive by Law 45 (GRI25) and by NAMAs Proposal (GRI50) by using equation # 9 and # 10

$$\text{Equation \# 9- If } IC25 > IT10 \Rightarrow IT10 \neq IC25$$

$$\text{Equation \# 10- If } IC50 > IT10 \Rightarrow IT10 \neq IC50$$

To calculate CDM Revenues (CDMr) is necessary to Transform GGg in Gross Generation in Megawatts per hour (GGm) and the multiply it for the duration years, by the CO₂ emission price (CO2P) and by the CO₂ grid emission Factor (Gef)

$$\text{Equation \# 11- } CDMr = \frac{GGg}{1000} * 10 * CO2P * Gef$$

To determine the Netto Received Incentive for the law 45 (NRI25) and NAMAs Proposal (NRI50) it has to deduct the CDMr of the GRI respectively

$$\text{Equation \# 12- } NRI25 = GRI25 - CDMr$$

$$\text{Equation \# 13 - } NRI50 = GRI50 - CDMr$$

Having that calculated now is necessary to evaluate if the plants generate 10 MW or more and its year of construction in order to define if they comply with Law 45 regulations. Then if they comply the Final Incentive Amount (FIA25, FIA50) are the same as the NRI25 and NRI50 respectively, if not they become cero (0).

To have a better idea of the tax amount per year that the companies will have to pay (TPY25, TPY50) it's required to deduct from the IT the yearly equivalent FIA25 and FIA50.

$$\text{Equation \# 14- } TPY25 = IT - \frac{FIA25}{10} \quad \text{Equation \# 15- } TPY50 = IT - \frac{FIA50}{10}$$

Table #17.1 summarizes 2010 results assuming that most of the projects will receive CDM revenues:

Table # 17.1 - Fiscal Incentive from Law 45 and Proposed NAMA in year 2010

FISCAL INCENTIVE FROM LAW 45 BASE AND PROPOSED NAMA IN YEAR 2010 (USD)							
Investment Cost (USD)	Kwh Generated	Generated Income (USD)	Income Tax per year (USD)	% 25 Of Investment (USD)	% 50 Of Investment (USD)	10 year Income Tax (USD)	Gross Incentive to receive base on 25 % of investment (USD)
63000000	1756770000	210812400	66197201.72	157500000	315000000	661972017.2	157500000
1012116000	1903130000	228375600	71712222.16	253029000	506058000	717122221.6	253029000
47166000	117590000	14110800	4430932.308	11791500	23583000	44309323.08	11791500
8820000	19190000	2302800	690840	2205000	4410000	6908400	2205000
1407000	2520000	302400	90720	351750	703500	907200	351750
21000000	40030000	4803600	1441080	5250000	10500000	14410800	5250000
3087000	2780000	333600	100080	771750	1543500	1000800	771750
1113000	1380000	165600	52000.056	278250	556500	520000.56	278250
126000000	244700000	29364000	8809200	31500000	63000000	88092000	31500000
52500000	60000	7200	2160	13125000	26250000	21600	21600
10500000	6100000	732000	219600	2625000	5250000	2196000	2196000
7350000	21470000	2576400	772920	1837500	3675000	7729200	1837500
42000000	74370000	8924400	2802350.844	10500000	21000000	28023508.44	10500000
1963059000	4190090000	502810800	157321307	490764750	981529500	1573213071	477232350

Table # 17.2 - Fiscal Incentive from Law 45 and Proposed NAMA in year 2010

FISCAL INCENTIVE FROM LAW 45 AND PROPOSED NAMA BASE IN YEAR 2010 (USD)									
Gross Incentive to receive base on 50 % of investment (USD)	CDM Revenue (USD)	Netto Incentive to Receive base on 25 % of investment (USD)	Netto Incentive to Receive base on 50 % of investment (USD)	G.10 MW or more	Constructed after Law 45 imp.	Final Incentive amount (25 % , USD)	Final Incentive amount (50 % , USD)	Tax to Pay per Year (25 % , USD)	Tax to Pay per Year (50 % , USD)
315000000	117703590	39796410	197296410	yes	yes	39796410	197296410	62217560.72	46467560.72
506058000	127509710	125519290	378548290	yes	no	0	0	71712222.16	71712222.16
23583000	7878530	3912970	15704470	yes	yes	3912970	15704470	4039635.308	2860485.308
4410000	1285730	919270	3124270	no	yes	919270	3124270	598913	378413
703500	168840	182910	534660	no	yes	182910	534660	72429	37254
105000000	2682010	2567990	7817990	no	yes	2567990	7817990	1184281	659281
1000800	186260	585490	814540	no	yes	585490	814540	41531	18626
520000.56	92460	185790	427540.56	no	yes	185790	427540.56	33421.056	9246
63000000	16394900	15105100	46605100	yes	no	0	0	8809200	8809200
21600	4020	17580	17580	yes	yes	17580	17580	402	402
2196000	408700	1787300	1787300	no	yes	1787300	1787300	40870	40870
3675000	1438490	399010	2236510	no	yes	399010	2236510	733019	549269
21000000	4982790	5517210	16017210	yes	no	0	16017210	2802350.844	1200629.844
951667901	280736030	196496320	670931871			50354720	245778481	152285835	132743459

The next table summarizes the fiscal incentives including the CDM projects that currently receive CDM revenues.

Table 18 - Fiscal Incentive from Law 45 and Proposed NAMA in year 2010 with current CDM Revenues

FISCAL INCENTIVE FROM LAW 45 AND PROPOSED NAMA BASE IN YEAR 2010 (USD)									
Gross Incentive to receive base on 50 % of investment (USD)	Possible CDM revenues (USD)	Netto Incentive to Receive base on 25 % of investment (USD)	Netto Incentive to Receive base on 50 % of investment (USD)	G.10 MW or more	Constructed after Law 45 imp.	Final Incentive amount (25 % limit)	Final Incentive amount (50 %)	Tax to Pay per Year (25 % limit)	Tax to Pay per Year (50 % limit)
315000000	0	157500000	315000000	yes	yes	157500000	315000000	50447201.7	34697201.7
506058000	0	253029000	506058000	yes	no	0	0	71712222.2	71712222.2
23583000	0	11791500	23583000	yes	yes	11791500	23583000	3251782.31	2072632.31
4410000	0	2205000	4410000	no	yes	2205000	4410000	470340	249840
703500	0	351750	703500	no	yes	351750	703500	55545	20370
10500000	0	5250000	10500000	no	yes	5250000	10500000	916080	391080
1000800	0	771750	1000800	no	yes	771750	1000800	22905	0
0	0	0	0	no	yes	0	0	0	0
63000000	0	31500000	63000000	yes	no	0	0	8809200	8809200
21600	0	21600	21600	yes	yes	21600	21600	0	0
2196000	408700	1787300	1787300	no	yes	1787300	1787300	40870	40870
3675000	0	1837500	3675000	no	yes	1837500	3675000	589170	405420
21000000	0	10500000	21000000	yes	no	0	21000000	2802350.84	702350.844
951147900	408700	476545400	950739200			181516400	381681200	139117667	119101187

Assuming that most of the projects will receive CDM revenues the support for fiscal incentives in the proposed NAMA will be 195.423.760,60 USD; if support contemplate only current receive CDM Revenues the support will be 200.164.800,00 USD in 2010 scenario.

- ✚ Baseline scenarios: As baseline scenario the proposed NAMA will use the actual electricity generation situation, state of affairs, defined by ETESA in its Energy expansion Plan 2010-2024 (see table # 4), in order to represent starting point for the future comparison with the Scenario that will be Generated by the proposed NAMA.
- ✚ Full or incremental cost estimation: Table # 19 shows the Baseline Scenarios Cost and Table # 20 include proposed NAMAs scenarios Cost cover by the private sector.

Table # 19 - Baseline Scenarios Cost. Source ETESA, 2010; Lindo, 2011

Cases	Investment Cost (million \$)	Operation Cost (million \$)	Total (million \$)
Case #1	1916.79	1111.75	3028.54
Case # 2	2181.49	1043.6	3225.09
Case # 3	2211.52	1096.94	3308.46

Table # 20 - proposed NAMAs Scenarios Cost. Source ETESA, 2010; Lindo, 2011

Cases	Investment Cost (million \$)	Operation Cost (million \$)	Total (million \$)
Case #1	1916.79	1114.98	3031.77
Case # 2	2259.23	1078.36	3337.59
Case # 3	2264.44	1115.68	3380.12

Comparing Baseline Scenarios Cost and Proposed NAMAs scenarios cost is probable to conclude that in the three cases the total cost has a substantial cost increment. In case # 1 the increment is due operation cost as fossil fuel has increase de barrel from 80 USD in 2011 to 95 USD. In case # 2 and # 3 the increments are not only due fossil fuels prices but also the incremental cost comes from the introduction of 100 MW from hydropower plants and 100 from wind power plants in case # 2, and in case # 3 100 MW of Hydropower plants and 250 of wind power plants.

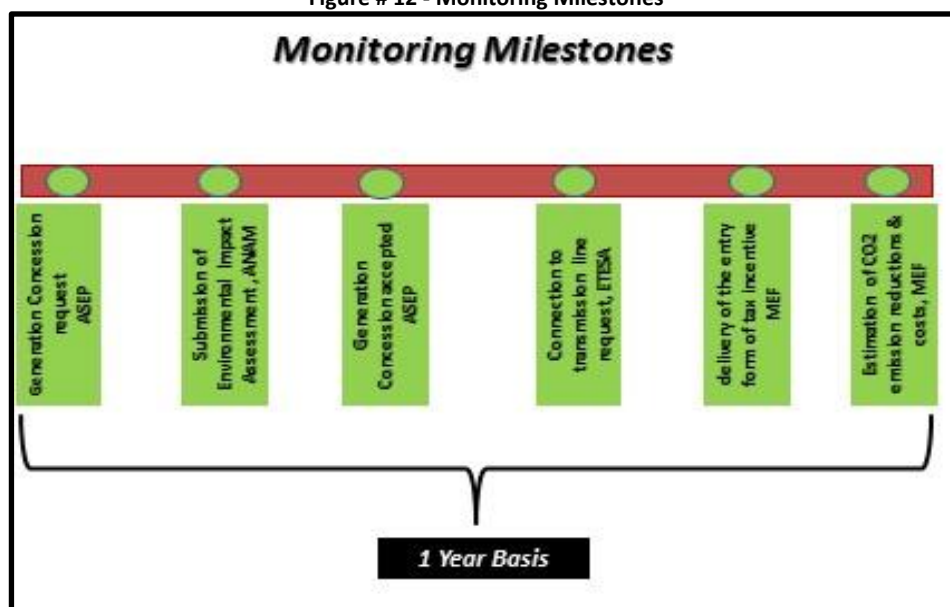
The next important incremental cost is the governmental cost of not perceiving the total income taxes. The increment cost in the Proposed NAMA arises to 195.423.790,00 USD. This number comes from the deduction of FIA25 from FIA50 (Calculation for 2010 scenario). When making the estimation for the 3 cases and using the period 2010-2024 the increment varies as show in table # 21.

Table # 21 - Cases Fiscal incentive increments

Fiscal Incentive Increment		
	Without Future BAU (Million USD)	Future BAU (Million USD)
Case # 1	241.1044689	309.407217
Case # 2	543.250914	604.063062
Case # 3	586.03666	639.76731

- Monitoring: To monitor the development of the NAMA the key participation of the Ministry of Economy and Finance (MEF) is imperative. The only way to follow if the proposed NAMA have success is by making a yearly report of how many new renewable energy companies had receive benefits from the adjustments of law 45. The Energy Secretariat could also play an important role in monitoring quarterly the compliance with the steps required by law to develop renewable energy projects. Using the information gathering means at institutions such as ASEP, ANAM, ETESA can build monitoring milestones NAMA (see Figure # 12)

Figure # 12 - Monitoring Milestones



- Sustainable Development Impacts: The sustainable development impacts of the proposed NAMA are:
 - ❖ Reduction of GHG emission.
 - ❖ Increment of renewable energy technology in the energy matrix.
 - ❖ Increment of employment % in local areas.
 - ❖ Increment of purchasing power in local areas.
 - ❖ Promotes investment and the development of depressed rural areas, optimizing the use of natural resources.
 - ❖ Contributes with environmental protection and reduction of adverse environmental effects.
 - ❖ Helps in coverage national power
 - ❖ Decrease dependence on traditional fuels
 - ❖ Diversify energy sources in the country.

- ❖ Contributes to poverty eradication in conjunction capacity building support.
- ✚ Requested funding or assistance: The proposed NAMA needs funding and assistance in three phases:
 - ❖ Preparation and Readiness support: includes strategies preparation and capacity-building for government officials and private sector on Renewable energy technologies, estimation of energy baseline and CO₂ emission baseline, and review of law 45 and modification of incentives amount. These actions could have access to public and private support.
 - ❖ Intermediate support: encompasses strengthening of renewable energy incentive strategies. It's require an international financial support fund, a voluntary contribution between 241.10 Million USD / 639.77 Million USD , that works in conjunction with governmental funds to feed the proposed NAMA fund in order to fulfill the incentive increment established for the renewable energy sector.
 - ❖ Final Support: comprises assistance on the verification of emission reductions (MRV) of the proposed NAMA.
- ✚ The anticipated timeframe for NAMA implementation: Establishing the NAMA on Panama will be a challenge but as the country has already being implemented at some level, it is a matter of discovering ways to enumerate, balance and assimilate them into holistic approach(See table # 22)

Table # 22 - Timeframe NAMA Implementation

Timeframe NAMA Implementation															
YEAR #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Preparation and Readiness Support															
Strategy Preparation															
Capacity Building															
Estimation of Energy and CO2 emission baselines															
Law 45 review and modification															
Intermediate Support															
Strengthening of Renewable Energy Strategies															
International Financial Support Fund Establishment															
Final Support															
MRV design assistance															

- ✚ A definition of the applicable MRV (Monitoring, Reporting and Verification): It will guarantee monitoring, reporting and review which impulses proposed goal: increment the renewable energy participation on the energy matrix in a Sectoral approach.
The MRV procedure will have to establish common rules to ensure transparency, comparability and consistency along the NAMA time framework. MRV has to adapt to the Sectoral approach in the energy sector. The Method of learning-by-doing should be embrace to facilitate futures improvements.

The NAMA design and implementation must be malleable in a way that aid to address future improvements within United Nations Frameworks level over the next years, including the opportunity to connect NAMAs to the international carbon markets when countries are ready in a voluntary basis.

If a NAMA is implemented, the financial benefit for the Panamanian government is the avoided financial expenditure of subsidizing the energy consumption of thermal energy production that remains yearly around 30 million USD (just for electricity generation) (energy secretariat, 2008).

Panama needs financing for the implementation and operation of the NAMA because:

- Private investors can benefit from fiscal incentive through the increment of fiscal incentive to all renewable energy projects, similarly as law 44 proposals for wind power plants and also benefiting local communities by redirecting the CERs revenues from the total received fiscal incentive to local sustainable development investment.
- Annex I countries could provide technology; finance and capacity building support the MRV design.
- NAMAs must be subject to domestic MRV, regardless of the use of international support and will not be used to offset carbon credits in this specific case.

The Panamanian government should decide which qualification requirements will use for domestic reviewers of MRV of NAMAs, or whether international consultation and analysis need to be implemented.

The proposed NAMA plans to be fully funded covering implementation costs that could be describe as:

- Capacity building
- MRV design, implementation and operation
- 50 % increment in Fiscal Revenues
- Institutional strengthening

Taking in to account that the European Union (EU) is asking for the allocation of support developing countries that move on the way to a performance-based system, the performance of law 45 has been positive as has stimulated the development of several renewable energy projects, but has its limitations, consequently, to move forward a low carbon intensity economy a NAMA on this sector must be defined.

A Panamanian legislation NAMA will proof vast opportunities that NAMAs could offer and will also proof its adaptability to national circumstances helping to overcome mitigation obstacles.

The NAMA will be able to quantified emission reductions on the electricity generation and allows maintaining a Clean Development Mechanism within the country with the Sectoral approach explains in chapter # 13.3.

The NAMAs goal will be a renewable intensity targets, measuring how renewable Energy development will increase when the NAMAs begins.

To clearly identify the functioning of NAMA the development of should be longer than 15 years; it should run 45 years and should include stakeholder participation.

Similar evaluations should be done in Central America in order to create common interest to defend the possibility to redirect the characteristics of Latin American NAMAs in the UNFCCC negotiation

helping to face socio- economics challenges together. To prepare it will be necessary to create workshops where NAMAs and its relation the electricity market becomes the central subject not forgetting analyzing possibilities to design baselines, Business as Usual, and the supported NAMAs interpretation.

Possibilities to find financial support

During the COP 15 in Copenhagen, developed countries agreed to commit 30 billion USD for the next 5 years and to mobilize 100 billion USD dollars a year by 2020 to support adaptation and mitigation actions in non-Annex I Countries (UNFCCC, 2010).

Nevertheless, the funding sources and mechanisms have not been already specified. For mitigation actions, developing countries want a sustainable, adequate, predictable and stable financing; despite the fact developed countries desire to use public financing to provide private sector financing. Designing a financing mechanism for NAMAs that could satisfy all Parties and mobilize as much funding as possible is a key issue surrounding negotiations in the NAMA debate (UNEP, 2010) but a decision has to be taken in the next COP this year in.

Finding financial support not only depend on emission reductions estimations or the definition of possible actions scenarios, it will depend on

- ✚ "The future detailed international rules for baseline setting under such frameworks,
- ✚ The quality of argumentation that can be provide on why certain technology standards should or should not be part of the baseline, and
- ✚ The willingness of donors to finance the more expensive components of technology-scale ups" (UNEP, 2010)

Last year, in COP 16 within Long-term Cooperative Action (LCA) Working Group, a special fund for financing mitigation in developing countries was created to give multilateral support through UNFCCC mechanisms.

According to the Cancun Agreement (UNFCCC, 2010) the fund must:

- ✚ "Be new, additional, adequate, predictable and sustainable financial resources.
- ✚ Be under the guidance of and accountable to the Conference of the Parties.
- ✚ Be inefficient and effective operation.
- ✚ Direct access where fiduciary standards of the implementing/executing entities are guaranteed.
- ✚ Balance allocation between mitigation and adaptation with priority for countries most vulnerable to the adverse impacts of climate change and unable to bear the costs".

Another source of finance support could be the so called "Green NAMA Bond" which was proposed by International Emissions Trading Association (IETA). It is a mechanism to conduct private investments to support mitigation actions in developing countries. The country that asks for support has to emit the green Sectoral bond, and this one will have a credit support that comes from an International Financial Institution or Institutions. If objectives are not achieve the investors will be re-paid by an OECD credit support agreement (IETA, 2010).

The current public sector funding mechanism proposed for NAMAs will generate a solid enabling situation to motivate private sector investment through CDM.

It is possible that NAMA provide to start loan and subsidy programs to the host country.

The combination of support that the proposed NAMA suggest is partially paying the costs for implementation of the fiscal incentive.

NAMAs are an innovative way to achieve GHG emission reduction because it will suitable up-front financing it diminish risks in event of an impossibility to acquire support after application of the mitigation measure which is a benefit that current CDM cannot offer.

Analysis of PANAMAs CDM and NAMAs implementation

CDM could help to support developing countries NAMAs if Panamanian government develops a strategy to link carbon market benefits and NAMAs implementation.

Developing countries have decided that NAMAs have to contribute to sustainable development, but within the Non Annex I Parties carbon market based on NAMA carbon credit will be more beneficial to obtain sustainable development. Some other countries prefer to separate carbon market mechanism from NAMAs because it could mix CDM and NAMAs benefits, leading to possible double counting of GHG emission.

Before making a comparison of CDM and NAMAs pros and cons is necessary to understand that as NAMAs is a mitigation measure that aims to contribute and stimulate actions that facilitate activities that help to reduce GHG emission by adapting and preparing the country to climate change adverse effects when CDM is a flexible mechanism which mayor objective is to reduce GHG emissions and bring sustainable development in the host country.

“The prevalent difference between CDM and NAMAs is that CDM is totally defined and established by the COP, but in contradiction a NAMA can be only defined by a country, no one else can decide what is or what is not a NAMA; only governments could select which activity to include. What is ‘nationally appropriate’ cannot be defined for one country by another and particularly not by an international institution” (UNEP, 2010).

Making a general overview about the specific function of mitigation measures, CDM as part of its requirements, obligatorily has to validate and verify that real emission reductions are taking place. In NAMA’s case, they have the possibility to do so, just like CDM or be more flexible and assure that other kind of activities will induce emission reductions take place.

“There is a main difference between asking for support first in order to act later, and offering to act first and asking for support later. The difference lies in trust” (UNEP, 2010)

After having addressed this issue, it’s indispensable to recognize, that if a NAMA overlap a CDM range of action, none of the benefits of each mitigation measure will take place, or, one of them will be loose.

How to define and design each mitigation measure ratio is a responsibility that belongs to Parties governments.

Comparison between CDM and NAMAs

While current reporting mechanisms, founded on carbon emissions, base their success only on carbon emission reductions as only indicator, NAMAs has the possibility to define which indicator could be appropriate to quantify its achievements.

The direct emission reduction effects of enabling policies and measures, as NAMAs do, are not easy to estimate since the mitigation actions which private sector effectuate, usually do not occur only with a policy intervention. It is a conjunction of activities and market tendency that make things happen.

Looking it from other perspective, the influence of an explicit policy does not only could result in emission reduction but also could create a positive environment or allowing conditions for businesses to move forward mitigation activities.

It is extremely complicated to divide what is emission reduction effect from a policy or measure, therefore, a double counting could be a common error of implementing NAMAs and CDM in the same sector.

NAMAs are more applicable to policies or measures with long-term impacts that generate co-benefits (UNEP, 2010) that are not accountable on CDM and do not have access to common finance or cooperation.

The most well known obstacle of CDM projects of all times is the additionality prove. It has permanently been challenging when defining the additionality of a CDM project and has proven to be debatable in most CDM projects (Schneider, 2007).

The debate usually appears when CDM projects are developed with government policy support. That could be one of the reasons that Panama with all its potential as just registered 6 projects.

Even having proved that the proposed NAMA will reduce GHG emissions, the other indicator is the renewable energy % in the energy matrix (See tables # 32 and 33).

Additionality test for CDM projects cannot be used for mitigation policies because both have several differences as table # 23 shows.

Table # 23 Differences between CDM projects and NAMAs that affect additionality analysis
 Source: Okubo et al, 2009; Kartha et al, 2005; Lindo, 2011

NAMAs	CDM Projects
Government covers implementation costs	Private sector covers implementation costs
Assess governmental and private sector costs	Asses private sector costs
Total number of mitigation action is unknown when project begins	Mitigation action its well defined
Barriers difficult to delimitate	Barriers are well defined
Baseline need constant update	Baseline remains the same in each project

For an activity to qualify as a CDM should be able to demonstrate their effective capacity to reduce or sequester greenhouse gases and it should also be supported by a methodology.

To meet Kyoto Protocol targets are needed or DNAs Environment Authorities engaged in the process. DNA is the responsibility of ensuring sustainable development before issuing a Letter of Approval

The NAMAs baseline has to be adjusted to consider self-directed technological enhancement over time. Additionality of long term policies have to demonstrate short-term impacts if evaluated as CDM projects.

The proposed NAMA target one of the most attractive sectors for CDM in Panama. As private project developers have already start with UNFCCC registration process a NAMA on this sector could put in danger the additionality of these projects as they could possible addressing the same emission reductions.

The biggest problem of addressing the same sector is that private companies have plan CM project counting with the earnings that will come from it. In order to protect those earnings and provide an attractive incentive the proposed NAMA can separate emission reduction from each mitigation activity (CDM or NAMAs) and open a market space of both of them. Using the UNEP model, “existing CDM projects can be excluded from the calculation of a GHG baseline of a NAMA by subtracting the amount of CERs issued for the CDM projects from the amount of emission reductions achieved by the NAMA” (UNEP, 2010).

It has to be recognizing that it is possible that NAMA can impact the upcoming CDM baseline in is being incentivized to develop CDM projects to address the fiscal incentive. In that way Panama and private sector commit to the CERs revenues to local communities.

As Panama has chosen a Sectoral hybrid NAMA, CDM projects can co-exist with the proposed NAMA by passing the incentives for GHG abatement directly to the private sector. Within UNFCCC Parties has chosen 2007 as the policy base year, which means, all policies and measures that were originated before the end of 2007 would be incorporated in the BAU scenario, and new policies and measures presented after 2007 will influence the scenario (UNEP, 2009).

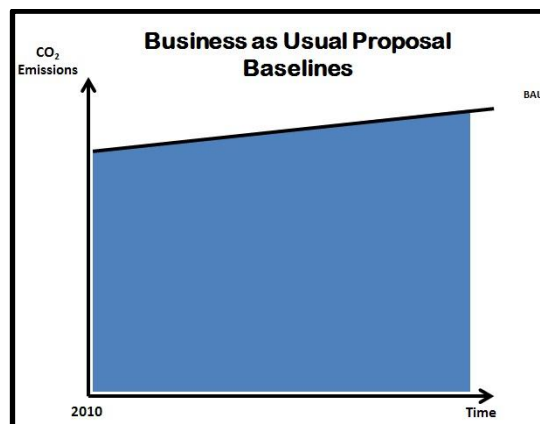
The co-existence between them is possible by giving boundaries to CDM range of action. In proposed NAMAs case The CDM boundary will be delimited with this eligibility criteria:

- ✚ All CDM projects that have finished or begun the UNFCCC registration process will not be considered as part of the proposed NAMA, having as reference the year 2010
- ✚ All projects that do not begin with the UNFCCC registration process will enter as NAMA, having as reference the year 2010.

This information will be corroborated with the Panamanian National DNA and UNFCCC. The delimitation has to be very carefully done because donor countries might not want CDM projects to take place in the renewable power sector if boundaries are not has a robust design. In that way the donor country will eliminate the possibility of paying for the same GHG reduction in a NAMA and CDM mechanism.

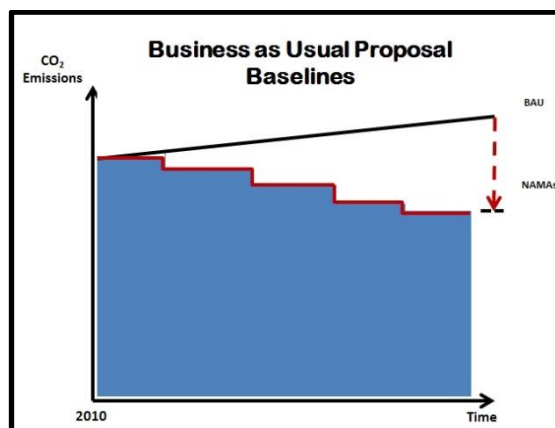
To be sure that the situation will not occur, host country has to delimit it as soon as possible. Consequently it will protect the survival of CDM projects. As recommended by UNEP- Risoe, a good definition of boundaries will be utilizing the NAMA-financed emission level as the baseline for future CDM projects (UNEP, 2010). See graphic # 7 to 11.

Graphic # 7- Business as Usual Proposal Baselines. Source Hinostroza, 2010; Lindo, 2011



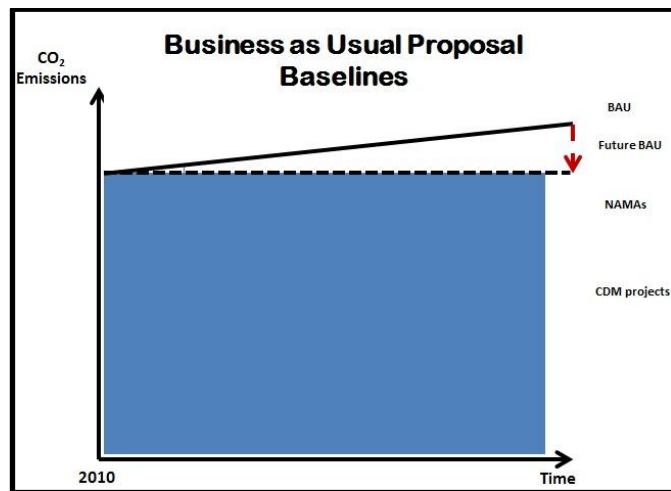
The graphic above shows the tendency of GHG emissions tendency from 2010 to "n" moment in the future time. This BAU include CDM projects already registered.

Graphic # 8 - Business as Usual Proposal Baselines. Source Hinostroza, 2010; Lindo, 2011



Graphic # 8 Demonstrate that by implementing NAMA GHG emission decrease in a determine %. The proposed NAMA boundary is represented with the red arrow.

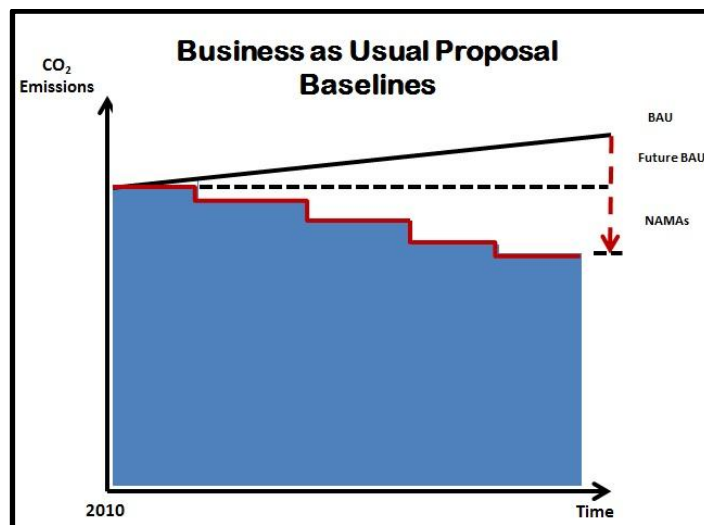
Graphic # 9 - Future BAU. Source Hinostrza, 2010; Lindo, 2011



But the BAU will change depending of the development of the energy sector, it means, what an emission reduction was caused by the NAMA implementation, in a long term will become part of the Future BAU (See graphic # 9)

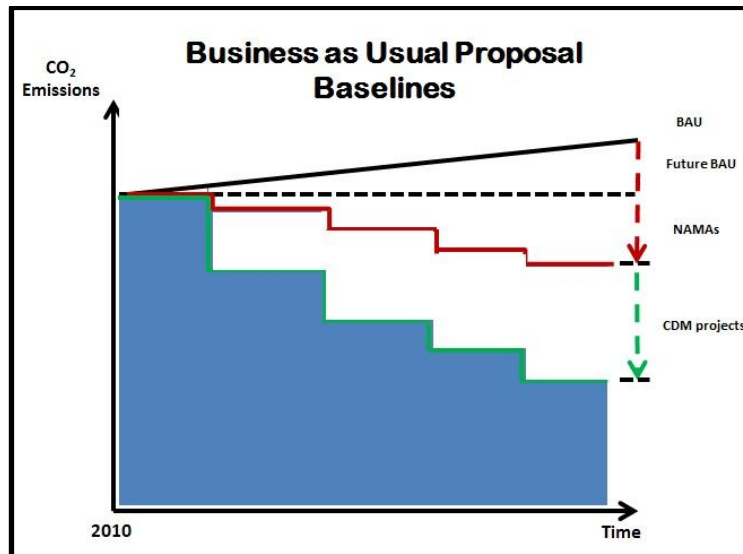
Unifying Graphic # 8 and # 9 is possible to appreciate how total NAMAs emission reduction will depend of the energy sector behavior.

Graphic # 10 - Business as Usual Proposal Baselines. Source Hinostrza, 2010; Lindo, 2011



The graphic above estipulate NAMAs range of action; the red line defines were NAMAs emission reduction ends and were CDM projects emission reduction potential begins. See Graphic # 11

Graphic # 11 - Business as Usual Proposal Baselines. Source Hinostrroza, 2010; Lindo, 2011



The presented set of graphics proves that the proposed NAMA is able to coexist with CDM projects.

Also, the proposed NAMA helps to improve of Sectoral conditions. Having the possibility to created better conditions in the energy sector is a good reason to develop a NAMA using an improvement indicator like **renewable energy increment %**.

The proposed NAMA has to tackle the Bali Action Plan components: common but differentiated responsibilities, sustainable development, technology transfer, capacity building, financing and MRV of mitigation action (UNEP, 2010) but it is also important that helps to overthrow barriers and scale-up mitigation actions.

For designing effective Sectoral NAMAs, a country should assess relevant policies and successful elements of effective policies and implemented them as a package.

A NAMA connected to carbon market is the right vehicle to drive carbon market financial mechanism to deliver the essential financial support and incentives to Panama's local communities and accelerate competitiveness.

Adaptation and mitigation are the basis to achieve and maintain sustainable development the proposed include this to subjects in one contribute to effective adaptation.

13.3. Possible scenarios of result creating spillover effects on the energy matrix

As mention before on chapter # 9, The Panamanian State has a constitutional responsibility to safeguard the natural resources within its territory and regulate the use of those resources to meet population needs, preserving the environment and ensuring sustainable development and supply; therefore this research could help the State to make responsibly energy planning, giving sustainable options to the energy sector.

To define which are the spillover effects of the proposed NAMA; the research recreates the indicative Energy Expansion Plan (Generating section) using two software: Optgen and SDDP.

These programs were used because ETESA used the same software. The purpose was to use the same conditions and variables to calculate how much will cost to increment renewable energy shares in the energy matrix if NAMAs incentive lightly stimulates its implementation.

The generation study used the official criteria and scenarios of the Panama Energy Secretariat which are:

- ✚ General Criteria. Expansion plans at minimal cost are generally collected from different types of studies.
- ✚ Minimum Cost Criterion. Plans that are obtained are of minimum total costs (investment and operation and maintenance costs of fixed and variable), brought to present value. Additionally, these plans must meet the criteria of reliability of power and energy.
- ✚ Long Term Average Incremental Cost. Represents the long-term cost of serving an additional unit of demand. Is calculated for a given expansion plan as the ratio of annual increments of total costs (investment, fixed and variable operating and maintenance), current reference year and annual increases in demand, also updated to the year of reference. The discount rate used must be the same discount rate used in the plan.
- ✚ Reliability Criteria. The reliability criteria used are as follows:
 - Energy:
 - Energy deficit exceeding 2% of the demand are not allowed in any month in more than 5% of the hydrological series.
 - Deficits are not allowed in any year of the planning period in all hydrological series.
 - Power: a minimum reserve for the reserve ratio of long-term reliability must be set.
- ✚ Technical and economic parameters:
 - Two scenarios of growth in peak demand and net energy (High Demand and Demand Media), based on forecasts made by ETESA submitted to the National Authority of Public Services in January 2010, in the Compendium of Basic Studies.
 - A planning horizon of 15 years from 2010, with an extension period of 1 year.
 - Market costs are used for investment.
 - For the fuel price forecast scenario, ETESA used a base price around 80 U.S. \$ / barrel and a high price scenario of around 100 U.S. \$ / barrel. As prices went higher the prices used in the research were: base price 90 U.S. \$ / barrel and a high price scenario of around 110 U.S. \$ / barrel.
 - A discount rate of 12%.

The next sub chapters include which are the spillover effects in each subsector

13.3.1. National Energy Policies

Including Law 45 as part of the proposed NAMA will impact the National Energy Policies in the following ways:

- ✚ As mention above, only policies and incentives created before 2007 will be consider business as usual. The Law 45 was created in 2004, meaning that all projects that applied to the CDM mechanism and also applied to law 45 will be able to receive both incentives and also receive NAMAs incentive when it take place. The proposed NAMA imply a modification of law 45, but even if the modification take place after 2007, it will have it bases on law 45 from 2004 (with a retroactive order, giving the opportunity to existing Panamanian CDM projects to receive both incentives.
- ✚ Law 44 which promotes only wind power plants, as it was approved in 2011 will not belong to the Business as usual scenario; therefore, every project that wants to receive this benefit will not be able to receive CDM benefits. As CDM revenues are, in most cases, less than, current fiscal incentive benefits, is very provable that wind projects will not indicate CDM registration process a simply ask for incentive of Law 44. If the proposed NAMA take place, it will assure renewable Energy CDM projects survival, and will give a similar fiscal incentive as Law 44. Having that in mind is possible to say, that Law 44 will have to be abolish.
- ✚ If Law 44 of 2011 is abolished, project developers will find more interest in been part of the proposed NAMA. When a project developer applies to the fiscal incentive from law 45 from 2004 will be accepting the proposed NAMA conditions explained above.
- ✚ If Law 44 is not Abolish Wind power project developers who apply to it and want to participate from CDM mechanism will be not earning

13.3.2. Conformation of Panama Energy Sector

To analyze the future behavior of the generation sector, it was established to run 3 scenarios cases. From the 3 cases the # 1 was run with the same Install capacity as the one made by ETESA with the intention to use it as software calibration and as a conservative generation possibility. Case #2 differs from case # 2 from ETESA by incorporating a Hydropower plat of 100 MW, a wind power plant of 100 W and replacing a diesel thermal plant of 250 MW for a thermal plant of 50 MW. Case # 3 incorporates two wind power plants withy 100 MW and 150 MW respectively, 1 Hydropower plant of 100 MW and replaces a 250 thermal plant for a 50 MW thermal plant. Case #2 and # 3 have the same install capacity as ETESA generation expansion plan but case # 3 increases the capacity in 250 MW.

The following table will show the Generation Expansion Plan 2010-2024 Propose by the researcher.

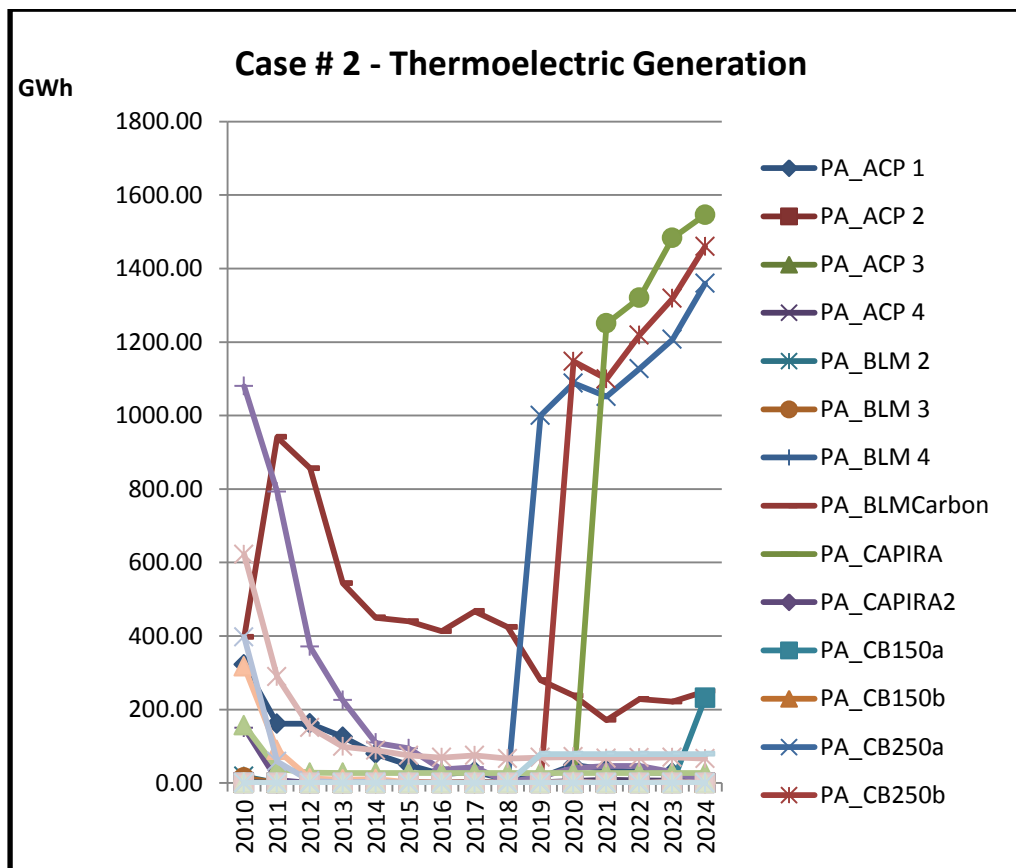
Table # 24 Expansion Plan 2010-2014 Proposed by Eng. Lindo

EXPANSION PLAN 2010-2014 PROPOUSE BY ING. LINDO																									
DEMAND					Case # 1							Case # 2							Case # 3						
Moderate Medium Scenario					Capacity MW							Capacity MW							Capacity MW						
Year	Energy GWh	Growth %	Power	Growth %	Month	Project	Hydro	Thermal	Eolic	Total MW	Install Capacity MW	Month	Project	Hydro	Thermal	Eolic	Total MW	Install Capacity MW	Month	Project	Hydro	Thermal	Eolic	Total MW	Install Capacity MW
Current Install Capacity MW (2010)																							1659.12		
2010	7076.9	0	1142.6	0	May	Paso Ancho	5			214.39	1873.51	May	Paso Ancho	5			214.39	1873.51	May	Paso Ancho	5			214.39	1873.51
					June	Los Planetas I	4.76					June	Los Planetas I	4.76					June	Los Planetas I	4.76				
					August	Macano	3.43					August	Macano	3.43					August	Macano	3.43				
					August	BLM (Carbon)			120			August	BLM (Carbon)			120			August	BLM (Carbon)			120		
					September	Bajo de Mina	56					September	Bajo de Mina	56					September	Bajo de Mina	56				
2011	7495.3	5.91	1210.1	5.91	January	Lorena	33.8			500.96	2374.47	January	Lorena	33.8			500.96	2374.47	January	Lorena	33.8			500.96	2374.47
					May	Chan I	222.46					May	Chan I	222.46					May	Chan I	222.46				
					July	Prudencia	56					July	Prudencia	56					July	Prudencia	56				
					August	Pedregalito	20					August	Pedregalito	20					August	Pedregalito	20				
					October	Eólico El Baitún			80			October	Eólico El Baitún			80			October	Eólico El Baitún			80		
2012	7931.7	5.82	1279.8	5.76	January	Cochea	12.5			55.75	2430.22	January	Cochea	12.5			160.75	2535.22	January	Cochea	12.5			160.75	2535.22
					October	San Bartolo	15.25					October	San Bartolo	15.25					October	San Bartolo	15.25				
					October	Las Perlas Norte	10					October	Las Perlas Norte	10					October	Las Perlas Norte	10				
					October	Las Perlas Sur	10					October	Las Perlas Sur	10					October	Las Perlas Sur	10				
					December	Mendre II	8					December	Mendre II	8					December	Mendre II	8				
2013	8428.3	6.26	1359	6.19	January	Bonyic	31.3			315.4	2745.62	January	Bonyic	31.3			385.4	2920.62	January	Bonyic	31.3			585.4	3120.62
					January	Pando	32.6					January	Pando	32.6					January	CCGN200		200			
					January	Monte Lirio	51.6					January	Monte Lirio	51.6					January	Monte Lirio	51.6				
					January	El Alto	68					January	El Alto	68					January	El Alto	68				
					January	Caldera	4					January	Caldera	4					January	Caldera	4				
					January	Las Cruces	9.17					January	Las Cruces	9.17					January	Las Cruces	9.17				
					January	Los Estrechos	10					January	Los Estrechos	10					January	Los Estrechos	10				
					January	La Laguna	9.3					January	La Laguna	9.3					January	La Laguna	9.3				
					February	RP-490	9.95					February	RP-490	9.95					February	RP-490	9.95				
					April	Eólico I E2			70			April	Eólico I E2			70			April	Eólico I E2			70		
					May	Bajo Frío	56					May	Bajo Frío	56					May	Bajo Frío	56				
					June	Tizingal	4.64					June	Tizingal	4.64					June	Tizingal	4.64				
					July	Barro Blanco	28.84					July	Barro Blanco	28.84					July	Barro Blanco	28.84				
2014	8968.4	6.41	1445.2	6.34	January	San Lorenzo	8.12			12.29	2757.91	January	San Lorenzo	8.12			12.29	2932.91	January	San Lorenzo	8.12			12.29	3132.91
					December	Potrillo	4.17					December	Potrillo	4.17					December	Potrillo	4.17				
2015	9583.5	6.86	1543.3	6.79	January	Pedregalito II	13			47.53	2805.44	January	Pedregalito II	13			47.53	2980.44	January	Pedregalito II	13			47.53	3180.44
					April	Tabasará II	34.53					April	Tabasará II	34.53					April	Tabasará II	34.53				
2016	10153.7	5.95	1634.1	5.88	January	El Síndigo	10			10	2815.44	January	El Síndigo	10			10	2990.44	January	El Síndigo	10			10	3190.44
2017	10750.5	5.88	1729	5.81	January	Chan II	214			214	3029.44	January	Chan II	214			214	3204.44	January	Chan II	214			214	3404.44
2018	11308.6	5.19	1817.6	5.12						0	3029.44						0	3204.44						0	3404.44
2019	11982.3	5.96	1924.6	5.89	January	Hydeo A1	100			250	3279.44	January	Hydeo A1	100			250	3454.44	January	Hydeo A1	100			250	3654.44
					January	Eolico E3			100			January	Eolico E3			100			January	Eolico E3			100		
2020	12692.1	5.92	2037.3	5.86	January	CB 250 a		250		250	3529.44	January	CB 250 a		250		250	3704.44	January	CB 250 a		250		250	3904.44
2021	13412.5	5.68	2151.6	5.61	January	CB 250 c		250		250	3779.44	January	CB 250 b		250		250	3954.44	January	CB 250 a		250		250	3904.44
2022	14147.3	5.48	2268	5.41						0	3779.44						0	3954.44	January	CB 250 b		250		250	4154.44
2023	14915.1	5.43	2389.5	5.36						0	3779.44						0	3954.44						0	4154.44
2024	15741.4	5.54	2520.3	5.47	January	CB 150 a		150		150	3929.44	January	CB 150 a		150		150	4104.44	January	Eolico E 4			150	150	4304.44

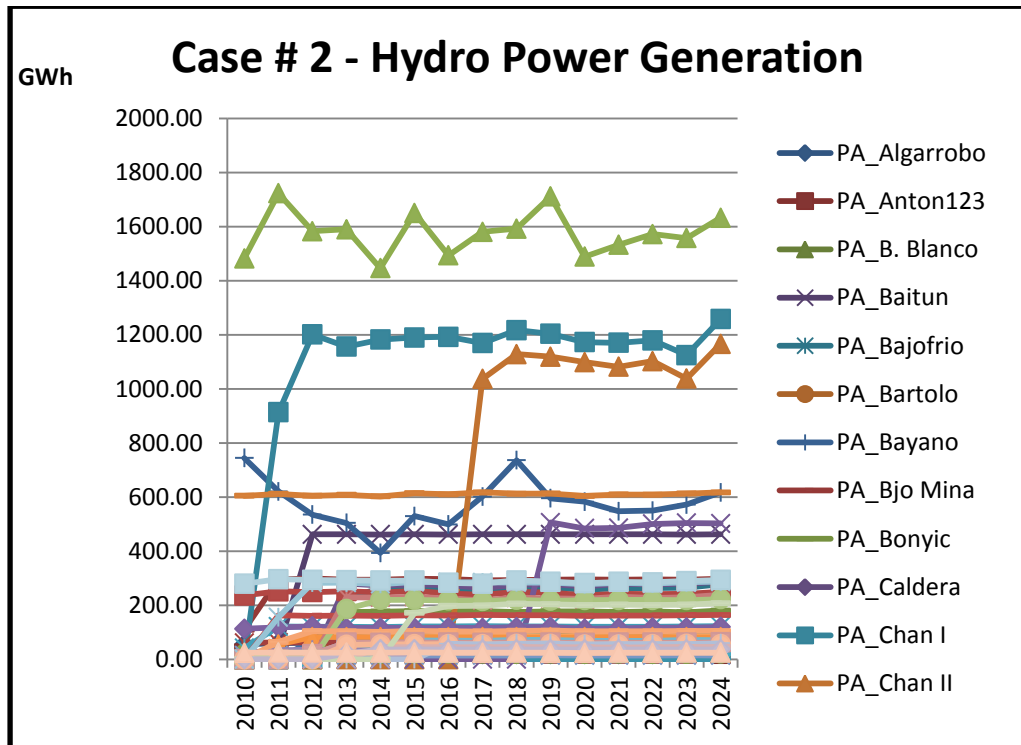
Case # 1: As case # 1 calculation was used for calibration purposes and present same values as ETESA's generation expansion plan, it will not be discuss in detail.

Case # 2: In This case the main objective was to create a generation scenario assuming that NAMAs implementation will facilitate the displacement of one 250 MW Thermal power plant for 100 MW Hydro power, 100 MW wind power plant and 50 Thermal power plant in the year 2019. The year 2019 was chosen because ETESA's scenario showed the necessity to introduce an electric plant that makes the minimal incremental cost to cover the electricity demand. But with the proposed fiscal incentives increments proposed in the NAMA the market will react positively opening renewables energy path. Graphics # 12, # 13 and # 14 demonstrate that between years 2018 and 2024 as the demand grows the energy generation has to grow but even introducing hydro and wind power plants the generation with thermal plants is necessary to assure energy security and matrix diversification.

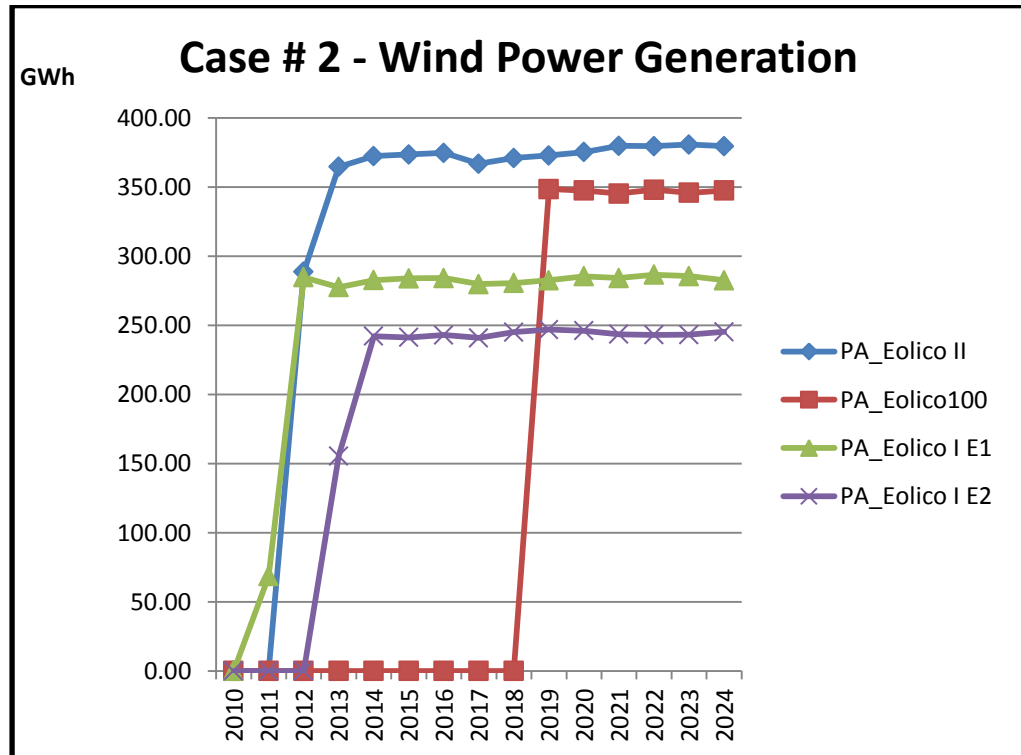
Graphic # 12 - Case # 2 Thermolectric Generations



Graphic # 13 Case # 2 Hydro _Power Generation

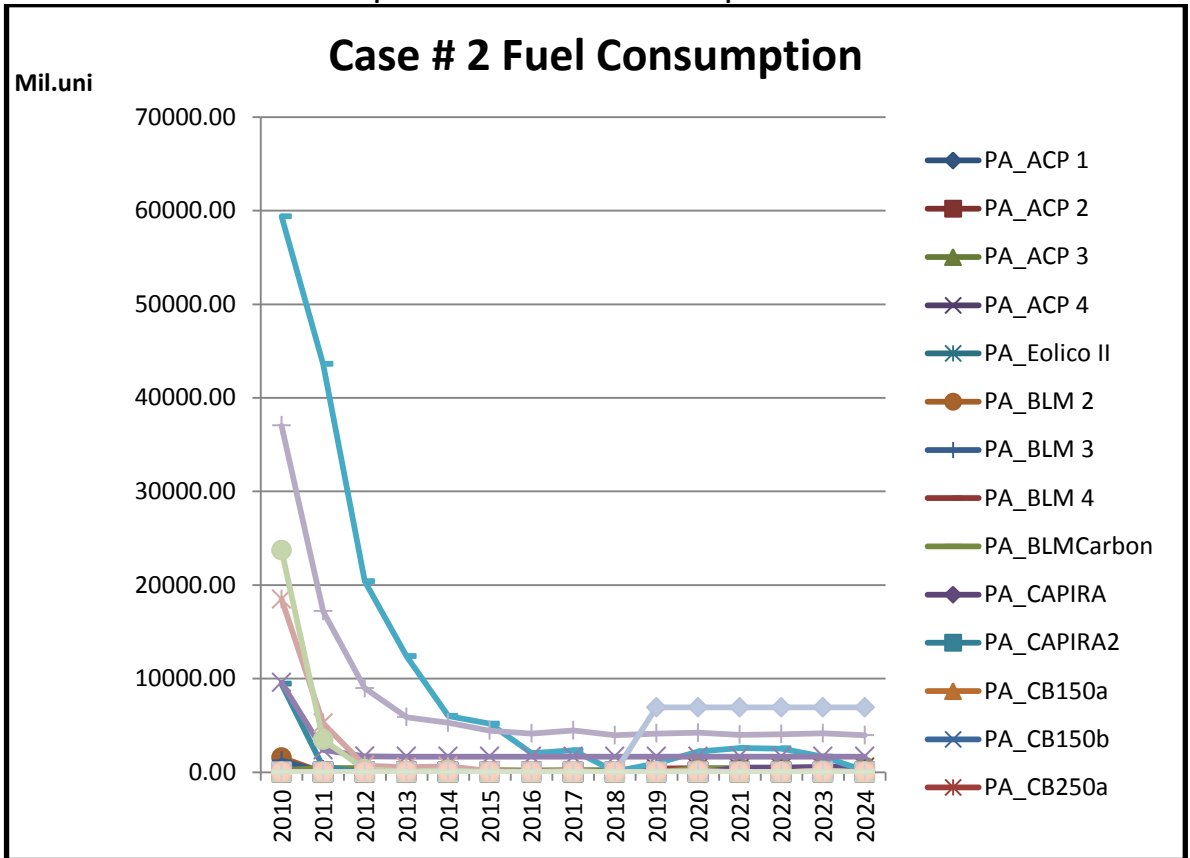


Graphic # 14. Case # 2 Wind power Generation



Another effect from the proposed NAMA is the fuel consumption decrease. Graphic # 15 shows how the amount of fuel achieve its lowest consumption in year period 2016-2018 after decreasing with an almost perpendicularly curve and then begins to grow until finding a straight parallel line.

Graphic # 15- Case # 2 Fuel Consumptions

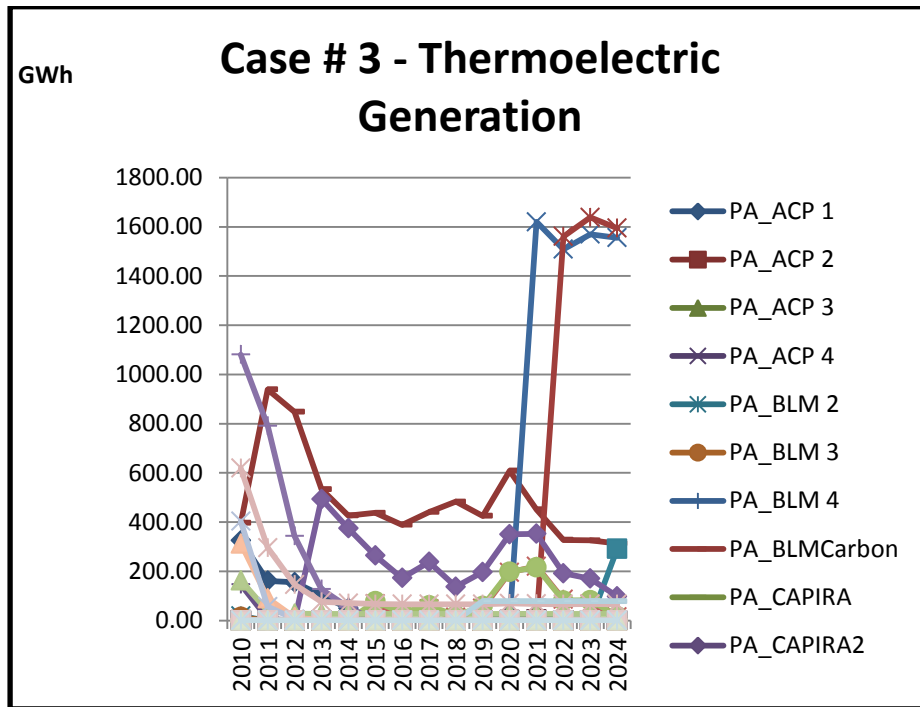


Case # 3:

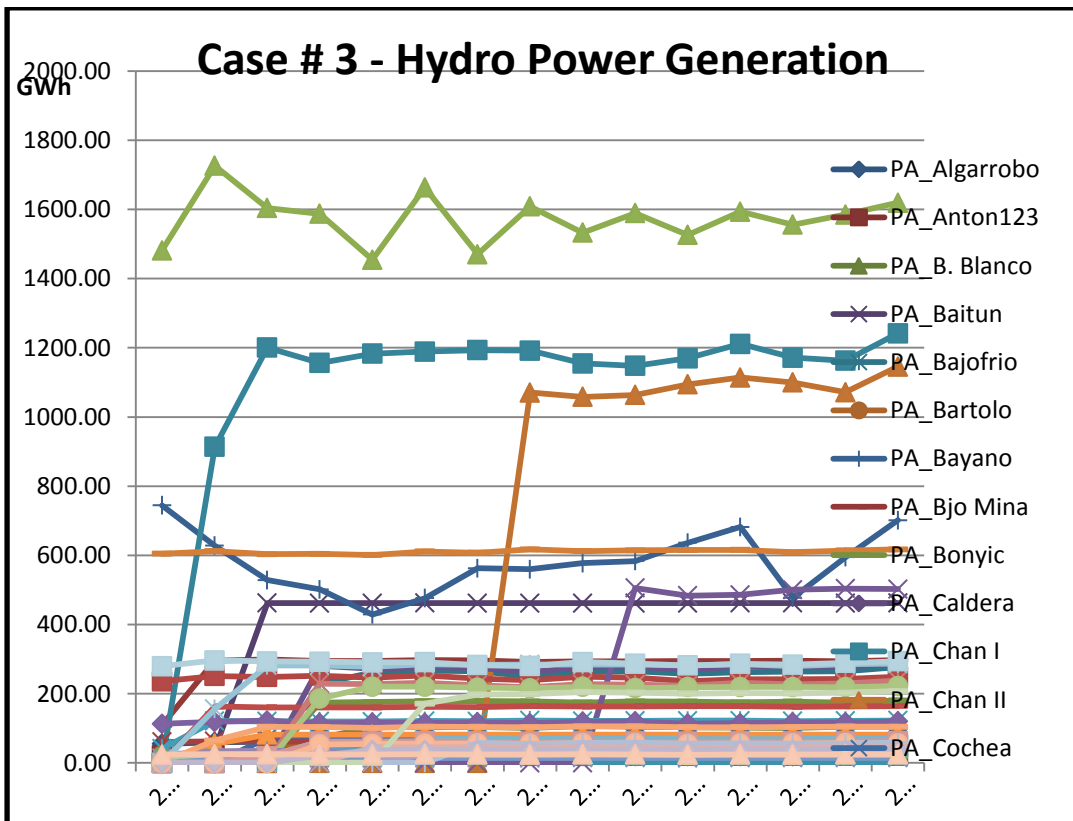
This case differs from case #2 because not only increment its renewable energy capacity but also increment the energy matrix install capacity in 250 MW. One of the particularities of case # 3 is the introduction of a wind power plant in year 2023 which has the intention to help to stabilize the thermoelectric generation as show graphics # 16 and # 18.

Also another interesting effect of the proposed NAMA is to appreciate the strength of the hydro power generation through the last 12 years. The hydropower plant generation begins to reach a steady grow giving market space for other renewable energy alternatives (See graphic # 17).

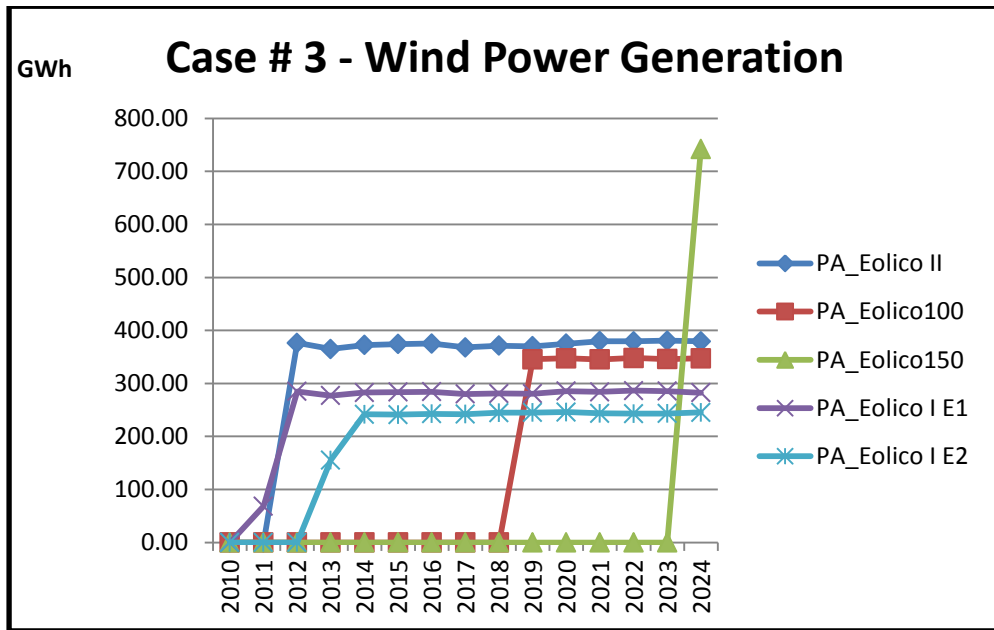
Graphic # 16 - Case # 3 Thermolectric Generations



Graphic # 17 - Case # 3 Hydropower Generation

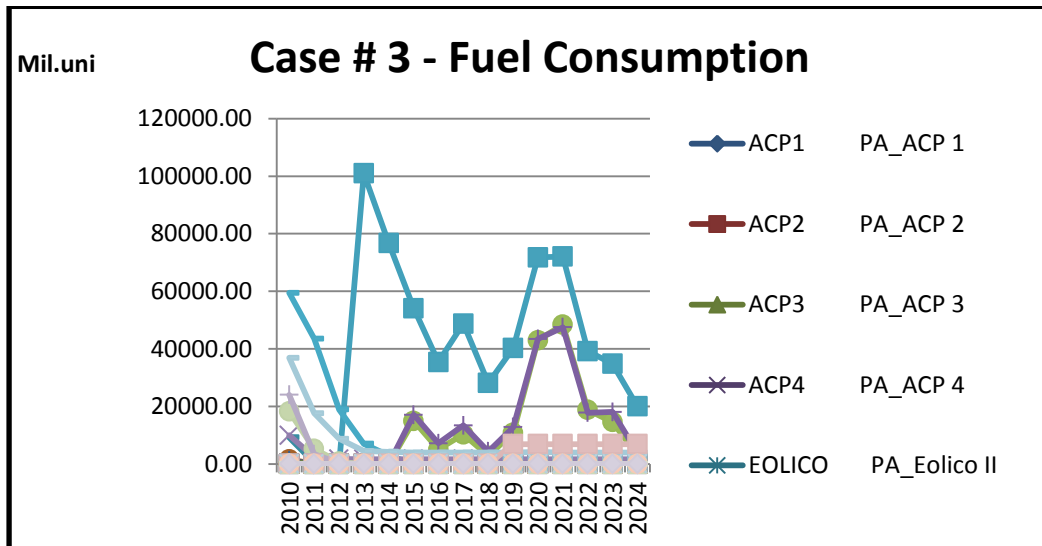


Graphic # 18 - Case # 3 Wind Power Generations



The fuel consumption goes in a completely different pattern when compared with case # 2 as there is a 200 MW thermoelectric plant that runs into operation in year 2013, and another one between years 2019-2021. A key effect of the proposed NAMA is as the added wind power plants enter into operation in year 2023 and renewable energy projects have preference grid connection it decreases the fuel consumption in 2023-2024 when fossil fuel prices will be higher (see graphic # 19).

Graphic # 19 - Case # 3 - Fuel Consumption



When comparing costs there is a significant difference between minimum cost Energy Secretariat Criteria used in ETESA's scenarios and the modeled scenarios. In case # 1 the Investment Cost remains the same as no generation plant was added or changed but the operation cost increased by 3,23 million USD. The increase is due to fossil fuel prices. Case # 2 total cost grew 112,5 million USD and Case # 3 total costs increase by 71,66 million USD.

(See tables 25 and #26). An important factor to consider is that investment and operation cost are covered by the private sector. The proposed NAMA has added an additional player in the cost equation that search for another source of market balance.

Table # 25 - ETESA's Estimated Expansion Costs. Source ETESA, 2009

ETESA's Estimated Costs			
Cases	Investment Cost (million \$)	Operation Cost (million \$)	Total (million \$)
Case #1	1916.79	1111.75	3028.54
Case # 2	2181.49	1043.6	3225.09
Case # 3	2211.52	1096.94	3308.46

Table #26 - Eng. Lindo's Estimated Costs

Eng. Lindo's Estimated Costs			
Cases	Investment Cost (million \$)	Operation Cost (million \$)	Total (million \$)
Case #1	1916.79	1114.98	3031.77
Case # 2	2259.23	1078.36	3337.59
Case # 3	2264.44	1115.68	3380.12

The increment of fiscal incentive will add between 241,10 Million USD and 639,77 Million USD (See table # 27) depending on the future business as usual evolution. If we compare the total increase cost in the three (3) cases, the private sector will be earning more than 237 million USD in each case (See table 28).

Table # 27 - Fiscal Incentive Increment

Fiscal Incentive Increment		
	Without Future BAU	Future BAU
Case # 1	241.1044689	309.407217
Case # 2	543.250914	604.063062
Case # 3	586.03666	639.76731

Table # 28 -Private Sector Netto Earnings

Private Sector Netto Earnings		
	Without Future BAU (million USD)	Future BAU (million USD)
Case # 1	237.874469	306.177217
Case # 2	430.750914	491.563062
Case # 3	514.37666	568.10731

Estimation of Total Fiscal Incentive increment is show in Annex # 4. Is it important also to recognize in this table that the three cases show that CDM revenues are higher than the fiscal incentive when its 25 % of investment, in a 10 year basis calculation. Therefore the Proposed NAMA is recommended.

13.3.3. Status and trends of primary energy production and GHG emissions

To identify how the proposed NAMA will impact the amount CO2 emissions of the generation matrix the research proceed to estimate them not only in the ETESA’s Energy Expansion Plan but also in the proposed modeled generation scenarios.

The estimation was made with the following equation:

$$\text{Equation \# 15 - } GE \text{ (Thousand of CO2tons)} = (TIC * YOH * Gef) / 1000$$

Where GE are generated emissions; TIC is the Total Install Capacity of the case on analysis; YOH is the yearly operation hours and Gef is the Grid CO2 emission factor. Table # 29 and table # 30 presented CO2 emissions of the analyzed cases.

Table # 29 - CO2 Emissions from ETESA’s Expansion Plan

CO2 Emissions from ETESA’s Expansion Plan		
Case # 1 Thousands of tons	Case # 2 Thousands of tons	Case # 3 Thousands of tons
22641.43328	22356.8696	22664.3196

Table # 30 -CO2 Emission from Eng. Lindo’s estimated Expansion Plan

CO2 Emissions From Eng. Lindo’s estimated Expansion Plan		
Case # 1 Thousands of tons	Case # 2 Thousands of tons	Case # 3 Thousands of tons
22641.4	20472.95	21470.5467

To calculate the total emission reduction from the proposed NAMA is necessary to use equation #16

$$\text{Equation \# 16 - } NER (\text{Thousand of CO2 tons}) = GEC1 - GEC2$$

Where NER are NAMA's Emission Reductions; GEC1 are Generated Emissions from ETESA's case and GEC2 are Generated Emissions from modeled scenarios (See table # 24).

Table # 31 - NAMA's CO2 Emission Reduction

NAMA's CO2 Emissions Reductions		
Case # 1 Thousands of tons	Case # 2 Thousands of tons	Case # 3 Thousands of tons
0	1883.92288	1193.77288

An interesting find is that Case # 2 shows the biggest amount of CO2 emission reductions even having less renewable energy % as case # 3 (See tables # 32 and # 33)

Table 32 - Generation Distribution %

	ETESA's Generation Distribution %			Eng. Lindo's Generation Distribution		
	Case # 1	Case # 2	Case # 3	Case # 1	Case # 2	Case # 3
Electric Generation	%	%	%	%	%	%
Hydro Generation	53.5727737	52.6351189	51.9211038	53.5727737	53.7249905	51.2287313
Thermal Generation	44.3913128	43.614356	41.789495	44.3913128	37.6258393	37.0391967
Wind Generation	2.03591351	6.37589262	6.28940125	2.03591351	8.64917017	11.732072

Table # 33 - Renewable Energy %

ETESA's Expansion Plan Renewable Energy %			Eng. Lindo's Estimated Renewable Energy %		
Case #1	Case #2	Case #3	Case #1	Case #2	Case #3
55.61	59.01	58.21	55.61	62.37	62.96

13.3.4. Clean Development Mechanism (CDM) in Panama

The carbon market in Panama, specifically referring to hydroelectric projects, has been stalled because of discrepancies between energy and climate change policies and its implementation and management.

The government sector is creating regulatory frameworks that send mixed signals to investors, as well as investors have diminished "faith" in the functionality of Clean Development Mechanism.

It is here where the proposed NAMA plays a critical role in strengthening the balance between these actors.

The results of the evaluated data shows that without strengthening and tax incentives increase in the law 45, investors will choose not to apply the law as they find more profitable to receive the revenues from CDM activities.

On the other hand, the approval of CDM projects in Panama has been affected by the ambiguous communication between government and private enterprise. There is a misunderstanding of what policies and legislation wants to promote, and what the government set as priority areas.

Panama has 6 approved projects from which only one was considered on the Panama Expansion Plan by ETESA. With the prevalent conditions of Law 45 if all projects apply to CDM they will be earning more from what the incentive offers; 64.916.384,00 USD in case # 1 , 409.810.915,00 USD in case # 2 and 447.632.167,00 USD in case # 3. What the numbers are saying is that apply to Law 45 as it is right now in a long term perspective, is not worth it, because they will not receive any benefit as all CDM revenues has to be discounted.

Delimitating the range of action of CDM, NAMAs and present and Future Business as Usual Baseline will give provide the adequate tool to implement and modify energy policies without affecting negatively the carbon market.

If the delimitation of actions does not occur, the confusion of what is voluntarily, or additional, or a common country practice will remain and it will make even more complicated the CDM registration process, as the registration stakeholders won't have a define criteria to work with

In the absence of a business as usual scenario definition, Designated National Authority will not have an idea of how many projects will fulfill the BAU behavior, therefore, won't be able to make a conscious decision of which projects will approved. Every project most calculate its BAU, but when doing a NAMA, as the government is the only responsible, the BAU scenario has to include current and future polices. Also with a lack of a defined emission

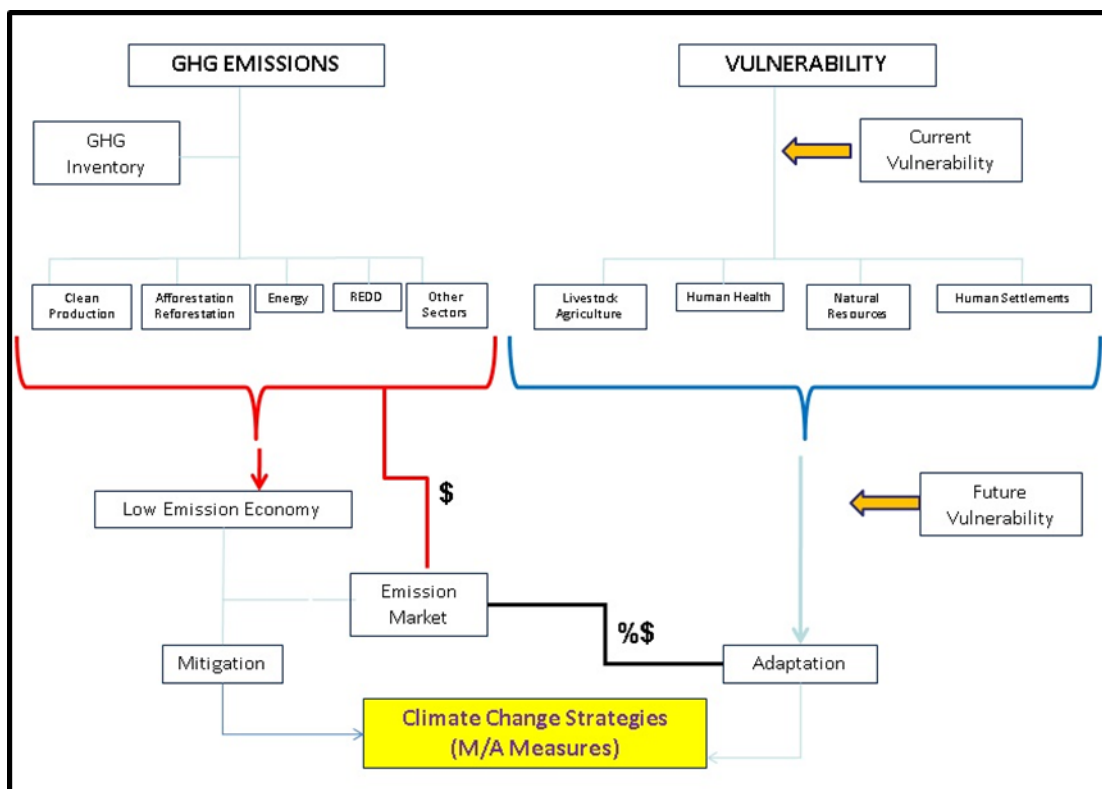
reduction horizon, Designated Operation Entities will have problems in the validation process because will have two different perspectives: Governmental Perspective and Private Sector perspective and not a country perspective.

One direct effect of NAMAs will be ensuring the permanence, at the present and in the future of renewable energy CDM projects.

13.3.5. Panama point of view of Nationally Appropriate Mitigation Activities (NAMAs)

When Panama design its Climate Change Mitigation Strategy, created in the year when the Bali Action Plan was been develop. The guideline and the essence of the BAP are including in the strategy. Figure # 13 display summary of the strategy. The two blocks to address are GHG Emission and Vulnerability. To different lines of work unified in a single point; Measures that help to adapt and to mitigate. Now is possible to say that NAMAs are that middle point. It is an instrument which leverage financial resources to prepare countries to a new reality were emission reductions is a part of it as well as providing capacity building and technological support to do what its need to do in order to prepare population and national economy to change its behavior.

Figure # 13 - Panama’s Climate Change Mitigation Strategy (Lindo, 2007)



Having said that, it could be totally understandable that the Panamanian government agrees with NAMAs implementation and that is ready to work on that direction; nevertheless, in 2009 the Panamanian Foreign Ministry sent a letter to United Nations Secretary signed the Copenhagen Agreed but refraining NAMAs point. It affirms that Panama will not emit any comment on that subject. In December 2010 the Presidency Ministry removed the issue of climate change on the country's priority list. Now, if it is true that NAMAs important part of the country's politics the relevance of the issue is now in a fragile balance.

The proposed NAMA raises significant issues which certainly proved that a holistic generation management is fundamental to take advantage of Climate Change Architecture. Panama as well as all developing countries is in a position to choose were to prioritize how deep to prepare them to face climate change impacts, climate change adverse effect, and last but not least, climate change spillover effects.

A NAMA as a mitigation policy, when is correctly managed could bring sustainability to the country, but there is a thin line with giving the country new opportunities to grow and closing the doors of international support.

13.3.6. Participation of Panama in negotiation groups within UNFCCC

The large diversity of mitigation actions already submitted by non-Annex I countries, makes clear the existence of finding ways to transparent the implementation of these actions never forgetting dissimilar national circumstances and countries know-hows.

The issues on which developing countries differ are (UNFCCC, 2011):

- ✚ NAMAs Diversity;
- ✚ Fundamental assumptions relating to NAMAs;
- ✚ Support needed for their implementation

Developing countries are looking not only for North –South Cooperation, but also South-South Cooperation, in order to get valuable insights into the level of efforts already implemented by members of GRULAC and Group 77 + China. From the LAC region Mexico is applying to a credited NAMA while Costa Rica has established a Unilateral NAMA. Panama could also be a good example for the region, if the proposed NAMA is develop, bringing new perspective to the UNFCCC negotiation groups, in order to raise a voice with a different perspective that can help order countries to find a green path.

Until know Developing countries have presented distinct types of NAMA such as:

- ✚ Economy-wide quantified emission reduction targets in absolute amounts.
- ✚ Carbon intensity targets.
- ✚ Deviation from BAU emission level (including renewable energy and energy efficiency goals).
- ✚ Sustainable forest management.
- ✚ Enhancing forest carbon sinks.
- ✚ Individual mitigation measures involving a variety of sectors (UNFCCC, 2007).

It demonstrates that there are several countries competing to receive international support for mitigations activities. It also means that Panama have to proof that have the local capacity enough to do so, but not enough to do It alone.

Existing NAMAs were expressed in short-, medium- and long-term perspectives. As international support donors are looking for short term results, the proposed NAMA could attract Annex I countries that what to invest between 2012 and 2020.

Several countries had started implementing their NAMAs, some indicated their interest to do so, and Panama has not indicated anything. The country needs to send a positive signal about NAMA because if not, could be losing a perfect opportunity to develop a sustainable road to the future.

An appropriate taxation policy is an already registered NAMA, therefore, will be easier for Panama to make the proposed NAMA road to reality.

13.4. Steps to maximize positive spillover effect of including renewable energy policies as NAMA.

After understanding the way that Panama has built its energy sector, recognizing how UNFCCC Mitigation Policies have been developed and applied, noting the complexity of building laws and regulations that meet national and international standards, having in mind that the globe is sharing the responsibility to mitigate climate change in every way possible to assure temperature raise until 2 ° C, accepting that all decisions and actions made in a global market affect the economical behavior in every other country, it is undeniable to affirm that the Global decision agreed in the Bali Action Plan of develop Nationally Appropriate Mitigation Actions will have important spillover effects on the Panamanian Energy Matrix. The spillover effects will be lived if Panama implement the measure and if Panama does not implement it. The suffered spillover effects will be positive and negative, but Panama has de capacity to manage them.

As the research has proved the majority of spillover effects of implementing a NAMA are positive for the country when strategically managed they could be improved. Below are the steps of how to do it.

13.4.1. National Energy Policies

Panama should select from the countries that have already registered NAMAs, which have similar national circumstances, and similar interest and identify a way to shared information and create on the institutional arrangements to facilitate NAMAs implementation.

The institutional arrangements should also be done within governmental institution in order to manage the same level of information and unify concepts. This activity will facilitate the establishment of domestic measurement, reporting and verification.

To assure a better understanding, stakeholders must participate in the preparation process and during implementation also. To ensure the active participation of all sectors involved a public consultation will be recommended.

International support donors need a host country with credibility; therefore the consultations could be also included in the official procedure to build the proposed NAMA in order to facilitate stakeholder's cooperation.

13.4.2. Conformation of Panama Energy Sector

As a research work, modeling scenarios were performed to illustrate in a modest way, how the stimulation of renewable energy market scan affect, in a so marked way, the performance of a country's energy matrix.

It is of great importance to define a medium and long term perspectives for the proposed NAMA. If Panama in a not so far future decide to evolve to a credited NAMA or, have another source of commitment, a long term perspective of what the proposed NAMA can do, will facilitate decision making.

The proposed NAMA could be starting point to develop a low emission development strategy, which could be also a NAMA in the future. The capacity and experience raise in the

proposed NAMA will help to facilitate the low emission strategy design, always including key concepts as equity, sustainable development, energy security and poverty alleviation.

13.4.3. Status and trends of primary energy production and GHG emissions

It is not simple to develop a BAU that covers all national circumstances, therefore, it is recommended to utilize top-down and bottom-up models to setting the BAU emission level. As the proposed NAMA established a deviation from its original Emission levels through renewable energy deployment, comparing and analyzing what have been done by other developing countries could be used to find other financial sources.

To continue increasing the renewable energy potential and not putting in risk the transmitting lines capacity by t wind power generation a deeper analysis of the electric system behavior with the total Panama wind potential is needed.

13.4.4. Clean Development Mechanism (CDM) in Panama

Decision makers need to know the advantages and disadvantages of Implementing NAMA. For them to be aware of the relevance of this issue, a link between scientist, technicians and politicians should work closer and find a common language that help to involve easier all stakeholders.

To ensure the international financial support, the final decision of participating within the NAMA must be done by State with stakeholder consultations. By doing so, the quality and certainty of the estimated BAU and reduction potential will be maintained.

13.4.5. Panama point of view of Nationally Appropriate Mitigation Activities (NAMAs)

Before Panama refrain from participating of NAMAs was the leading country in Central America in the UNFCCC negotiations. Panama has the capacity and potential to regain its place in the negotiations and set an example in the development of this mitigation measure. When evaluated in detail the type of activities undertaken by the Republic of Panama on climate change issue, could be observed that the country has various unilateral NAMAs.

For international finance, donors must consider the country a country of trust that is consistent with its regulations. That is why Panama has to reawake and returns to resume his position as regional leader and mitigation opportunities that the UNFCCC provides without compromising their development.

13.4.6. Participation of Panama in negotiation groups within UNFCCC

Panama should share its experiences with other developing countries that are at the stage of initiating the process of planning for and preparing their NAMAs and focus on analyzing the barriers that they confront in their countries and sectors.

In the negotiations developing countries are looking to find different source of finance. They ask for NAMAs completely domestically funded or just first a phase domestically funded however and then implements actions in second and third phases with international funding. Panama has to be sure what type of funding is the best for our circumstances and negotiates for it, finding allies in the way to achieve it.

14. Discussion

Behind the NAMAs charm, there is a significant amount of issues to clarify. When countries go deep in to the regulation characterization crucial discussion on assumptions are been increased. Why? Because developing and develop countries know for sure that this mitigation tool could not only bring benefits to their countries, but also, depending on how rules are established the economy of donors and host Parties will be radically affected, for bad or for good.

One of the most controversial doubts about NAMAs is how to make assumptions regarding the rate of GDP and population growth when a developing country defines a carbon intensity target as its NAMA indicator.

Also another common uncertainty is when a country presents their NAMAs as a deviation from the BAU emission level (as the proposed NAMA does), countries argue on how the BAU emission level was calculated? Will the NAMA have an economy-wide coverage, or will focus only in some sectors of the economy? It will be covering the whole sector or just a part of it? What are the projected emissions for 2020? Could NAMA's implementation generate spillover effects of NAMA in other country sectors?

The above uncertainties are upraised because when defining this conditions the countries will acquire an international responsibility that has to be achieve and that why MRVs are so important. Developing countries does not want to commit to something they are not 100% sure they can achieve, because will not only depend from the government, it depends of market behavior that are been affected by a weak economy which in most cases define country priorities. If countries were sure on how to manage spillover effects, climate change negotiations will become easier; but as is not a complex job to do so, countries with not enough resources to determine spillover effect sometimes take decision blind, trusting in the good faith of some other countries. Sometimes it works, sometimes brings to countries more responsibility of what they can handle.

It is import to recall that NAMA basic conditions for the implementation are:

- ✚ They are voluntary I they will not be consider as a legally binding commitments.
- ✚ They depend on the suitable finance provision including technology and capacity-building support;
- ✚ Level and type of targets and actions are decided only by the host country.
- ✚ NAMAs are based on the premise that all countries implement their commitments in good faith.

For what explain above, NAMAs are an excellent mitigation tool, who faces a premature stage of development. To overcome the lack of information and definition of its features to support development in countries, NAMAs have to grow and mature. To facilitate that grow countries have the moral responsibility to determine spillover effects and to look for international support, if available, before making a decision that could change economy growth.

15. Conclusions

✚ Implementation of NAMAs

- NAMAs is a mitigation measure that aims to contribute and stimulate actions that facilitate activities that help to reduce GHG emission by adapting and preparing the country to climate change adverse effects when CDM is a flexible mechanism which mayor objective is to reduce GHG emissions and bring sustainable development in the host country
- Law 45 can be categorized as a unilateral NAMA; the next step for the government would develop a hybrid NAMA compound by a NAMA conditional with the a unilateral NAMA (Law 45) focusing of a no-loose target Sectoral approach having as a result non-legally binding indicators.
- As NAMAs has the possibility to define which indicator could be appropriate to quantify it achievements, Panama could success in the implementation of the proposed NAMA with less complications than with current reporting mechanisms, founded on carbon emissions as they base their success only on carbon emission reductions.
- Even if the proposed NAMA does not result in emission reduction could create a positive environment or allowing conditions for businesses to move forward mitigation activities, what is also a success indicator: positive spillover effect.
- To maximize positive spillover effects Government and Private Sector have to work hand by hand to determine a BAU delineated baseline and protect mutual interest, creating a common language will all stakeholders in order to continue drawing Panama's green economy road.
- NAMA's design and implementation must be malleable in a way that aid to address future improvements within United Nations Frameworks level over the next years, including the opportunity to connect NAMAs to the international carbon markets when countries are ready, in a voluntary basis
- NAMA's BAU scenarios should run at least 45 years and must include stakeholder participation.
- The implementation of a NAMA in the energy sector could produce the following spillover effects:
 - Increment of Generation Investment and Operational Cost
 - Increment of fiscal incentives %
 - Increment of Private Sector Revenues
 - Increment of Local Communities quality of life
 - Increment of Capacity Building in governmental al private sector
 - Increment of Panama's Role in NAMA's negotiations
 - Increment of North-South and South-South Cooperation
 - Increment of Renewable Energies % in the Energy Matrix
 - Decrease of Generation Scenarios CO2 emissions
- To prepare it will be necessary to create workshops where NAMAs and its relation the electricity market becomes the central subject, analyzing possibilities to design Business as Usual baselines, and the supported NAMAs interpretation.
- To take unilateral action to reduce greenhouse gas (GHG) emissions could affect the competitiveness of domestic industries in relation to countries which abstained from such actions and cause "carbon leakage" and the relocation of emitting industries to countries with less stringent GHG regulations.

- It is necessary to support development projects that reduce emissions of GHGs, which resulting in the reduction of fuel required for electricity generation.
- Similar analysis should be done in Central America in order to create common interest to defend the possibility to redirect the characteristics of Latin American NAMAs in the UNFCCC negotiation helping to face socio- economics challenges together.
- When implementing the proposed NAMA, the possible barriers to confront are:
 - Limited human and institutional capacity.
 - Lack of upfront finance and lack of comprehensive understanding of the diverse array of financial sources and opportunities to access those sources.
 - The need to remove financial and regulatory barriers.

✚ Interaction between NAMAs and CDM

- As CDM and the proposed NAMA address the same sector it could interfere with financial private companies' business plans. In order to protect those earnings and provide an attractive incentive the proposed NAMA can separate emission reduction from each mitigation activity (CDM or NAMAs) and open a market space of both of them.
- The proposed NAMA could impact the upcoming CDM baseline by deviating the Business as Usual scenario.
- Panama could choose to implement a Sectoral hybrid NAMA, allowing CDM projects co-existence with the proposed NAMA by passing the incentives for GHG abatement directly to the private sector, representing a greater earning than current CDM potential and current fiscal incentive.
- To assure co-existence between them the set of boundaries to CDM and NAMAs range of actions is needed.

✚ NAMAs and Government interaction

- The Republic of Panama is blessed with enormous natural resources which feed the potential to develop renewable energy in the country. This allows the development of a NAMA in the energy sector making it attractive to government and private sector.
- To maximize positive spillover effects Government and Private Sector have to work hand by hand to determine a BAU delineated baseline and protect mutual interest, creating a common language will all stakeholders in order to continue drawing Panama's green economy road.
- NAMA's design and implementation must be malleable in a way that aid to address future improvements within United Nations Frameworks level over the next years, including the opportunity to connect NAMAs to the international carbon markets when countries are ready, in a voluntary basis
- The Panamanian government should decide which qualification requirements will use for domestic reviewers of MRV of NAMAs, or whether international consultation and analysis need to be implemented.
- Law 45 has been positive as has stimulated the development of several renewable energy projects, but has its limitations, consequently, to move forward a low carbon intensity economy a NAMA on this sector must be defined.
- A Panamanian legislation NAMA will proof vast opportunities that NAMAs could offer and will also proof its adaptability to national circumstances helping to overcome mitigation obstacles.
- To create a better mitigation strategy in the energy sector, government have to count with better vulnerability information in order to provide the adaptation support were is needed and include it on NAMAs projects.

- Even having available capital, viable renewable energy businesses are not being financed because they are either too small or do not offer high enough annual returns or repay loans quickly enough, therefore is a need to develop new financial products to overcome these challenges. That new financial product could be NAMA.

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17. Annexes

Annex # 1: Law 45 of 2004

N° 25,112

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geotermoelectricas y sistemas de centrales de otras fuentes nuevas, renovables y limpias de hasta 10 MW de potencia instalada, que inicie su construcción después de la entrada en vigencia de la presente Ley, podrá optar por adquirir del Estado un incentivo fiscal equivalente hasta el veinticinco por ciento (25%) de la inversión directa en el respectivo proyecto, con base a la reducción de toneladas de emisión de dióxido de carbono (CO₂) equivalentes por año calculados por el término de la concesión o licencia, el cual podrá ser utilizado para el pago del Impuesto Sobre la Renta liquidado en la actividad, en un periodo fiscal determinado, durante los primeros diez años contados a partir de la entrada en operación comercial del proyecto, siempre que no gocen de otros incentivos, exoneraciones, exenciones y créditos fiscales establecidos en otras leyes.

3. La sociedad que desarrolle proyectos nuevos o que aumente la capacidad de producción de energía de sistemas de centrales de pequeñas hidroeléctricas, sistemas de centrales hidroeléctricas, sistemas de centrales geotermoelectricas y sistemas de centrales de otras fuentes nuevas, renovables y limpias de más de 10 MW de potencia instalada, que inicie su construcción después de la entrada en vigencia de la presente Ley, podrá optar por adquirir del Estado un incentivo fiscal equivalente hasta el veinticinco por ciento (25%) de la inversión directa en el respectivo proyecto, con base a la reducción de toneladas de emisión de dióxido de carbono (CO₂) equivalentes por año calculado por el término de la concesión o licencia, el cual solamente podrá ser utilizado hasta el cincuenta por ciento (50%) del Impuesto Sobre la Renta liquidado en la actividad, en un periodo fiscal determinado, durante los primeros diez años contados a partir de la entrada en operación comercial del proyecto, siempre que no gocen de otros incentivos, exoneraciones, exenciones y créditos fiscales establecidos en otras leyes.
4. Para los efectos de determinar el monto total del incentivo fiscal a que se refieren los numerales 2 y 3 de este artículo, se utilizará un precio de referencia por tonelada de dióxido de carbono (CO₂) equivalente por año y una línea base en toneladas métricas de dióxido de carbono (CO₂) equivalente por MW-hora a ser aplicado a la totalidad de los MW-hora que se estima serán generados durante el periodo de concesión o licencia calculado para cada proyecto por el Ente Regulador de los Servicios Públicos, en coordinación con el Ministerio de Economía y Finanzas y la Autoridad Nacional del Ambiente.
5. La sociedad que desarrolle proyectos nuevos o que aumente la capacidad de producción de energía de sistemas de centrales de minihidroeléctricas, sistemas de centrales de pequeñas hidroeléctricas, sistemas de centrales hidroeléctricas, sistemas de centrales

- electricidad, sin el requisito del proceso de libre concurrencia de conformidad con el artículo 8 de esta Ley.
4. *Fuentes nuevas, renovables y limpias.* Recursos que provienen de fuentes hidráulicas, geotérmicas, solares, eólicas, biomasa y otras fuentes nuevas, renovables y limpias, que son aprovechadas para la generación de energía eléctrica.
 5. *Generación hidroeléctrica.* Generación de energía eléctrica mediante la utilización de los recursos hidráulicos naturales ubicados en cualquier parte del territorio de la República de Panamá.
 6. *Sistemas de centrales de minihidroeléctricas.* Centrales o conjuntos de centrales de generación con una capacidad instalada de hasta 10 MW, así como todas las líneas, subestaciones y sistemas de distribución y/o transmisión necesarios para la debida conexión al sistema de distribución y/o al sistema de transmisión.
 7. *Sistemas de centrales de otras fuentes nuevas, renovables y limpias.* Centrales de generación eléctrica que utilizan recursos provenientes de fuentes solares, eólicas, biomasa, así como todas las líneas, subestaciones y sistemas de distribución y/o transmisión necesarios para la debida conexión a los sistemas de distribución o al sistema de transmisión.
 8. *Sistemas de centrales geotermoeléctricas.* Plantas de generación que utilizan recursos provenientes de las fuentes geotérmicas, así como todas las líneas, subestaciones y sistemas de distribución y/o de transmisión necesarios para la debida conexión a los sistemas de distribución o al sistema de transmisión.
 9. *Sistemas de centrales hidroeléctricas.* Centrales o conjuntos de centrales de generación con una capacidad instalada mayor de 20 MW, así como todas las líneas, subestaciones y sistemas de transmisión necesarios para la debida conexión con el sistema de transmisión.
 10. *Sistemas de pequeñas centrales hidroeléctricas.* Centrales o conjunto de centrales de generación con una capacidad instalada mayor de 10 MW hasta 20 MW, así como todas las líneas, subestaciones y sistemas de distribución y/o transmisión necesarios para la debida conexión al sistema de distribución y/o transmisión.

Capítulo II

Concesiones y Licencias

Artículo 3. El último párrafo del artículo 55 de la Ley 6 de 1997 queda así:

Artículo 55. Otorgamiento. ...

A partir del sexto año de la entrada en vigencia de esta Ley, el otorgamiento de las concesiones relativas a la generación hidroeléctrica no estará sujeto al requisito de concurrencia. Dichas concesiones se otorgarán mediante resolución motivada del Ente Regulador, en la que se consignarán los términos y condiciones bajo los cuales se otorga la concesión en cada caso particular, previo el cumplimiento de los requisitos exigidos en la legislación vigente en materia de protección ambiental, seguridad e higiene industrial y funcionamiento de establecimientos industriales. Otorgada la concesión, su titular quedará sujeto a las normas para la prestación de los servicios establecidos en esta Ley y sus reglamentos. El Ente Regulador reglamentará, mediante resolución motivada, los plazos para la presentación de los documentos del contrato y la fianza de cumplimiento, y emitirá concepto sobre las concesiones de uso de agua para generación hidroeléctrica y geotermoeléctrica a fin de evitar la subutilización del recurso.

Artículo 4. Concesiones y licencias. Para efectos de acogerse a los beneficios establecidos en esta Ley, los interesados en la construcción y explotación de sistemas de centrales de minihidroeléctricas, sistemas de pequeñas centrales hidroeléctricas, sistemas de centrales hidroeléctricas, sistemas de centrales geotermoeléctricas y sistemas de centrales de otras fuentes nuevas, renovables y limpias, deberán mantener vigente una concesión o licencia al amparo de lo establecido en la Ley 6 de 1997, con excepción de las centrales particulares de fuentes nuevas, renovables y limpias que no requieren concesiones ni licencias. Queda expresamente entendido que las personas o empresas que hayan solicitado concesiones o licencias con anterioridad a la entrada en vigencia de esta Ley y no hayan iniciado la construcción, podrán acogerse a sus beneficios.

Artículo 5. Concesión de uso de agua para generación de energía hidroeléctrica. Los contratos de concesión de agua, que otorgue la Autoridad Nacional del Ambiente para el desarrollo de los sistemas de centrales de minihidroeléctricas, sistemas de pequeñas centrales hidroeléctricas y de sistemas de centrales hidroeléctricas, deberán expedirse por el mismo término que las concesiones o licencias que otorgue el Ente Regulador para esos fines. Para ello, el Ente Regulador, previo al otorgamiento de la concesión de agua, le comunicará a la Autoridad Nacional del Ambiente el término de vigencia de la concesión o licencia que otorgue para el aprovechamiento del recurso hídrico en la generación de energía eléctrica. Para el desarrollo de centrales particulares de fuentes nuevas, renovables y limpias, que utilicen agua para la

generación de energía eléctrica, deberán solicitar a la Autoridad Nacional del Ambiente su respectiva concesión de agua.

Artículo 6. Concesión de uso de agua para generación de energía geotérmica. Se autoriza a la Autoridad Nacional del Ambiente para que otorgue concesiones de agua para la explotación de las fuentes geotérmicas. Los contratos de concesión de agua para centrales geotérmicas que otorgue la Autoridad Nacional del Ambiente para la explotación de sistemas de centrales geotérmicas, deberán expedirse por el mismo término que las concesiones o licencias que otorgue el Ente Regulador para esos fines. Para ello, el Ente Regulador, previo otorgamiento de la concesión de agua, le comunicará a la Autoridad Nacional del Ambiente el término de vigencia de la concesión o licencia que otorgue para el aprovechamiento del recurso geotérmico en la generación de energía eléctrica.

Artículo 7. Expiración de las concesiones de uso de agua. Las concesiones de agua que otorgue la Autoridad Nacional del Ambiente para centrales de minihidroeléctricas, sistemas de centrales de pequeñas hidroeléctricas, sistemas de centrales hidroeléctricas y sistemas de centrales geotérmicas finalizarán cuando expire la concesión otorgada por el Ente Regulador de los Servicios Públicos, previa autorización de la Autoridad Nacional del Ambiente. Esta disposición aplica para los proyectos construidos y por construir.

Capítulo III

Beneficios

Artículo 8. Compraventa directa. Con independencia de su ubicación, los sistemas de centrales de minihidroeléctricas y sistemas de centrales de otras fuentes nuevas, renovables y limpias, con una capacidad instalada de hasta 10 MW, podrán realizar contratos de compraventa directa con las empresas distribuidoras, siempre que exista la capacidad de contratación por parte de la distribuidora de acuerdo con su obligación de contratar y que la suma de la generación propia y las compras directas aquí autorizadas no excedan el límite del quince por ciento (15%) de la demanda máxima de generación atendida en el área de concesión de la respectiva distribuidora que compra. Los criterios técnicos y comerciales de estas compras directas serán determinados por el Ente Regulador de los Servicios Públicos.

Los sistemas de centrales de minihidroeléctricas, los sistemas de centrales geotérmicas y sistemas de centrales de otras fuentes nuevas, renovables y limpias con una

capacidad instalada de hasta 10 MW, no estarán sujetos a ningún cargo por distribución ni transmisión cuando vendan en forma directa o vendan en el mercado ocasional. En ningún caso, los costos de la distribución y la transmisión serán traspasados a los usuarios.

Artículo 9. Beneficios para centrales de más de 10 MW hasta 20 MW. Los sistemas de pequeñas centrales hidroeléctricas, sistemas de centrales geotermoeléctricas y sistemas de centrales de otras fuentes nuevas, renovables y limpias de más de 10 MW hasta 20 MW de capacidad instalada, no estarán sujetos a ningún cargo de distribución ni transmisión por los primeros 10 MW de capacidad instalada durante los primeros diez años de operación comercial. En ningún caso, los costos de la distribución y la transmisión serán traspasados a los usuarios.

Artículo 10. Beneficios fiscales. Las personas naturales o jurídicas que desarrollen sistemas de centrales de minihidroeléctricas, sistemas de centrales de pequeñas hidroeléctricas, sistemas de centrales hidroeléctricas, sistemas de centrales geotermoeléctricas, centrales particulares de fuentes nuevas, renovables y limpias y sistemas de centrales de otras fuentes nuevas, renovables y limpias, gozarán de los siguientes beneficios fiscales:

1. Exoneración del Impuesto de Importación, aranceles, tasas, contribuciones y gravámenes, así como del Impuesto de Transferencia de Bienes Corporales Muebles y Prestación de Servicios, que pudiesen causarse por razón de la importación de equipos, máquinas, materiales, repuestos y demás que sean necesarios para la construcción, operación y mantenimiento de centrales particulares de fuentes nuevas, renovables y limpias de hasta 500 KW de capacidad instalada, sistemas de centrales de minihidroeléctricas, sistemas de centrales de pequeñas hidroeléctricas, sistemas de centrales hidroeléctricas, sistemas de centrales geotermoeléctricas y sistemas de centrales de otras fuentes nuevas, renovables y limpias, al igual que para el aumento de potencia y/o energía de centrales existentes. Esta disposición también se aplicará a centrales particulares de fuentes nuevas, renovables y limpias de hasta 500 KW de capacidad instalada, sistemas de centrales de minihidroeléctricas, sistemas de centrales de pequeñas hidroeléctricas, sistemas de centrales hidroeléctricas, sistemas de centrales geotermoeléctricas y sistemas de centrales de otras fuentes nuevas, renovables y limpias que, al momento de la entrada en vigencia de la presente Ley, se encuentran en etapa de construcción, las que tendrán un plazo de seis meses a partir de la promulgación de esta Ley, para solicitar el reconocimiento de la exoneración a la Dirección General de Ingresos.
2. La sociedad que desarrolle proyectos nuevos o que aumente la capacidad de producción de energía de sistemas de centrales de minihidroeléctricas, sistemas de centrales

geotermoeléctricas y sistemas de centrales de otras fuentes nuevas, renovables y limpias de hasta 10 MW de potencia instalada, que inicie su construcción después de la entrada en vigencia de la presente Ley, podrá optar por adquirir del Estado un incentivo fiscal equivalente hasta el veinticinco por ciento (25%) de la inversión directa en el respectivo proyecto, con base a la reducción de toneladas de emisión de dióxido de carbono (CO₂) equivalentes por año calculados por el término de la concesión o licencia, el cual podrá ser utilizado para el pago del Impuesto Sobre la Renta liquidado en la actividad, en un periodo fiscal determinado, durante los primeros diez años contados a partir de la entrada en operación comercial del proyecto, siempre que no gocen de otros incentivos, exoneraciones, exenciones y créditos fiscales establecidos en otras leyes.

3. La sociedad que desarrolle proyectos nuevos o que aumente la capacidad de producción de energía de sistemas de centrales de pequeñas hidroeléctricas, sistemas de centrales hidroeléctricas, sistemas de centrales geotermoeléctricas y sistemas de centrales de otras fuentes nuevas, renovables y limpias de más de 10 MW de potencia instalada, que inicie su construcción después de la entrada en vigencia de la presente Ley, podrá optar por adquirir del Estado un incentivo fiscal equivalente hasta el veinticinco por ciento (25%) de la inversión directa en el respectivo proyecto, con base a la reducción de toneladas de emisión de dióxido de carbono (CO₂) equivalentes por año calculado por el término de la concesión o licencia, el cual solamente podrá ser utilizado hasta el cincuenta por ciento (50%) del Impuesto Sobre la Renta liquidado en la actividad, en un periodo fiscal determinado, durante los primeros diez años contados a partir de la entrada en operación comercial del proyecto, siempre que no gocen de otros incentivos, exoneraciones, exenciones y créditos fiscales establecidos en otras leyes.
4. Para los efectos de determinar el monto total del incentivo fiscal a que se refieren los numerales 2 y 3 de este artículo, se utilizará un precio de referencia por tonelada de dióxido de carbono (CO₂) equivalente por año y una línea base en toneladas métricas de dióxido de carbono (CO₂) equivalente por MW-hora a ser aplicado a la totalidad de los MW-hora que se estima serán generados durante el periodo de concesión o licencia calculado para cada proyecto por el Ente Regulador de los Servicios Públicos, en coordinación con el Ministerio de Economía y Finanzas y la Autoridad Nacional del Ambiente.
5. La sociedad que desarrolle proyectos nuevos o que aumente la capacidad de producción de energía de sistemas de centrales de minihidroeléctricas, sistemas de centrales de pequeñas hidroeléctricas, sistemas de centrales hidroeléctricas, sistemas de centrales

- geotermoelectricas y sistemas de centrales de otras fuentes nuevas, renovables y limpias, que logre vender sus certificados de reducci3n de emisiones de di3xido de carbono (CO₂) equivalentes por a1o antes o despu3s de acogerse a los beneficios de esta Ley, deber3 reportar la venta de los certificados referidos a la Direcci3n General de Ingresos del Ministerio de Econom3a y Finanzas para que esta deduzca el monto de la venta de los certificados referidos del saldo del incentivo fiscal de hasta el veinticinco por ciento (25%) de la inversi3n directa en el respectivo proyecto.
6. El incentivo fiscal a que se refieren los numerales 2 y 3 de este articulo no podr3n ser transferidos, cedidos ni compensados. Los contribuyentes que se acojan al beneficio del cr3dito fiscal indicado en estos numerales y adquieran bienes susceptibles de depreciaci3n, no podr3n deducir como gasto dicha depreciaci3n en la misma proporci3n del cr3dito fiscal, para la determinaci3n de su renta neta gravable.
 7. Orogamiento de un cr3dito fiscal aplicable al Impuesto Sobre la Renta liquidado en la actividad en un periodo fiscal determinado, por un m3ximo del cinco por ciento (5%) del valor total de la inversi3n directa en concepto de obras, que despu3s de la construcci3n de sistemas de centrales de minihidroel3ctricas, sistemas de peque1as centrales de hidroel3ctricas, sistemas de centrales hidroel3ctricas, sistemas de centrales geotermoelectricas y sistemas de centrales de otras fuentes nuevas, renovables y limpias, que inicien su construcci3n despu3s de la entrada en vigencia de la presente Ley, se conviertan en infraestructura de uso p3blico, como carreteras, caminos, puentes, alcantarillados, escuelas, centros de salud y otras de similar naturaleza, previa evaluaci3n de la entidad p3blica que reciba la obra correspondiente, en coordinaci3n con el Ministerio de Econom3a y Finanzas. El cr3dito referido no puede ser objeto de compensaci3n, cesi3n o transferencia.
 8. Los incentivos fiscales podr3n aplicarse 3nicamente a las personas naturales o jur3dicas que desarrollen directamente los proyectos y solamente por la parte que corresponda a dicho proyecto. Los incentivos no podr3n aplicarse a las dem3s actividades.

Articulo 11. Aplicaci3n de los beneficios. Esta Ley es de car3cter especial y, con excepci3n de lo establecido en el articulo 10 los incentivos aqu3 establecidos con sus l3mites y alcances, se aplican de manera exclusiva a los sistemas de centrales de minihidroel3ctricas, sistemas de centrales de peque1as hidroel3ctricas, sistemas de centrales geotermoelectricas y sistemas de centrales de otras fuentes nuevas, renovables y limpias hasta un limite de 20 MW de capacidad

instalada, por tanto, dichos beneficios no serán extendidos a otros generadores, en virtud de lo dispuesto en el primer párrafo del artículo 68 de la Ley 6 de 1997.

Capítulo IV

Disposiciones Finales

Artículo 12. Obligaciones de los beneficiarios de esta Ley. Las empresas que resulten beneficiadas con las disposiciones de la presente Ley, tendrán las siguientes obligaciones:

1. Colaborar con los programas y planes oficiales de mejora y conservación de la cuenca o áreas respectivas de influencia, incluyendo, pero no limitado, los trabajos de reforestación o de lucha contra la erosión y desertificación, con el objeto de conservar los recursos naturales del país para las generaciones futuras.
2. Los desarrolladores de los proyectos realizados al amparo de esta Ley deberán respetar los derechos de los afectados y contemplar la adecuada mitigación de los aspectos sociales como medida indispensable para lograr la armonía entre la población, el ambiente y los requerimientos del desarrollo nacional.
3. Los generadores cubrirán las inversiones para adecuar las redes existentes del distribuidor, de requerirse para la conexión y entrega de energía, además de cubrir las pérdidas de distribución en el caso de que estas aumenten debido a la referida conexión. En ningún caso, los costos de las pérdidas de distribución serán traspasados a los usuarios.
4. Los generadores que entregan en alta tensión, deben dejar una salida en media tensión habilitada para posibilitar la extensión de redes de electrificación rural.

Artículo 13. Tarifa durante los reclamos. En caso de reclamación, los usuarios de los servicios públicos fiscalizados por el Ente Regulador de los Servicios Públicos, seguirán pagando la tarifa usual inmediatamente anterior al periodo que está sujeto a reclamación, y la empresa distribuidora del servicio no podrá suspender el suministro del servicio público por ningún motivo, en tanto el Ente Regulador de los Servicios Públicos no emita su decisión.

Artículo 14. La presente Ley modifica el último párrafo del artículo 55 de la Ley 6 de 3 de febrero de 1997.

Artículo 15. Esta Ley comenzará a regir desde su promulgación.

COMUNIQUESE Y CÚMPLASE.

Aprobada en tercer debate, en el Palacio Justo Arosemena, ciudad de Panamá, a los 30 días del mes de junio del año dos mil cuatro.

El Presidente,
JACOBO L. SALAS DIAZ

El Secretario General Encargado,
JORGE RICARDO FABREGA

ORGANO EJECUTIVO NACIONAL - PRESIDENCIA DE LA REPUBLICA - PANAMA, REPUBLICA DE PANAMA, 4 DE AGOSTO DE 2004.

MIREYA MOSCOSO
Presidenta de la República

NORBERTO DELGADO DURAN
Ministro de Economía y Finanzas

Annex # 2 - Law No. 6 that regulates and provide the institutional framework for the provision of Public Electricity Services

GACETA OFICIAL
ORGANO DEL ESTADO

AÑO XCIII PANAMA, R. DE PANAMA MIÉRCOLES 5 DE FEBRERO DE 1997. N°23,220

CONTENIDO

ASAMBLEA LEGISLATIVA
LEY N° 6
(De 3 de febrero de 1997)

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AVISOS Y EDICTOS

ASAMBLEA LEGISLATIVA
LEY N° 6
(De 3 de febrero de 1997)

Por la cual se dicta el Marco Regulatorio e Institucional para la
Prestación del Servicio Público de Electricidad

LA ASAMBLEA LEGISLATIVA

DECRETA:

Título I

Disposiciones Generales

Capítulo I

Aplicabilidad

Artículo 1. Objeto de la Ley. La presente Ley establece el régimen a que se sujetarán las actividades de generación, transmisión, distribución y comercialización de energía eléctrica, destinadas a la prestación del servicio público de electricidad, así como las actividades normativas y de coordinación consistentes en la planificación de la expansión, operación integrada del sistema interconectado nacional, regulación económica y fiscalización.

Artículo 2. Finalidad del régimen. El régimen establecido en esta Ley, para la prestación del servicio público de electricidad, tiene por finalidad:

1. Propiciar el abastecimiento de la demanda de los servicios de energía eléctrica y el acceso de la comunidad a éstos, bajo criterios de eficiencia económica, viabilidad financiera, calidad y confiabilidad de servicio, dentro de un marco de uso racional y eficiente de los diversos recursos energéticos del país.

GACETA OFICIAL

ORGANO DEL ESTADO

Fundada por el Decreto de Gabinete N° 10 del 11 de noviembre de 1903

LICDO. JORGE SANIDAS A.
DIRECTOR GENERAL

OFICINA
Avenida Norte (Eloy Alfaro) y Calle 3a. Casa N° 3-12.
Edificio Casa Amarilla, San Felipe Ciudad de Panamá.
Teléfono 228.8631, 227-9833 Apartado Postal 2189.
Panamá, República de Panamá
LEYES, AVISOS, EDICTOS Y OTRAS
PUBLICACIONES
NUMERO SUELTO: B/.3.20

YEXENIA I. RUIZ
SUBDIRECTORA, a.i

Dirección General de Ingresos
IMPORTE DE LAS SUSCRIPCIONES
Mínimo 6 Meses en la República: B/. 18.00
Un año en la República: B/.36.00
En el exterior 6 meses: B/. 18.00, más porte aéreo
Un año en el exterior: B/.36.00, más porte aéreo

Todo pago adelantado.

2. Establecer el marco legal que incentive la eficiencia económica en el desarrollo de las actividades de generación, transmisión y distribución, así como en el uso de la energía eléctrica.
3. Promover la competencia y la participación del sector privado, como instrumentos básicos para incrementar la eficiencia en la prestación de los servicios, mediante las modalidades que se consideren más convenientes al efecto.

Artículo 3. Carácter de servicio público. La generación, transmisión, distribución y comercialización de electricidad destinadas a satisfacer necesidades colectivas primordiales en forma permanente, se consideran servicios públicos de utilidad pública.

Capítulo II

Principios y Lineamientos

Artículo 4. Intervención del Estado. El Estado intervendrá en los servicios públicos de electricidad, únicamente para los siguientes fines:

1. Garantizar la calidad del servicio y su disposición final, para asegurar el mejoramiento de la calidad de vida de los clientes.
2. Propiciar la ampliación permanente de la cobertura del servicio.
3. Asegurar la prestación eficiente, continua e ininterrumpida del servicio, salvo cuando existan razones de fuerza mayor, caso fortuito, de orden técnico, económico, por sanciones impuestas a los clientes, o por uso fraudulento de la electricidad, que así lo exijan.
4. Garantizar la libertad de competencia en las actividades contempladas en esta Ley.

5. Establecer el régimen tarifario de las actividades en las cuales no haya competencia.
6. Procurar la obtención de economías de escala comprobables.
7. Permitir a los clientes el acceso a los servicios.
8. Proteger al ambiente.
9. Garantizar el servicio público de electricidad en las áreas no rentables, rurales no servidas y no concesionadas, de acuerdo con lo estipulado en la presente Ley.

Artículo 5. Instrumentos de la intervención estatal. Constituyen instrumentos para la intervención estatal en los servicios públicos de electricidad, todas las atribuciones y funciones asignadas a las entidades, autoridades y organismos de que trata esta Ley, especialmente las relativas a las siguientes materias:

1. Promoción y apoyo a personas naturales o jurídicas, de capital estatal o privado, nacional o extranjero, que presten los servicios.
2. Gestión y obtención de recursos para la prestación de los servicios, cuando se trate de empresas estatales.
3. Regulación de la prestación de los servicios; fijación de metas de eficiencia, cobertura y calidad; evaluación de éstas y definición del régimen tarifario.
4. Control y vigilancia de la observancia de las normas y de los planes y programas sobre la materia.
5. Organización de sistemas de información, capacitación y asistencia técnica.
6. Protección de los recursos naturales.
7. Otorgamiento de subsidios directos a las personas de menores ingresos.
8. Estímulo a la inversión privada en estos servicios.
9. Respeto del principio de neutralidad, a fin de asegurar que no exista ninguna práctica discriminatoria en la prestación de los servicios.
10. Asignación, en el Presupuesto General del Estado, de los recursos necesarios, para financiar el costo de extender el servicio público de electricidad a las áreas rurales no servidas y no concesionadas.

Artículo 6. Definiciones. Para los efectos de la presente Ley, se entiende por:

Acceso libre. Régimen bajo el cual la empresa responsable de la operación de la red nacional de transmisión o de distribución, permite el acceso, conexión y uso no discriminatorio de la red de transmisión o de la de distribución, a los agentes del mercado que así lo soliciten, previo cumplimiento, únicamente, de las normas de operación que rijan tal servicio y el pago de las retribuciones económicas que correspondan.

Agentes del mercado. Empresas generadoras, cogeneradoras, autogeneradoras, transportistas, distribuidoras, los grandes clientes y las interconexiones internacionales.

Alumbrado público. Iluminación de calles y avenidas de uso público.

Autogenerador. Persona natural o jurídica que produce y consume energía eléctrica en un mismo predio, para atender sus propias necesidades y que no usa, comercializa o transporta su energía con terceros o asociados; pero que puede vender excedentes a la Empresa de Transmisión y a otros agentes del mercado.

Cliente. Persona natural o jurídica que se beneficia con la prestación del servicio público de electricidad, bien como propietario del inmueble en donde éste se presta, o como receptor directo del servicio, y cuyas compras de electricidad están sujetas a tarifas reguladas.

Cliente final. Cliente o gran cliente que compra electricidad para su uso y no para la reventa.

Cogenerador. Persona natural o jurídica que produce energía eléctrica como subproducto de un proceso industrial y cuya finalidad primaria es producir bienes o servicios distintos a energía eléctrica. Puede vender energía eléctrica a la Empresa de Transmisión y a otros agentes del mercado.

Comercialización. Venta a clientes finales. Incluye la medición, lectura, facturación y cobro de la energía entregada.

Comprador principal. Ente responsable de efectuar la licitación para la compra de energía necesaria, a fin de satisfacer las necesidades de los distribuidores durante los primeros cinco años de vigencia de esta Ley.

Despacho de carga. Operación, supervisión y control de los recursos de generación, interconexión y transmisión del sistema eléctrico interconectado, con base en la optimización de criterios técnicoeconómicos.

Distribución. Actividad que tiene por objeto el transporte de energía eléctrica y la transformación de tensión vinculada, desde el punto de entrega de la energía por la red de transmisión hasta el punto de suministro al cliente.

Ente Regulador. Es el Ente Regulador de los servicios públicos, entidad creada por la Ley 26 de 1996.

Generación. Producción de energía eléctrica por cualquier medio.

Generador. Persona natural o jurídica que produce energía eléctrica para ser comercializada.

Full document:

<https://www.panamaemprende.gob.pa/descargas/LEY%206%20DE%201997%20ELECTRICIDAD.pdf>

LEY 44
Del 5 de abril de 2011

Que establece el régimen de incentivos para el fomento de la construcción y explotación de centrales eólicas destinadas a la prestación del servicio público de electricidad

LA ASAMBLEA NACIONAL

DECRETA:

Capítulo I

Disposiciones Generales

Artículo 1. Esta Ley establece el régimen de incentivos para la construcción y explotación de centrales eólicas destinadas a la prestación del servicio público de electricidad.

Artículo 2. El régimen de incentivos que establece esta Ley tiene por objeto:

1. Propiciar la diversificación de la matriz energética del país.
2. Propiciar el abastecimiento de la demanda de los servicios de energía eléctrica con fuentes no convencionales o renovables, para el acceso de la comunidad a estos, bajo criterios de eficiencia económica, viabilidad financiera y técnica, calidad y confiabilidad de servicio, dentro de un marco de uso racional y eficiente de los diversos recursos energéticos.
3. Establecer un marco legal que fomente el desarrollo de las actividades de generación eólica.

Artículo 3. El Estado, a través de la Secretaría Nacional de Energía, promoverá el uso de fuentes nuevas, renovables y limpias para diversificar las fuentes energéticas, mitigar los efectos ambientales adversos y reducir la dependencia del país de los combustibles tradicionales.

Artículo 4. Quedan sujetas a esta Ley las personas naturales o jurídicas que construyan y exploten centrales eólicas, con sus respectivas líneas de conexión, equipos de transformación y demás componentes en el territorio de la República de Panamá, con el fin de producir energía y venderla al Sistema Interconectado Nacional.

Artículo 5. Para los efectos de esta Ley, se entiende por:

1. *Central eólica.* Conjunto de turbinas productoras de electricidad cuyo recurso energético es el viento. Esta central incluye las instalaciones auxiliares para la transformación, control y transporte de la energía hasta el punto de conexión.
2. *Energía eólica.* La obtenida del viento o energía cinética generada por efecto de las corrientes de aire y transformada en energía eléctrica.

3. *Licenciataria.* Persona natural o jurídica titular de una licencia de generación de energía eléctrica, expedida por la Autoridad Nacional de los Servicios Públicos, para la construcción, explotación, mantenimiento, generación y venta de energía.
4. *Punto de conexión.* Aquel en el que la central eólica se conecta a la red de transmisión o de distribución.

Igualmente, serán aplicables a esta Ley, en lo que corresponda, las definiciones establecidas en la Ley 6 de 1997 y el Decreto Ejecutivo 22 de 19 de junio de 1998.

Capítulo II **Licencias**

Artículo 6. Quedan sujetas al régimen de licencias la construcción y explotación de centrales eólicas destinadas a la prestación del servicio público de electricidad.

Artículo 7. Las licencias serán otorgadas por la Autoridad Nacional de los Servicios Públicos, mediante resolución motivada, y se formalizarán y registrarán previo el cumplimiento de los requisitos exigidos por la legislación vigente en materia de protección ambiental, seguridad e higiene industrial y funcionamiento de establecimientos industriales.

Otorgada la licencia, su titular quedará sujeto a las normas aplicables para la prestación de los servicios establecidos en la Ley 6 de 1997 y sus reglamentos.

La Autoridad Nacional de los Servicios Públicos reglamentará, mediante resolución motivada, los requisitos que se deberán cumplir para el otorgamiento de las licencias a las que se refiere esta Ley.

Artículo 8. Los licenciarios que, a la fecha de la entrada en vigencia de esta Ley, construyan o exploten centrales eólicas deberán aportar una fianza de cumplimiento, que garantice las obligaciones contenidas en la licencia definitiva.

La Autoridad Nacional de los Servicios Públicos y la Contraloría General de la República fijarán conjuntamente el contenido de la fianza de cumplimiento. El monto de la fianza de cumplimiento corresponderá a quinientos balboas (B/500.00) por megavatio nominal a instalar.

Artículo 9. Las centrales eólicas a las que se les aplique esta Ley quedarán excluidas de lo establecido en el numeral 10 del artículo 6 y en el numeral 7 del artículo 67 de la Ley 6 de 1997.

Capítulo III **Conexión al Sistema Interconectado Nacional**

Artículo 10. Corresponderá a la Empresa de Transmisión Eléctrica, S. A. autorizar la conexión de una central eólica al Sistema Interconectado Nacional. Dicha autorización será otorgada

siempre que no se vulneren la calidad y la seguridad del Sistema Interconectado Nacional y exista capacidad de transmisión disponible.

Artículo 11. Los licenciatarios deberán cumplir con las normas técnicas, operativas y de calidad y con el código de red que establezca la Autoridad Nacional de los Servicios Públicos para la conexión al Sistema Interconectado Nacional.

Artículo 12. Corresponderá a la Autoridad Nacional de los Servicios Públicos establecer las normas regulatorias para la conexión de pequeñas centrales eólicas a las redes eléctricas de baja tensión de las empresas de distribución eléctrica.

Artículo 13. Corresponderá a la Empresa de Transmisión Eléctrica, S.A. preparar anualmente un informe que establezca la capacidad máxima de generación eólica que puede conectarse al Sistema Interconectado Nacional a corto, mediano y largo plazo sin que se afecte la confiabilidad y seguridad del Sistema. Este informe deberá ser incluido como un capítulo del Plan de Expansión del Sistema Interconectado Nacional.

Capítulo IV **Contratos para Centrales Eólicas**

Artículo 14. Para promover proyectos de energía limpia de fuentes renovables, la Empresa de Transmisión Eléctrica, S.A. realizará actos de concurrencia para la compra de energía (kWh), exclusivos para centrales eólicas, cuyos contratos resultantes tendrán periodos de vigencia hasta de quince años.

Artículo 15. La energía total que podrá ser contratada como resultado de actos de concurrencia exclusivos para centrales eólicas no podrá ser superior al 5% del consumo anual de energía. Para tal efecto, la Empresa de Transmisión Eléctrica, S.A. solo podrá adjudicar contratos resultantes de actos de concurrencia exclusivos para centrales eólicas, si la suma de la energía prevista de los contratos a adjudicar más la energía prevista de los contratos vigentes que hayan resultado de actos de concurrencia exclusivos para centrales eólicas es menor o igual al 5% del consumo anual de energía previsto en el horizonte de contratación en el mercado mayorista de electricidad de Panamá.

No obstante lo anterior, las empresas a las que se les adjudiquen contratos resultantes de actos de concurrencia exclusivos para centrales eólicas podrán participar en todos los actos de concurrencia convocados por la Empresa de Transmisión Eléctrica, S.A.

El Órgano Ejecutivo podrá autorizar que se aumente este porcentaje cuando lo considere necesario para diversificar la matriz energética del país.

Artículo 16. La cantidad de energía a contratar, a través de los actos de concurrencia exclusivos para centrales eólicas, será determinada por la Empresa de Transmisión Eléctrica, S.A. y aprobada por la Autoridad Nacional de los Servicios Públicos.

Artículo 17. Las condiciones de contratación y las fórmulas de remuneración de la energía de dichos contratos de suministro serán reglamentadas por la Autoridad Nacional de los Servicios Públicos.

Artículo 18. Para efectos de la liquidación de transferencias, se aplicará lo dispuesto en la Ley 6 de 1997, en el Decreto Ejecutivo 22 de 19 de junio de 1998, en las resoluciones que expida la Autoridad Nacional de los Servicios Públicos y demás normas que le sean aplicables.

Artículo 19. La Empresa de Transmisión Eléctrica, S.A. preparará el pliego de cargos y efectuará la convocatoria de los actos de concurrencia para la compra de energía (kWh), exclusivos para centrales eólicas, así como la evaluación y adjudicación de los contratos de suministro correspondientes, de acuerdo con la reglamentación establecida por la Autoridad Nacional de los Servicios Públicos, y asignará dichos contratos de suministro de energía a las empresas distribuidoras para la firma y ejecución mediante resolución debidamente motivada.

Artículo 20. Los actos de concurrencia que convoque la Empresa de Transmisión Eléctrica, S.A. para la compra de energía (kWh), exclusivos para centrales eólicas, se adjudicarán por mejor precio ofertado condicionado a que los oferentes cumplan, de manera previa, con todos los requisitos que se consignan en el pliego de cargos.

Capítulo V **Incentivos**

Artículo 21. Las centrales eólicas que se amparen en los incentivos establecidos en esta Ley deberán instalar unidades de generación con altos estándares técnicos y de desempeño, acordes con las últimas tecnologías y mejores prácticas de la industria.

La Autoridad Nacional de los Servicios Públicos determinará los estándares técnicos y de desempeño mínimos que deberán cumplir las centrales eólicas que deseen beneficiarse con esta Ley.

Artículo 22. Las personas naturales o jurídicas que mantengan una licencia vigente para la construcción y explotación de centrales eólicas destinadas a la prestación del servicio público de electricidad gozarán de los siguientes incentivos fiscales:

1. Exoneración del impuesto de importación, de aranceles, tasas, contribuciones y gravámenes, así como del impuesto de transferencia de bienes corporales muebles y la prestación de servicios, que se causen por razón de la importación de equipos, máquinas,

materiales, repuestos y demás que sean necesarios para la construcción, operación y mantenimiento de las centrales eólicas. Esta disposición también se aplicará a centrales eólicas que, al momento de la entrada en vigencia de la presente Ley, se encuentran en etapa de construcción, las que tendrán un plazo de seis meses, contado a partir de la entrada en vigencia de esta Ley, para solicitar el reconocimiento de la exoneración a la Dirección General de Ingresos.

2. La utilización del método de depreciación acelerada del equipo destinado a la generación eólica para que se vea menos afectada la utilidad neta de la empresa de generación eléctrica eólica.
3. Exoneración de todo gravamen impositivo nacional, por el término de quince años, aplicable a las actividades de producción de equipamiento mecánico, electrónico, electromecánico, metalúrgico y eléctrico que realicen empresas radicadas o a radicarse, nacionales o internacionales, destinadas a la fabricación de equipos de generación eólica en el territorio nacional.
4. Exoneración del impuesto de importación, de aranceles, tasas, contribuciones y gravámenes, así como del impuesto de transferencia de bienes corporales muebles y la prestación de servicios, que se causen por razón de la importación de equipos, máquinas, materiales, repuestos y demás que sean destinados para la construcción, operación y mantenimiento de las centrales eólicas, cuando se trate de personas naturales o jurídicas que importen equipo destinado a generación eólica con la finalidad de comercializarlos.

Artículo 23. Para acogerse a los incentivos establecidos en esta Ley, las centrales eólicas deberán mantener vigente la licencia al amparo de lo establecido en la Ley 6 de 1997.

Queda entendido que las personas naturales o jurídicas que hayan solicitado licencias para la construcción y explotación de centrales eólicas con anterioridad a la entrada en vigencia de esta Ley podrán acogerse a sus incentivos.

Artículo 24. La persona natural o jurídica que tenga una licencia vigente para la construcción y explotación de una central eólica tendrá derecho al régimen de incentivos previsto en la Ley 43 de 2004 y su reglamentación, así como en cualquier otra norma vigente o que se expida para beneficiar los sistemas de generación de fuentes nuevas, renovables y limpias.

Capítulo VI Disposiciones Finales

Artículo 25. Para efectos del despacho de carga y del despacho económico, se aplicará lo previsto en la Ley 5 de 1997, en el Decreto Ejecutivo 22 de 19 de junio de 1998, en las resoluciones que expida la Autoridad Nacional de los Servicios Públicos y demás normas que les sean aplicables.

Artículo 26. Esta Ley es de carácter especial y los incentivos que establece se aplicarán, con sus límites y alcances, de manera exclusiva a las personas naturales o jurídicas que posean una licencia para la construcción y explotación de centrales eólicas; en consecuencia, estos incentivos no podrán ser extendidos a otros generadores de acuerdo con lo dispuesto en el primer párrafo del artículo 68 de la Ley 6 de 1997.

Artículo 27. Esta Ley comenzará a regir el día siguiente al de su promulgación.

COMUNIQUESE Y CÚMPLASE.

Proyecto 315 de 2011 aprobado en tercer debate en el Palacio Justo Arosemena, ciudad de Panamá, a los 7 días del mes de abril del año dos mil once.

El Presidente,

José Muñoz Molina

El Secretario General,

Walter E. Quintero G.

ÓRGANO EJECUTIVO NACIONAL. PRESIDENCIA DE LA REPÚBLICA.
PANAMÁ, REPÚBLICA DE PANAMÁ, 25 DE abril DE 2011.

RICARDO MARTINELLI BERROCAL
Presidente de la República

DEMETRIO PAPADIMITRIU
Ministro de la Presidencia

Annex # 4 – Business as Usual, and Future Business as Usual Increment Scenario

Case # 1 Business as Usual Incentive Increment																					
Month	Project	Capacity MW	Gross Generation (MWh)	Investment Cost (USD)	Kwh Generated	Generated Income (USD)	Income Tax per year (USD)	% 25 Of Investment (USD)	% 50 Of Investment (USD)	10 year Income Tax (USD)	Gross Incentive to recieve base on 25 % of investment (USD)	Gross Incentive to recieve base on 50 % of investment (USD)	Possible CDM revenues (USD)	Netto Incentive to Recieve base on 25 % of investment (USD)	Netto Incentive to Recieve base on 50 % of investment (USD)	G.10 MW or more	Constructed after Law 45 imp.	Final Incentive amount (25 % limit)	Final Incentive amount (50 %)	Tax to Pay per Year (25 % limit)	Tax to Pay per Year (50 % limit)
May	Paso Ancho	5	43000	10500000	43000000	5160000	1620291.6	2625000	5250000	1620291.6	2625000	5250000	2881000	-256000	2369000	no	yes	0	2369000	1620291.6	179791.6
June	Los Planetas I	4.76	40936	9996000	40936000	4912320	1542517.603	2499000	4998000	1542517.603	2499000	4998000	2742712	-243712	2255288	no	yes	0	2255288	1542517.603	171161.6032
August	Macano	3.43	29498	7203000	29498000	3539760	1111520.038	1800750	3601500	1111520.038	1800750	3601500	1976366	-175616	1625134	no	yes	0	1625134	1111520.038	123337.0376
September	Bajo de Mina	56	481600	117600000	481600000	57792000	18147265.92	29400000	58800000	18147265.92	29400000	58800000	32267200	-2867200	26532800	yes	yes	0	9073632.96	18147265.92	2013665.92
September	Gualaca	25.2	216720	52920000	216720000	26006400	8166269.664	13230000	26460000	8166269.664	13230000	26460000	14520240	-1290240	11939760	yes	yes	0	4083134.832	8166269.664	906149.664
January	Lorena	33.8	290680	70980000	290680000	34881600	10953171.22	17745000	35490000	10953171.22	17745000	35490000	19475560	-1730560	16014440	yes	yes	0	5476585.608	10953171.22	1215391.216
May	Chan I	222.46	1913156	467166000	1913156000	229578720	72090013.87	116791500	233583000	72090013.87	116791500	233583000	128181452	-11389952	105401548	yes	yes	0	36045006.93	72090013.87	7999287.867
July	Prudencia	56	481600	117600000	481600000	57792000	18147265.92	29400000	58800000	18147265.92	29400000	58800000	32267200	-2867200	26532800	yes	yes	0	9073632.96	18147265.92	2013665.92
August	Pedregalito	20	172000	42000000	172000000	20640000	6481166.4	10500000	21000000	6481166.4	10500000	21000000	11524000	-1024000	9476000	yes	yes	0	3240583.2	6481166.4	719166.4
October	Eólico El	80	688000	168000000	688000000	82560000	25924665.6	42000000	84000000	25924665.6	42000000	84000000	46096000	-4096000	37904000	yes	yes	0	12962332.8	25924665.6	2876665.6
December	Baitún	88.7	762820	186270000	762820000	91538400	28743972.98	46567500	93135000	28743972.98	46567500	93135000	51108940	-4541440	42026060	yes	yes	0	14371986.49	28743972.98	3189502.984
January	Cochea	12.5	107500	26250000	107500000	12900000	4050729	6562500	13125000	4050729	6562500	13125000	7202500	-640000	5922500	yes	yes	0	2025364.5	4050729	449479
October	San Bartolo	15.25	131150	32025000	131150000	15738000	4941889.38	8006250	16012500	4941889.38	8006250	16012500	8787050	-780800	7225450	yes	yes	0	2470944.69	4941889.38	548364.38
October	Las Perlas Norte	10	86000	21000000	86000000	10320000	3240583.2	5250000	10500000	3240583.2	5250000	10500000	5762000	-512000	4738000	no	yes	0	4738000	3240583.2	359583.2
October	Las Perlas Sur	10	86000	21000000	86000000	10320000	3240583.2	5250000	10500000	3240583.2	5250000	10500000	5762000	-512000	4738000	no	yes	0	4738000	3240583.2	359583.2
December	Mendre II	8	68800	16800000	68800000	8256000	2592466.56	4200000	8400000	2592466.56	4200000	8400000	4609600	-409600	3790400	no	yes	0	3790400	2592466.56	287666.56
January	Bonyic	31.3	269180	65730000	269180000	32301600	10143025.42	16432500	32865000	10143025.42	16432500	32865000	18035060	-1602560	14829940	yes	yes	0	5071512.708	10143025.42	1125495.416
January	Pando	32.6	280360	68460000	280360000	33643200	10564301.23	17115000	34230000	10564301.23	17115000	34230000	18784120	-1669120	15445880	yes	yes	0	5282150.616	10564301.23	1172241.232
January	Monte Lirio	51.6	443760	108360000	443760000	53251200	16721409.31	27090000	54180000	16721409.31	27090000	54180000	29731920	-2641920	24448080	yes	yes	0	8360704.656	16721409.31	1855449.312
January	El Alto	68	584800	142800000	584800000	70176000	22035965.76	35700000	71400000	22035965.76	35700000	71400000	39181600	-3481600	32218400	yes	yes	0	11017982.88	22035965.76	2445165.76
January	Caldera	4	34400	8400000	34400000	4128000	1296233.28	2100000	4200000	1296233.28	2100000	4200000	2304800	-204800	1895200	no	yes	0	1895200	1296233.28	143833.28
January	Las Cruces	9.17	78862	19257000	78862000	9463440	2971614.794	4814250	9628500	2971614.794	4814250	9628500	5283754	-469504	4344746	no	yes	0	4344746	2971614.794	329737.7944
January	Los Estrechos	10	86000	21000000	86000000	10320000	3240583.2	5250000	10500000	3240583.2	5250000	10500000	5762000	-512000	4738000	no	yes	0	4738000	3240583.2	359583.2
January	La Laguna	9.3	79980	19530000	79980000	9597600	3013742.376	4882500	9765000	3013742.376	4882500	9765000	5358660	-476160	4406340	no	yes	0	4406340	3013742.376	334412.376
February	RP-490	9.95	85570	20895000	85570000	10268400	3224380.284	5223750	10447500	3224380.284	5223750	10447500	5733190	-509440	4714310	no	yes	0	4714310	3224380.284	357785.284
May	Bajo Frío	56	481600	117600000	481600000	57792000	18147265.92	29400000	58800000	18147265.92	29400000	58800000	32267200	-2867200	26532800	yes	yes	0	9073632.96	18147265.92	2013665.92
June	Tizingal	4.64	39904	9744000	39904000	4788480	1503630.605	2436000	4872000	1503630.605	2436000	4872000	2673568	-237568	2198432	no	yes	0	2198432	1503630.605	166846.6048
July	Barro Blanco	28.84	248024	60564000	248024000	29762880	9345841.949	15141000	30282000	9345841.949	15141000	30282000	16617608	-1476608	13664392	yes	yes	0	4672920.974	9345841.949	1037037.949
January	San Lorenzo	8.12	69832	17052000	69832000	8379840	2631353.558	4263000	8526000	2631353.558	4263000	8526000	4678744	-415744	3847256	no	yes	0	3847256	2631353.558	291981.5584
December	Potreriillo	4.17	35862	8757000	35862000	4303440	1351323.194	2189250	4378500	1351323.194	2189250	4378500	2402754	-213504	1975746	no	yes	0	1975746	1351323.194	149946.1944
January	Pedregalito II	13	111800	27300000	111800000	13416000	4212758.16	6825000	13650000	4212758.16	6825000	13650000	7490600	-665600	6159400	no	yes	0	6159400	4212758.16	467458.16
April	Tabasará II	34.53	296958	72513000	296958000	35634960	11189733.79	18128250	36256500	11189733.79	18128250	36256500	19896186	-1767936	16360314	yes	yes	0	5594866.895	11189733.79	1241640.79
January	El Síndigo	10	86000	21000000	86000000	10320000	3240583.2	5250000	10500000	3240583.2	5250000	10500000	5762000	-512000	4738000	no	yes	0	4738000	3240583.2	359583.2
January	Chan II	214	1840400	449400000	1840400000	220848000	69348480.48	112350000	224700000	69348480.48	112350000	224700000	123306800	-10956800	101393200	yes	yes	0	34674240.24	69348480.48	7695080.48
		1250.32	10752752	2625672000	10752752000	1290330240	405176598.7	656418000	1312836000	4051765987	656418000	1312836000	720434384	-64016384	592401616			0	241104468.9	405176598.7	44959406.66

Case # 1 Future Business as Usual Incentive Increment Scenario																					
Month	Project	Capacity MW	Gross Generation(M Wh)	Investment Cost (USD)	Kwh Generated	Generated Income (USD)	Income Tax per year (USD)	% 25 Of Investment (USD)	% 50 Of Investment (USD)	10 year Income Tax (USD)	Gross Incentive to recieve base on 25 % of investment (USD)	Gross Incentive to recieve base on 50 % of investment (USD)	Possible CDM revenues (USD)	Netto Incentive to Recieve base on 25 % of investment (USD)	Netto Incentive to Recieve base on 50 % of investment (USD)	G.10 MW or more	Constructed after Law 45 imp.	Final Incentive amount (25 % limit)	Final Incentive amount (50 %)	Tax to Pay per Year (25 % limit)	Tax to Pay per Year (50 % limit)
May	Paso Ancho	5	43000	10500000	43000000	5160000	1620291.6	2625000	5250000	16202916	2625000	5250000	2881000	-256000	2369000	no	yes	0	2369000	1620291.6	179791.6
June	Los Planetas I	4.76	40936	9996000	40936000	4912320	1542517.603	2499000	4998000	15425176.03	2499000	4998000	0	2499000	4998000	no	yes	0	4998000	1542517.603	1542517.603
August	Macano	3.43	29498	7203000	29498000	3539760	1111520.038	1800750	3601500	11115200.38	1800750	3601500	0	1800750	3601500	no	yes	0	3601500	1111520.038	1111520.038
September	Bajo de Mina	56	481600	117600000	481600000	57792000	18147265.92	29400000	58800000	181472659.2	29400000	58800000	0	29400000	58800000	yes	yes	0	9073632.96	18147265.92	18147265.92
September	Gualaca	25.2	216720	52920000	216720000	26006400	8166269.664	13230000	26460000	81662696.64	13230000	26460000	0	13230000	26460000	yes	yes	0	4083134.832	8166269.664	8166269.664
January	Lorena	33.8	290680	70980000	290680000	34881600	10953171.22	17745000	35490000	109531712.2	17745000	35490000	0	17745000	35490000	yes	yes	0	5476585.608	10953171.22	10953171.22
May	Chan I	222.46	1913156	467166000	1913156000	229578720	72090013.87	116791500	233583000	720900138.7	116791500	233583000	0	116791500	233583000	yes	yes	0	36045006.93	72090013.87	72090013.87
July	Prudencia	56	481600	117600000	481600000	57792000	18147265.92	29400000	58800000	181472659.2	29400000	58800000	0	29400000	58800000	yes	yes	0	9073632.96	18147265.92	18147265.92
August	Pedregalito	20	172000	42000000	172000000	20640000	6481166.4	10500000	21000000	64811664	10500000	21000000	0	10500000	21000000	yes	yes	0	3240583.2	6481166.4	6481166.4
October	Eólico El	80	688000	168000000	688000000	82560000	25924665.6	42000000	84000000	259246656	42000000	84000000	0	42000000	84000000	yes	yes	0	12962332.8	25924665.6	25924665.6
December	Baitún	88.7	762820	186270000	762820000	91538400	28743972.98	46567500	93135000	287439729.8	46567500	93135000	0	46567500	93135000	yes	yes	0	14371986.49	28743972.98	28743972.98
January	Cochea	12.5	107500	26250000	107500000	12900000	4050729	6562500	13125000	40507290	6562500	13125000	0	6562500	13125000	yes	yes	0	2025364.5	4050729	4050729
October	San Bartolo	15.25	131150	32025000	131150000	15738000	4941889.38	8006250	16012500	49418893.8	8006250	16012500	0	8006250	16012500	yes	yes	0	2470944.69	4941889.38	4941889.38
October	Las Perlas Norte	10	86000	21000000	86000000	10320000	3240583.2	5250000	10500000	32405832	5250000	10500000	0	5250000	10500000	no	yes	0	10500000	3240583.2	3240583.2
October	Las Perlas Sur	10	86000	21000000	86000000	10320000	3240583.2	5250000	10500000	32405832	5250000	10500000	0	5250000	10500000	no	yes	0	10500000	3240583.2	3240583.2
December	Mendre II	8	68800	16800000	68800000	8256000	2592466.56	4200000	8400000	25924665.6	4200000	8400000	0	4200000	8400000	no	yes	0	8400000	2592466.56	2592466.56
January	Bonyic	31.3	269180	65730000	269180000	32301600	10143025.42	16432500	32865000	101430254.2	16432500	32865000	0	16432500	32865000	yes	yes	0	5071512.708	10143025.42	10143025.42
January	Pando	32.6	280360	68460000	280360000	33643200	10564301.23	17115000	34230000	105643012.3	17115000	34230000	0	17115000	34230000	yes	yes	0	5282150.616	10564301.23	10564301.23
January	Monte Lírio	51.6	443760	108360000	443760000	53251200	16721409.31	27090000	54180000	167214093.1	27090000	54180000	0	27090000	54180000	yes	yes	0	8360704.656	16721409.31	16721409.31
January	El Alto	68	584800	142800000	584800000	70176000	22035965.76	35700000	71400000	220359657.6	35700000	71400000	0	35700000	71400000	yes	yes	0	11017982.88	22035965.76	22035965.76
January	Caldera	4	34400	8400000	34400000	4128000	1296233.28	2100000	4200000	12962332.8	2100000	4200000	0	2100000	4200000	no	yes	0	4200000	1296233.28	1296233.28
January	Las Cruces	9.17	78862	19257000	78862000	9463440	2971614.794	4814250	9628500	29716147.94	4814250	9628500	0	4814250	9628500	no	yes	0	9628500	2971614.794	2971614.794
January	Los Estrechos	10	86000	21000000	86000000	10320000	3240583.2	5250000	10500000	32405832	5250000	10500000	0	5250000	10500000	no	yes	0	10500000	3240583.2	3240583.2
January	La Laguna	9.3	79980	19530000	79980000	9597600	3013742.376	4882500	9765000	30137423.76	4882500	9765000	0	4882500	9765000	no	yes	0	9765000	3013742.376	3013742.376
February	RP-490	9.95	85570	20895000	85570000	10268400	3224380.284	5223750	10447500	32243802.84	5223750	10447500	0	5223750	10447500	no	yes	0	10447500	3224380.284	3224380.284
May	Bajo Frío	56	481600	117600000	481600000	57792000	18147265.92	29400000	58800000	181472659.2	29400000	58800000	0	29400000	58800000	yes	yes	0	9073632.96	18147265.92	18147265.92
June	Tizingal	4.64	39904	9744000	39904000	4788480	1503630.605	2436000	4872000	15036306.05	2436000	4872000	0	2436000	4872000	no	yes	0	4872000	1503630.605	1503630.605
July	Barro Blanco	28.84	248024	60564000	248024000	29762880	9345841.949	15141000	30282000	93458419.49	15141000	30282000	0	15141000	30282000	yes	yes	0	4672920.974	9345841.949	9345841.949
January	San Lorenzo	8.12	69832	17052000	69832000	8379840	2631353.558	4263000	8526000	26313535.58	4263000	8526000	0	4263000	8526000	no	yes	0	8526000	2631353.558	2631353.558
December	Potreriillo	4.17	35862	8757000	35862000	4303440	1351323.194	2189250	4378500	13513231.94	2189250	4378500	0	2189250	4378500	no	yes	0	4378500	1351323.194	1351323.194
January	Pedregalito II	13	111800	27300000	111800000	13416000	4212758.16	6825000	13650000	42127581.6	6825000	13650000	0	6825000	13650000	no	yes	0	13650000	4212758.16	4212758.16
April	Tabasará II	34.53	296958	72513000	296958000	35634960	11189733.79	18128250	36256500	111897337.9	18128250	36256500	0	18128250	36256500	yes	yes	0	5594866.895	11189733.79	11189733.79
January	El Síndigo	10	86000	21000000	86000000	10320000	3240583.2	5250000	10500000	32405832	5250000	10500000	0	5250000	10500000	no	yes	0	10500000	3240583.2	3240583.2
January	Chan II	214	1840400	449400000	1840400000	220848000	69348480.48	112350000	224700000	693484804.8	112350000	224700000	0	112350000	224700000	yes	yes	0	34674240.24	69348480.48	69348480.48
		1250.32	10752752	2625672000	10752752000	1290330240	405176598.7	656418000	1312836000	4051765987	656418000	1312836000	2881000	653537000	1309955000			0	309407216.9	405176598.7	403736098.7

Case # 2 Business as Usual Incentive Increment Scenario																					
Month	Project	Capacity MW	Gross Generation MWh	Investment Cost (USD)	Kwh Generated	Generated Income (USD)	Income Tax per year (USD)	% 25 Of Investment (USD)	% 50 Of Investment (USD)	10 year Income Tax (USD)	Gross Incentive to recieve base on 25 % of investment (USD)	Gross Incentive to recieve base on 50 % of investment (USD)	Possible CDM revenues (USD)	Netto Incentive to Recieve base on 25 % of investment (USD)	Netto Incentive to Recieve base on 50 % of investment (USD)	G.10 MW or more	Constructed after Law 45 imp.	Final Incentive amount (25 % limit)	Final Incentive amount (50 %)	Tax to Pay per Year (25 % limit)	Tax to Pay per Year (50 % limit)
May	Paso Ancho	5	43000	10500000	43000000	5160000	1620291.6	2625000	5250000	1620291.6	1620291.6	5250000	2881000	-1260708.4	2369000	no	yes	0	2369000	1620291.6	179791.6
June	Los Planetas I	4.76	40936	9996000	40936000	4912320	1542517.603	2499000	4998000	15425176.03	1542517.603	4998000	2742712	-1200194.397	2255288	no	yes	0	2255288	1542517.603	171161.6032
August	Macano	3.43	29498	7203000	29498000	3539760	1111520.038	1800750	3601500	11115200.38	1111520.038	3601500	1976366	-864845.9624	1625134	no	yes	0	1625134	1111520.038	123337.0376
September	Bajo de Mina	56	481600	117600000	481600000	57792000	18147265.92	29400000	58800000	181472659.2	18147265.92	58800000	32267200	-14119934.08	26532800	yes	yes	0	18147265.92	18147265.92	2013665.92
September	Gualaca	25.2	216720	52920000	216720000	26006400	8166269.664	13230000	26460000	81662696.64	8166269.664	26460000	14520240	-6353970.336	11939760	yes	yes	0	8166269.664	8166269.664	906149.664
January	Lorena	33.8	290680	70980000	290680000	34881600	10953171.22	17745000	35490000	109531712.2	10953171.22	35490000	19475560	-8522388.784	16014440	yes	yes	0	10953171.22	10953171.22	1215391.216
May	Chan I	222.46	1913156	467166000	1913156000	229578720	72090013.87	116791500	233583000	720900138.7	72090013.87	233583000	128181452	-56091438.13	105401548	yes	yes	0	72090013.87	72090013.87	7999287.867
July	Prudencia	56	481600	117600000	481600000	57792000	18147265.92	29400000	58800000	181472659.2	18147265.92	58800000	32267200	-14119934.08	26532800	yes	yes	0	18147265.92	18147265.92	2013665.92
August	Pedregalito	20	172000	42000000	172000000	20640000	6481166.4	10500000	21000000	64811664	6481166.4	21000000	11524000	-5042833.6	9476000	yes	yes	0	6481166.4	6481166.4	719166.4
October	Eólico El	80	688000	168000000	688000000	82560000	25924665.6	42000000	84000000	259246656	25924665.6	84000000	46096000	-20171334.4	37904000	yes	yes	0	25924665.6	25924665.6	2876665.6
December	Baitún	88.7	762820	186270000	762820000	91538400	28743972.98	46567500	93135000	287439729.8	28743972.98	93135000	51108940	-22364967.02	42026060	yes	yes	0	28743972.98	28743972.98	3189502.984
January	Cochea	12.5	107500	26250000	107500000	12900000	4050729	6562500	13125000	40507290	4050729	13125000	7202500	-3151771	5922500	yes	yes	0	4050729	4050729	449479
Marz	Eólico II	105	903000	220500000	903000000	108360000	34026123.6	55125000	110250000	340261236	34026123.6	110250000	60501000	-26474876.4	49749000	yes	yes	0	34026123.6	34026123.6	3775623.6
October	San Bartolo	15.25	131150	32025000	131150000	15738000	4941889.38	8006250	16012500	49418893.8	4941889.38	16012500	8787050	-3845160.62	7225450	yes	yes	0	4941889.38	4941889.38	548364.38
October	Las Perlas Norte	10	86000	21000000	86000000	10320000	3240583.2	5250000	10500000	32405832	3240583.2	10500000	5762000	-2521416.8	4738000	no	yes	0	4738000	3240583.2	359583.2
October	Las Perlas Sur	10	86000	21000000	86000000	10320000	3240583.2	5250000	10500000	32405832	3240583.2	10500000	5762000	-2521416.8	4738000	no	yes	0	4738000	3240583.2	359583.2
December	Mendre II	8	68800	16800000	68800000	8256000	2592466.56	4200000	8400000	25924665.6	2592466.56	8400000	4609600	-2017133.44	3790400	no	yes	0	3790400	2592466.56	287666.56
January	Bonyic	31.3	269180	65730000	269180000	32301600	10143025.42	16432500	32865000	101430254.2	10143025.42	32865000	18035060	-7892034.584	14829940	yes	yes	0	10143025.42	10143025.42	1125495.416
January	Pando	32.6	280360	68460000	280360000	33643200	10564301.23	17115000	34230000	105643012.3	10564301.23	34230000	18784120	-8219818.768	15445880	yes	yes	0	10564301.23	10564301.23	1172241.232
January	Monte Lirio	51.6	443760	108360000	443760000	53251200	16721409.31	27090000	54180000	167214093.1	16721409.31	54180000	29731920	-13010510.69	24448080	yes	yes	0	16721409.31	16721409.31	1855449.312
January	El Alto	68	584800	142800000	584800000	70176000	22035965.76	35700000	71400000	220359657.6	22035965.76	71400000	39181600	-17145634.24	32218400	yes	yes	0	22035965.76	22035965.76	2445165.76
January	Caldera	4	34400	8400000	34400000	4128000	1296233.28	2100000	4200000	12962332.8	1296233.28	4200000	2304800	-1008566.72	1895200	no	yes	0	1895200	1296233.28	143833.28
January	Las Cruces	9.17	78862	19257000	78862000	9463440	2971614.794	4814250	9628500	29716147.94	2971614.794	9628500	5283754	-2312139.206	4344746	no	yes	0	4344746	2971614.794	329737.7944
January	Los Estrechos	10	86000	21000000	86000000	10320000	3240583.2	5250000	10500000	32405832	3240583.2	10500000	5762000	-2521416.8	4738000	no	yes	0	4738000	3240583.2	359583.2
January	La Laguna	9.3	79980	19530000	79980000	9597600	3013742.376	4882500	9765000	30137423.76	3013742.376	9765000	5358660	-2344917.624	4406340	no	yes	0	4406340	3013742.376	334412.376
February	RP-490	9.95	85570	20895000	85570000	10268400	3224380.284	5223750	10447500	32243802.84	3224380.284	10447500	5733190	-2508809.716	4714310	no	yes	0	4714310	3224380.284	357785.284
April	Eólico I E2	70	602000	147000000	602000000	72240000	22684082.4	36750000	73500000	226840824	22684082.4	73500000	40334000	-17649917.6	33166000	yes	yes	0	22684082.4	22684082.4	2517082.4
May	Bajo Frio	56	481600	117600000	481600000	57792000	18147265.92	29400000	58800000	181472659.2	18147265.92	58800000	32267200	-14119934.08	26532800	yes	yes	0	18147265.92	18147265.92	2013665.92
June	Tizingal	4.64	39904	9744000	39904000	4788480	1503630.605	2436000	4872000	15036306.05	1503630.605	4872000	2673568	-1169937.395	2198432	no	yes	0	2198432	1503630.605	166846.6048
July	Barro Blanco	28.84	248024	60564000	248024000	29762880	9345841.949	15141000	30282000	93458419.49	9345841.949	30282000	16617608	-7271766.051	13664392	yes	yes	0	9345841.949	9345841.949	1037037.949
January	San Lorenzo	8.12	69832	17052000	69832000	8379840	2631353.558	4263000	8526000	26313535.58	2631353.558	8526000	4678744	-2047390.442	3847256	no	yes	0	3847256	2631353.558	291981.5584
December	Potrillo	4.17	35862	8757000	35862000	4303440	1351323.194	2189250	4378500	13513231.94	1351323.194	4378500	2402754	-1051430.806	1975746	no	yes	0	1975746	1351323.194	149946.1944
January	Pedregalito II	13	111800	27300000	111800000	13416000	4212758.16	6825000	13650000	42127581.6	4212758.16	13650000	7490600	-3277841.84	6159400	yes	yes	0	4212758.16	4212758.16	467458.16
April	Tabasará II	34.53	296958	72513000	296958000	35634960	11189733.79	18128250	36256500	111897337.9	11189733.79	36256500	19896186	-8706452.21	16360314	yes	yes	0	11189733.79	11189733.79	1241640.79
January	El Sándigo	10	86000	21000000	86000000	10320000	3240583.2	5250000	10500000	32405832	3240583.2	10500000	5762000	-2521416.8	4738000	no	yes	0	4738000	3240583.2	359583.2
January	Chan II	214	1840400	449400000	1840400000	220848000	69348480.48	112350000	224700000	693484804.8	69348480.48	224700000	123306800	-53958319.52	101393200	yes	yes	0	69348480.48	69348480.48	7695080.48
January	Hydro A1	100	860000	210000000	860000000	103200000	32405832	52500000	105000000	324058320	32405832	105000000	57620000	-25214168	47380000	yes	yes	0	32405832	32405832	3595832
January	Eolico E3	100	860000	210000000	860000000	103200000	32405832	52500000	105000000	324058320	32405832	105000000	57620000	-25214168	47380000	yes	yes	0	32405832	32405832	3595832
Total		1625.32	13977752	3413172000	13977752000	1677330240	526698468.7	853293000	1706586000	5266984687	526698468.7	1706586000	936509384	-409810915.3	770076616			0	543250914	526698468.7	58443776.66

Case # 2 Future Business as Usual Incentive Increment Scenario																					
Month	Project	Capacity MW	Gross Generation MWh	Investment Cost (USD)	Kwh Generated	Generated Income (USD)	Income Tax per year (USD)	% 25 Of Investment (USD)	% 50 Of Investment (USD)	10 year Income Tax (USD)	Gross Incentive to recieve base on 25 % of investment (USD)	Gross Incentive to recieve base on 50 % of investment (USD)	Possible CDM revenues (USD)	Netto Incentive to Recieve base on 25 % of investment (USD)	Netto Incentive to Recieve base on 50 % of investment (USD)	G.10 MW or more	Constructed after Law 45 imp.	Final Incentive amount (25 % limit)	Final Incentive amount (50 %)	Tax to Pay per Year (25 % limit)	Tax to Pay per Year (50 % limit)
May	Paso Ancho	5	43000	10500000	43000000	5160000	1620291.6	2625000	5250000	1620291.6	1620291.6	5250000	2881000	-1260708.4	2369000	no	yes	0	2369000	1620291.6	179791.6
June	Los Planetas I	4.76	40936	9996000	40936000	4912320	1542517.603	2499000	4998000	1542517.603	1542517.603	4998000	0	1542517.603	4998000	no	yes	0	4998000	1542517.603	1542517.603
August	Macano	3.43	29498	7203000	29498000	3539760	1111520.038	1800750	3601500	1111520.038	1111520.038	3601500	0	1111520.038	3601500	no	yes	0	3601500	1111520.038	1111520.038
September	Bajo de Mina	56	481600	117600000	481600000	57792000	18147265.92	29400000	58800000	18147265.92	18147265.92	58800000	0	18147265.92	58800000	yes	yes	0	18147265.92	18147265.92	18147265.92
September	Gualaca	25.2	216720	52920000	216720000	26006400	8166269.664	13230000	26460000	8166269.664	8166269.664	26460000	0	8166269.664	26460000	yes	yes	0	8166269.664	8166269.664	8166269.664
January	Lorena	33.8	290680	70980000	290680000	34881600	10953171.22	17745000	35490000	10953171.22	10953171.22	35490000	0	10953171.22	35490000	yes	yes	0	10953171.22	10953171.22	10953171.22
May	Chan I	222.46	1913156	467166000	1913156000	229578720	72090013.87	116791500	233583000	72090013.87	72090013.87	233583000	0	72090013.87	233583000	yes	yes	0	72090013.87	72090013.87	72090013.87
July	Prudencia	56	481600	117600000	481600000	57792000	18147265.92	29400000	58800000	18147265.92	18147265.92	58800000	0	18147265.92	58800000	yes	yes	0	18147265.92	18147265.92	18147265.92
August	Pedregalito	20	172000	42000000	172000000	20640000	6481166.4	10500000	21000000	6481166.4	6481166.4	21000000	0	6481166.4	21000000	yes	yes	0	6481166.4	6481166.4	6481166.4
October	Eólico El	80	688000	168000000	688000000	82560000	25924665.6	42000000	84000000	25924665.6	25924665.6	84000000	0	25924665.6	84000000	yes	yes	0	25924665.6	25924665.6	25924665.6
December	Baitún	88.7	762820	186270000	762820000	91538400	28743972.98	46567500	93135000	28743972.98	28743972.98	93135000	0	28743972.98	93135000	yes	yes	0	28743972.98	28743972.98	28743972.98
January	Cochea	12.5	107500	26250000	107500000	12900000	4050729	6562500	13125000	4050729	4050729	13125000	0	4050729	13125000	yes	yes	0	4050729	4050729	4050729
Marz	Eólico II	105	903000	220500000	903000000	108360000	34026123.6	55125000	110250000	34026123.6	34026123.6	110250000	0	34026123.6	110250000	yes	yes	0	34026123.6	34026123.6	34026123.6
October	San Bartolo	15.25	131150	32025000	131150000	15738000	4941889.38	8006250	16012500	4941889.38	4941889.38	16012500	0	4941889.38	16012500	yes	yes	0	4941889.38	4941889.38	4941889.38
October	Las Perlas Norte	10	86000	21000000	86000000	10320000	3240583.2	5250000	10500000	3240583.2	3240583.2	10500000	0	3240583.2	10500000	no	yes	0	10500000	3240583.2	3240583.2
October	Las Perlas Sur	10	86000	21000000	86000000	10320000	3240583.2	5250000	10500000	3240583.2	3240583.2	10500000	0	3240583.2	10500000	no	yes	0	10500000	3240583.2	3240583.2
December	Mendre II	8	68800	16800000	68800000	8256000	2592466.56	4200000	8400000	2592466.56	2592466.56	8400000	0	2592466.56	8400000	no	yes	0	8400000	2592466.56	2592466.56
January	Bonyic	31.3	269180	65730000	269180000	32301600	10143025.42	16432500	32865000	10143025.42	10143025.42	32865000	0	10143025.42	32865000	yes	yes	0	10143025.42	10143025.42	10143025.42
January	Pando	32.6	280360	68460000	280360000	33643200	10564301.23	17115000	34230000	10564301.23	10564301.23	34230000	0	10564301.23	34230000	yes	yes	0	10564301.23	10564301.23	10564301.23
January	Monte Lirio	51.6	443760	108360000	443760000	53251200	16721409.31	27090000	54180000	16721409.31	16721409.31	54180000	0	16721409.31	54180000	yes	yes	0	16721409.31	16721409.31	16721409.31
January	El Alto	68	584800	142800000	584800000	70176000	22035965.76	35700000	71400000	22035965.76	22035965.76	71400000	0	22035965.76	71400000	yes	yes	0	22035965.76	22035965.76	22035965.76
January	Caldera	4	34400	8400000	34400000	4128000	1296233.28	2100000	4200000	1296233.28	1296233.28	4200000	0	1296233.28	4200000	no	yes	0	4200000	1296233.28	1296233.28
January	Las Cruces	9.17	78862	19257000	78862000	9463440	2971614.794	4814250	9628500	2971614.794	2971614.794	9628500	0	2971614.794	9628500	no	yes	0	9628500	2971614.794	2971614.794
January	Los Estrechos	10	86000	21000000	86000000	10320000	3240583.2	5250000	10500000	3240583.2	3240583.2	10500000	0	3240583.2	10500000	no	yes	0	10500000	3240583.2	3240583.2
January	La Laguna	9.3	79980	19530000	79980000	9597600	3013742.376	4882500	9765000	3013742.376	3013742.376	9765000	0	3013742.376	9765000	no	yes	0	9765000	3013742.376	3013742.376
February	RP-490	9.95	85570	20895000	85570000	10268400	3224380.284	5223750	10447500	3224380.284	3224380.284	10447500	0	3224380.284	10447500	no	yes	0	10447500	3224380.284	3224380.284
April	Eólico I E2	70	602000	147000000	602000000	72240000	22684082.4	36750000	73500000	22684082.4	22684082.4	73500000	0	22684082.4	73500000	yes	yes	0	22684082.4	22684082.4	22684082.4
May	Bajo Frío	56	481600	117600000	481600000	57792000	18147265.92	29400000	58800000	18147265.92	18147265.92	58800000	0	18147265.92	58800000	yes	yes	0	18147265.92	18147265.92	18147265.92
June	Tizingal	4.64	39904	9744000	39904000	4788480	1503630.605	2436000	4872000	1503630.605	1503630.605	4872000	0	1503630.605	4872000	no	yes	0	4872000	1503630.605	1503630.605
July	Barro Blanco	28.84	248024	60564000	248024000	29762880	9345841.949	15141000	30282000	9345841.949	9345841.949	30282000	0	9345841.949	30282000	yes	yes	0	9345841.949	9345841.949	9345841.949
January	San Lorenzo	8.12	69832	17052000	69832000	8379840	2631353.558	4263000	8526000	2631353.558	2631353.558	8526000	0	2631353.558	8526000	no	yes	0	8526000	2631353.558	2631353.558
December	Potrillo	4.17	35862	8757000	35862000	4303440	1351323.194	2189250	4378500	1351323.194	1351323.194	4378500	0	1351323.194	4378500	no	yes	0	4378500	1351323.194	1351323.194
January	Pedregalito II	13	111800	27300000	111800000	13416000	4212758.16	6825000	13650000	4212758.16	4212758.16	13650000	0	4212758.16	13650000	yes	yes	0	4212758.16	4212758.16	4212758.16
April	Tabasará II	34.53	296958	72513000	296958000	35634960	11189733.79	18128250	36256500	11189733.79	11189733.79	36256500	0	11189733.79	36256500	yes	yes	0	11189733.79	11189733.79	11189733.79
January	El Síndigo	10	86000	21000000	86000000	10320000	3240583.2	5250000	10500000	3240583.2	3240583.2	10500000	0	3240583.2	10500000	no	yes	0	10500000	3240583.2	3240583.2
January	Chan II	214	1840400	449400000	1840400000	220848000	69348480.48	112350000	224700000	69348480.48	69348480.48	224700000	0	69348480.48	224700000	yes	yes	0	69348480.48	69348480.48	69348480.48
January	Hydro A1	100	860000	210000000	860000000	103200000	32405832	52500000	105000000	324058320	32405832	105000000	0	32405832	105000000	yes	yes	0	32405832	32405832	32405832
January	Eólico E3	100	860000	210000000	860000000	103200000	32405832	52500000	105000000	324058320	32405832	105000000	0	32405832	105000000	yes	yes	0	32405832	32405832	32405832
Total		1625.32	13977752	3413172000	1397752000	1677330240	526698468.7	853293000	1706586000	526698468.7	526698468.7	1706586000	2881000	523817468.7	1703705000			0	604063062	526698468.7	525257968.7

Case # 3 Business as Usual Incentive Increment Scenario																					
Month	Project	Capacity MW	Gross Generation MWh	Investment Cost (USD)	Kwh Generated	Generated Income (USD)	Income Tax per year (USD)	% 25 Of Investment (USD)	% 50 Of Investment (USD)	10 year Income Tax (USD)	Gross Incentive to receive base on 25 % of investment (USD)	Gross Incentive to receive base on 50 % of investment (USD)	Possible CDM revenues (USD)	Netto Incentive to Recieve base on 25 % of investment (USD)	Netto Incentive to Recieve base on 50 % of investment (USD)	G.10 MW or more	Constructed after Law 45 imp.	Final Incentive amount (25 % limit)	Final Incentive amount (50 %)	Tax to Pay per Year (25 % limit)	Tax to Pay per Year (50 % limit)
May	Paso Ancho	5	43000	10500000	43000000	5160000	1620291.6	2625000	5250000	1620291.6	5250000	2881000	-1260708.4	2369000	no	yes	0	2369000	1620291.6	179791.6	
June	Los Planetas I	4.76	40936	9996000	40936000	4912320	1542517.603	2499000	4998000	1542517.603	4998000	2742712	-1200194.397	2255288	no	yes	0	2255288	1542517.603	171161.6032	
August	Macano	3.43	29498	7203000	29498000	3539760	1111520.038	1800750	3601500	1111520.038	3601500	1976366	-864845.9624	1625134	no	yes	0	1625134	1111520.038	123337.0376	
September	Bajo de Mina	56	481600	117600000	481600000	57792000	18147265.92	29400000	58800000	18147265.92	58800000	32267200	-14119934.08	26532800	yes	yes	0	18147265.92	18147265.92	2013665.92	
September	Gualaca	25.2	216720	52920000	216720000	26006400	8166269.664	13230000	26460000	8166269.664	26460000	14520240	-6353970.336	11939760	yes	yes	0	8166269.664	8166269.664	906149.664	
January	Lorena	33.8	290680	70980000	290680000	34881600	10953171.22	17745000	35490000	10953171.22	35490000	19475560	-8522388.784	16014440	yes	yes	0	10953171.22	10953171.22	1215391.216	
May	Chan I	222.46	1913156	467166000	1913156000	229578720	72090013.87	116791500	233583000	72090013.87	233583000	128181452	-56091438.13	105401548	yes	yes	0	72090013.87	72090013.87	7999287.867	
July	Prudencia	56	481600	117600000	481600000	57792000	18147265.92	29400000	58800000	18147265.92	58800000	32267200	-14119934.08	26532800	yes	yes	0	18147265.92	18147265.92	2013665.92	
August	Pedregalito	20	172000	42000000	172000000	20640000	6481166.4	10500000	21000000	6481166.4	21000000	11524000	-5042833.6	9476000	yes	yes	0	6481166.4	6481166.4	719166.4	
October	Eólico El	80	688000	168000000	688000000	82560000	25924665.6	42000000	84000000	25924665.6	84000000	46096000	-20171334.4	37904000	yes	yes	0	25924665.6	25924665.6	2876665.6	
December	Baitún	88.7	762820	186270000	762820000	91538400	28743972.98	46567500	93135000	28743972.98	93135000	51108940	-22364967.02	42026060	yes	yes	0	28743972.98	28743972.98	3189502.984	
January	Cochea	12.5	107500	26250000	107500000	12900000	4050729	6562500	13125000	4050729	13125000	7202500	-3151771	5922500	yes	yes	0	4050729	4050729	449479	
Marz	Eólico II	105	903000	220500000	903000000	108360000	34026123.6	55125000	110250000	34026123.6	110250000	60501000	-26474876.4	49749000	yes	yes	0	34026123.6	34026123.6	3775623.6	
October	San Bartolo	15.25	131150	32025000	131150000	15738000	4941889.38	8006250	16012500	4941889.38	16012500	8787050	-3845160.62	7225450	yes	yes	0	4941889.38	4941889.38	548364.38	
October	Las Perlas Norte	10	86000	21000000	86000000	10320000	3240583.2	5250000	10500000	3240583.2	10500000	5762000	-2521416.8	4738000	no	yes	0	4738000	3240583.2	359583.2	
October	Las Perlas Sur	10	86000	21000000	86000000	10320000	3240583.2	5250000	10500000	3240583.2	10500000	5762000	-2521416.8	4738000	no	yes	0	4738000	3240583.2	359583.2	
December	Mendre II	8	68800	16800000	68800000	8256000	2592466.56	4200000	8400000	2592466.56	8400000	46096000	-2017133.44	37904000	no	yes	0	37904000	2592466.56	287666.56	
January	Bonyic	31.3	269180	65730000	269180000	32301600	10143025.42	16432500	32865000	10143025.42	32865000	18035060	-7892034.584	14829940	yes	yes	0	10143025.42	10143025.42	1125495.416	
January	Pando	32.6	280360	68460000	280360000	33643200	10564301.23	17115000	34230000	10564301.23	34230000	18784120	-8219818.768	15445880	yes	yes	0	10564301.23	10564301.23	1172241.232	
January	Monte Lirio	51.6	443760	108360000	443760000	53251200	16721409.31	27090000	54180000	16721409.31	54180000	29731920	-13010510.69	24448080	yes	yes	0	16721409.31	16721409.31	1855449.312	
January	El Alto	68	584800	142800000	584800000	70176000	22035965.76	35700000	71400000	22035965.76	71400000	39181600	-17145634.24	32218400	yes	yes	0	22035965.76	22035965.76	2445165.76	
January	Caldera	4	34400	8400000	34400000	4128000	1296233.28	2100000	4200000	1296233.28	4200000	2304800	-1008566.72	1895200	no	yes	0	1895200	1296233.28	143833.28	
January	Las Cruces	9.17	78862	19257000	78862000	9463440	2971614.794	4814250	9628500	2971614.794	9628500	5283754	-2312139.206	4344746	no	yes	0	4344746	2971614.794	329737.7944	
January	Los Estrechos	10	86000	21000000	86000000	10320000	3240583.2	5250000	10500000	3240583.2	10500000	5762000	-2521416.8	4738000	no	yes	0	4738000	3240583.2	359583.2	
January	La Laguna	9.3	79980	19530000	79980000	9597600	3013742.376	4882500	9765000	3013742.376	9765000	5358660	-2344917.624	4406340	no	yes	0	4406340	3013742.376	334412.376	
February	RP-490	9.95	85570	20895000	85570000	10268400	3224380.284	5223750	10447500	3224380.284	10447500	5733190	-2508809.716	4714310	no	yes	0	4714310	3224380.284	357785.284	
April	Eólico I E2	70	602000	147000000	602000000	72240000	22684082.4	36750000	73500000	22684082.4	73500000	40334000	-17649917.6	33166000	yes	yes	0	22684082.4	22684082.4	2517082.4	
May	Bajo Frío	56	481600	117600000	481600000	57792000	18147265.92	29400000	58800000	18147265.92	58800000	32267200	-14119934.08	26532800	yes	yes	0	18147265.92	18147265.92	2013665.92	
June	Tizingal	4.64	39904	9744000	39904000	4788480	1503630.605	2436000	4872000	1503630.605	4872000	2673568	-1169937.395	2198432	no	yes	0	2198432	1503630.605	166846.6048	
July	Barro Blanco	28.84	248024	60564000	248024000	29762880	9345841.949	15141000	30282000	9345841.949	30282000	16617608	-7271766.051	13664392	yes	yes	0	9345841.949	9345841.949	1037037.949	
January	San Lorenzo	8.12	69832	17052000	69832000	8379840	2631353.558	4263000	8526000	2631353.558	8526000	4678744	-2047390.442	3847256	no	yes	0	no	2631353.558	291981.5584	
December	Potrerrillo	4.17	35862	8757000	35862000	4303440	1351323.194	2189250	4378500	1351323.194	4378500	2402754	-1051430.806	1975746	no	yes	0	no	1351323.194	149946.1944	
January	Pedregalito II	13	111800	27300000	111800000	13416000	4212758.16	6825000	13650000	4212758.16	13650000	7490600	-3277841.84	6159400	yes	yes	0	4212758.16	4212758.16	467458.16	
April	Tabasará II	34.53	296958	72513000	296958000	35634960	11189733.79	18128250	36256500	11189733.79	36256500	19896186	-8706452.21	16360314	yes	yes	0	11189733.79	11189733.79	1241640.79	
January	El Sándigo	10	86000	21000000	86000000	10320000	3240583.2	5250000	10500000	3240583.2	10500000	5762000	-2521416.8	4738000	no	yes	0	4738000	3240583.2	359583.2	
January	Chan II	214	1840400	449400000	1840400000	220848000	69348480.48	112350000	224700000	69348480.48	224700000	123306800	-53958319.52	101393200	yes	yes	0	69348480.48	69348480.48	7695080.48	
January	Hydro A1	100	860000	210000000	860000000	103200000	32405832	52500000	105000000	32405832	52500000	57620000	-25214168	47380000	yes	yes	0	32405832	32405832	3595832	
January	Eolico E3	100	860000	210000000	860000000	103200000	32405832	52500000	105000000	32405832	52500000	57620000	-25214168	47380000	yes	yes	0	32405832	32405832	3595832	
January	Eolico E4	150	1290000	315000000	1290000000	154800000	48608748	78750000	157500000	48608748	157500000	86430000	-37821252	71070000	yes	yes	0	48608748	48608748	5393748	
Total		1775.32	15267752	3728172000	15267752000	1832130240	575307216.7	932043000	1864086000	575307216.7	575307216.7	1864086000	1022939384	-447632167.3	841146616			0	586036660	575307216.7	63837524.66

Case # 3 Future Business as Usual Incentive Increment Scenario																					
Month	Project	Capacity MW	Gross Generation MWh	Investment Cost (USD)	Kwh Generated	Generated Income (USD)	Income Tax per year (USD)	% 25 Of Investment (USD)	% 50 Of Investment (USD)	10 year Income Tax (USD)	Gross Incentive to receive base on 25 % of investment (USD)	Gross Incentive to receive base on 50 % of investment (USD)	Possible CDM revenues (USD)	Netto Incentive to Recieve base on 25 % of investment (USD)	Netto Incentive to Recieve base on 50 % of investment (USD)	G.10 MW or more	Constructed after Law 45 imp.	Final Incentive amount (25 % limit)	Final Incentive amount (50 %)	Tax to Pay per Year (25 % limit)	Tax to Pay per Year (50 % limit)
May	Paso Ancho	5	43000	10500000	43000000	5160000	1620291.6	2625000	5250000	1620291.6	1620291.6	5250000	2881000	-1260708.4	2369000	no	yes	0	2369000	1620291.6	179791.6
June	Los Planetas I	4.76	40936	9996000	40936000	4912320	1542517.603	2499000	4998000	15425176.03	1542517.603	4998000	0	1542517.603	4998000	no	yes	0	4998000	1542517.603	1542517.603
August	Macano	3.43	29498	7203000	29498000	3539760	1111520.038	1800750	3601500	11115200.38	1111520.038	3601500	0	1111520.038	3601500	no	yes	0	3601500	1111520.038	1111520.038
September	Bajo de Mina	56	481600	117600000	481600000	57792000	18147265.92	29400000	58800000	181472659.2	18147265.92	58800000	0	18147265.92	58800000	yes	yes	0	18147265.92	18147265.92	18147265.92
September	Gualaca	25.2	216720	52920000	216720000	26006400	8166269.664	13230000	26460000	81662696.64	8166269.664	26460000	0	8166269.664	26460000	yes	yes	0	8166269.664	8166269.664	8166269.664
January	Lorena	33.8	290680	70980000	290680000	34881600	10953171.22	17745000	35490000	109531712.2	10953171.22	35490000	0	10953171.22	35490000	yes	yes	0	10953171.22	10953171.22	10953171.22
May	Chan I	222.46	1913156	467166000	1913156000	229578720	72090013.87	116791500	233583000	720900138.7	72090013.87	233583000	0	72090013.87	233583000	yes	yes	0	72090013.87	72090013.87	72090013.87
July	Prudencia	56	481600	117600000	481600000	57792000	18147265.92	29400000	58800000	181472659.2	18147265.92	58800000	0	18147265.92	58800000	yes	yes	0	18147265.92	18147265.92	18147265.92
August	Pedregalito	20	172000	42000000	172000000	20640000	6481166.4	10500000	21000000	64811664	6481166.4	21000000	0	6481166.4	21000000	yes	yes	0	6481166.4	6481166.4	6481166.4
October	Eólico El	80	688000	168000000	688000000	82560000	25924665.6	42000000	84000000	259246656	25924665.6	84000000	0	25924665.6	84000000	yes	yes	0	25924665.6	25924665.6	25924665.6
December	Baitún	88.7	762820	186270000	762820000	91538400	28743972.98	46567500	93135000	287439729.8	28743972.98	93135000	0	28743972.98	93135000	yes	yes	0	28743972.98	28743972.98	28743972.98
January	Cochea	12.5	107500	26250000	107500000	12900000	4050729	6562500	13125000	40507290	4050729	13125000	0	4050729	13125000	yes	yes	0	4050729	4050729	4050729
Marz	Eólico II	105	903000	220500000	903000000	108360000	34026123.6	55125000	110250000	340261236	34026123.6	110250000	0	34026123.6	110250000	yes	yes	0	34026123.6	34026123.6	34026123.6
October	San Bartolo	15.25	131150	32025000	131150000	15738000	4941889.38	8006250	16012500	49418893.8	4941889.38	16012500	0	4941889.38	16012500	yes	yes	0	4941889.38	4941889.38	4941889.38
October	Las Perlas Norte	10	86000	21000000	86000000	10320000	3240583.2	5250000	10500000	32405832	3240583.2	10500000	0	3240583.2	10500000	no	yes	0	10500000	3240583.2	3240583.2
October	Las Perlas Sur	10	86000	21000000	86000000	10320000	3240583.2	5250000	10500000	32405832	3240583.2	10500000	0	3240583.2	10500000	no	yes	0	10500000	3240583.2	3240583.2
December	Mendre II	8	68800	16800000	68800000	8256000	25924665.6	42000000	84000000	259246656	25924665.6	84000000	0	25924665.6	84000000	no	yes	0	84000000	25924665.6	25924665.6
January	Bonyic	31.3	269180	65730000	269180000	32301600	10143025.42	16432500	32865000	101430254.2	10143025.42	32865000	0	10143025.42	32865000	yes	yes	0	10143025.42	10143025.42	10143025.42
January	Pando	32.6	280360	68460000	280360000	33643200	10564301.23	17115000	34230000	105643012.3	10564301.23	34230000	0	10564301.23	34230000	yes	yes	0	10564301.23	10564301.23	10564301.23
January	Monte Lirio	51.6	443760	108360000	443760000	53251200	16721409.31	27090000	54180000	167214093.1	16721409.31	54180000	0	16721409.31	54180000	yes	yes	0	16721409.31	16721409.31	16721409.31
January	El Alto	68	584800	142800000	584800000	70176000	22035965.76	35700000	71400000	220359657.6	22035965.76	71400000	0	22035965.76	71400000	yes	yes	0	22035965.76	22035965.76	22035965.76
January	Caldera	4	34400	8400000	34400000	4128000	1296233.28	2100000	4200000	12962332.8	1296233.28	4200000	0	1296233.28	4200000	no	yes	0	4200000	1296233.28	1296233.28
January	Las Cruces	9.17	78862	19257000	78862000	9463440	2971614.794	4814250	9628500	29716147.94	2971614.794	9628500	0	2971614.794	9628500	no	yes	0	9628500	2971614.794	2971614.794
January	Los Estrechos	10	86000	21000000	86000000	10320000	3240583.2	5250000	10500000	32405832	3240583.2	10500000	0	3240583.2	10500000	no	yes	0	10500000	3240583.2	3240583.2
January	La Laguna	9.3	79980	19530000	79980000	9597600	3013742.376	4882500	9765000	30137423.76	3013742.376	9765000	0	3013742.376	9765000	no	yes	0	9765000	3013742.376	3013742.376
February	RP-490	9.95	85570	20895000	85570000	10268400	3224380.284	5223750	10447500	32243802.84	3224380.284	10447500	0	3224380.284	10447500	no	yes	0	10447500	3224380.284	3224380.284
April	Eólico I E2	70	602000	147000000	602000000	72240000	22684082.4	36750000	73500000	226840824	22684082.4	73500000	0	22684082.4	73500000	yes	yes	0	22684082.4	22684082.4	22684082.4
May	Bajo Frío	56	481600	117600000	481600000	57792000	18147265.92	29400000	58800000	181472659.2	18147265.92	58800000	0	18147265.92	58800000	yes	yes	0	18147265.92	18147265.92	18147265.92
June	Tizingal	4.64	39904	9744000	39904000	4788480	1503630.605	2436000	4872000	15036306.05	1503630.605	4872000	0	1503630.605	4872000	no	yes	0	4872000	1503630.605	1503630.605
July	Barro Blanco	28.84	248024	60564000	248024000	29762880	9345841.949	15141000	30282000	93458419.49	9345841.949	30282000	0	9345841.949	30282000	yes	yes	0	9345841.949	9345841.949	9345841.949
January	San Lorenzo	8.12	69832	17052000	69832000	8379840	2631353.558	4263000	8526000	26313535.58	2631353.558	8526000	0	2631353.558	8526000	no	yes	0 no	2631353.558	2631353.558	2631353.558
December	Potreriillo	4.17	35862	8757000	35862000	4303440	1351323.194	2189250	4378500	13513231.94	1351323.194	4378500	0	1351323.194	4378500	no	yes	0 no	1351323.194	1351323.194	1351323.194
January	Pedregalito II	13	111800	27300000	111800000	13416000	4212758.16	6825000	13650000	42127581.6	4212758.16	13650000	0	4212758.16	13650000	yes	yes	0	4212758.16	4212758.16	4212758.16
April	Tabasará II	34.53	296958	72513000	296958000	35634960	11189733.79	18128250	36256500	111897337.9	11189733.79	36256500	0	11189733.79	36256500	yes	yes	0	11189733.79	11189733.79	11189733.79
January	El Sindigo	10	86000	21000000	86000000	10320000	3240583.2	5250000	10500000	32405832	3240583.2	10500000	0	3240583.2	10500000	no	yes	0	10500000	3240583.2	3240583.2
January	Chan II	214	1840400	449400000	1840400000	220848000	69348480.48	112350000	224700000	693484804.8	69348480.48	224700000	0	69348480.48	224700000	yes	yes	0	69348480.48	69348480.48	69348480.48
January	Hydro A1	100	860000	210000000	860000000	103200000	32405832	52500000	105000000	324058320	32405832	105000000	0	32405832	105000000	yes	yes	0	32405832	32405832	32405832
January	Eólico E3	100	860000	210000000	860000000	103200000	32405832	52500000	105000000	324058320	32405832	105000000	0	32405832	105000000	yes	yes	0	32405832	32405832	32405832
January	Eólico E 4	150	1290000	315000000	1290000000	154800000	48608748	78750000	157500000	486087480	48608748	157500000	0	48608748	157500000	yes	yes	0	48608748	48608748	48608748
Total		1775.32	15267752	3728172000	15267752000	1832130240	575307216.7	932043000	1864086000	5753072167	575307216.7	1864086000	2881000	572426216.7	1861205000			0	639767310	575307216.7	573866716.7

Annex# 5 - Law 45 Regulation

REPÚBLICA DE PANAMÁ

MINISTERIO DE ECONOMÍA Y FINANZAS

DECRETO EJECUTIVO N°45

(De 10 de Junio de 2009)

Por el cual se reglamenta el Régimen de los Incentivos para el Fomento de Sistemas de Generación Hidroeléctrica y de otras Fuentes Nuevas, Renovables y Limpias, contemplados en la Ley N° 45 de 4 de agosto de 2004.

EL PRESIDENTE DE LA REPÚBLICA

En ejercicio de sus facultades legales y constitucionales

CONSIDERANDO:

Que la Ley 45 del 4 de agosto de 2004 establece un régimen de incentivos para el fomento de sistemas de generación hidroeléctrica y otras fuentes nuevas, renovables y limpias, siendo necesaria su respectiva reglamentación por parte del Órgano Ejecutivo;

Que la Ley 45 contribuye con el desarrollo del país mediante la generación de empleos y nuevas fuentes de trabajo; promueve la inversión y el desarrollo de áreas rurales deprimidas, optimiza el uso de los recursos naturales; contribuye con la protección del medio ambiente y la disminución de los efectos ambientales adversos, contribuye en la cobertura nacional de energía eléctrica y en la disminución de la dependencia de los combustibles tradicionales y en la diversificación de las fuentes energéticas del país;

Que la Ley 45 en su artículo 8 contempla, entre otros beneficios, la exoneración del pago de los cargos de distribución y transmisión a aquellos sistemas de centrales minihidroeléctricas, los sistemas de centrales geotermoeléctricas y sistemas de centrales de otras fuentes, renovables y limpias cuya capacidad instalada no sea mayor de 10 MW, y el artículo 9 de la referida Ley contempla la misma exoneración a dichos sistemas cuya capacidad sean más de 10 MW hasta 20 MW, pero solo a los primeros 10 MW, cuya exoneración está directamente relacionada con la capacidad de generar de dichas plantas;

Que de conformidad con lo establecido en los numerales 2 y 3 del artículo 10 de la Ley N° 45 de 4 de agosto de 2004 es necesaria la reglamentación correspondiente, para facilitar el funcionamiento del beneficio fiscal a que hacen referencia estos numerales, con base a la reducción de toneladas de emisiones de dióxido de carbono equivalentes (CO₂ equivalente);

Que adicionalmente el numeral 7 del artículo 10 de la referida Ley No. 45, también contiene incentivos fiscales por lo que es conveniente su reglamentación, con el objetivo de facilitar el otorgamiento del incentivo fiscal a que hace referencia este numeral, con base al valor total de la inversión directa en concepto de obras que después de la construcción de Plantas de Generación Hidroeléctrica y de fuentes nuevas y renovables se conviertan en infraestructuras de uso público;

Que es necesario apoyar el desarrollo de proyectos que reducen emisiones de gases de efecto invernadero (GEI), lo que se traduce en la disminución del combustible requerido para la generación eléctrica, los cuales califican como proyectos dentro del Mecanismo de Desarrollo Limpio del Protocolo de Kyoto, consono con los principios y lineamientos de la política nacional del ambiente;

Que el Estado tiene la responsabilidad constitucional de salvaguardar los recursos naturales que se encuentren en su territorio y regular el uso de todos aquellos recursos destinados a satisfacer las necesidades de sus habitantes, preservando siempre el medio ambiente y garantizando un desarrollo y abastecimiento sostenible;

DECRETA:

ARTICULO 1. Objetivo.

La presente reglamentación tiene la finalidad de establecer los mecanismos administrativos necesarios para acogerse a los beneficios fiscales que otorga el Artículo 10 de la Ley N° 45 de 4 de agosto de 2004.

ARTICULO 2. De los Proyectos del Sector Energía.

Se considera a los proyectos de generación de energía eléctrica provenientes de fuentes nuevas, renovables y limpias como proyectos que reducen emisiones de gases de efecto invernadero.

ARTICULO 3. De los Certificados de Reducción de Emisiones.

Se entiende que el Certificado de reducción de toneladas de emisiones de dióxido de carbono equivalentes (CER) es la constancia que acredita los beneficios ambientales de la reducción o el desplazamiento de emisiones de gases con efecto invernadero a que se refiere la Convención Marco de las Naciones Unidas para el Cambio Climático y el Protocolo de Kyoto aprobado por la República de Panamá, mediante la Ley N° 88 de 1998, debidamente certificado por entidades facultadas y capacidades para el monitoreo y verificación de los mismos.

ARTICULO 4. Del Incentivo Fiscal por proyectos nuevos o que aumenten la capacidad de generación eléctrica.

Para obtener el incentivo fiscal en el Impuesto sobre la Renta por inversión directa (con base a la reducción de toneladas de emisión de dióxido de carbono CO₂ equivalente) por el desarrollo de proyectos nuevos o que aumenten la capacidad de producción de energía de sistemas de centrales de mini hidroeléctricas, sistemas de centrales de pequeñas hidroeléctricas, sistemas de centrales hidroeléctricas, sistemas de centrales geotermoeléctricas, y sistemas de centrales de otras fuentes nuevas, renovables y limpias, a que se refiere el numeral 2 o 3, según el caso, del artículo 10 de la Ley 45 de 2004, la persona natural o jurídica correspondiente deberá solicitar, ante la Dirección General de Ingresos del Ministerio de Economía y Finanzas el incentivo fiscal que le corresponda, para lo cual deberá entregar lo siguiente:

a. El contrato de ingeniería, suministro y montaje de la obra civil y electromecánica, para el proyecto de generación de energía y/o potencia, ya construido y en operación comercial, y adjuntar un desglose de los intereses durante la construcción y los costos administrativos.

b. Declaración jurada por el concesionario o licenciatario indicando que:

- No goza de otros incentivos, exoneraciones, exenciones y créditos fiscales establecidos en otras leyes.
- Inició la construcción del proyecto en fecha posterior al 10 de agosto de 2004, fecha de vigencia de la Ley.

En adición a lo solicitado anteriormente, las autoridades podrán requerir la presentación de otros documentos que esclarezcan la determinación del incentivo fiscal correspondiente.

ARTICULO 5. Del procedimiento para el cálculo del incentivo fiscal.

La Dirección General de Ingresos del Ministerio de Economía y Finanzas remitirá a la Autoridad Nacional de los Servicios Públicos los documentos presentados por las personas naturales o jurídicas que desarrollen los proyectos correspondientes, indicados en el artículo anterior, para su revisión y el cálculo del incentivo fiscal correspondiente.

La Autoridad Nacional de los Servicios Públicos realizará las siguientes acciones:

- a) Estimar la totalidad de los MWh que serán generados durante el periodo de concesión o licencia para cada proyecto nuevo, o que aumente la capacidad de generación de sistemas de plantas de generación eléctrica que califiquen para los incentivos aludidos de acuerdo a la Ley 45 de 2004.
 - b) Aplicar una línea base para el sector eléctrico establecida por la Secretaría Nacional de Energía, en toneladas de CO₂ equivalentes por MWh.
 - c) Aplicar un precio de referencia establecido en coordinación con la Autoridad Nacional del Ambiente en US\$ (dólares de los Estados Unidos de Norteamérica) por tonelada de dióxido de carbono (CO₂) equivalente, estimado exclusivamente para el cálculo de los incentivos fiscales correspondientes.
 - d) Establecer la inversión directa de referencia por kW de capacidad instalada de generación eléctrica y/o de incremento en generación en kWh por tipo de tecnología. Se considerará inversión directa la incurrida en la ingeniería, suministro y montaje de la obra civil y electromecánica hasta la puesta en operación comercial del proyecto, sin incluir los intereses durante la construcción y los gastos administrativos correspondientes. La determinación del incentivo fiscal no comprende aquellos desembolsos en concepto de reposición, refacción o reestructuración de activos que no sirvan para aumentar la capacidad instalada de generación eléctrica y/o incrementar la generación en kWh por tipo de tecnología.
- e. Determinar el monto del incentivo fiscal de hasta el 25% de la inversión directa a aplicarse durante los primeros 10 años de operación del proyecto correspondiente.
- f) Remitir a la Dirección General de Ingresos del Ministerio de Economía y Finanzas el informe técnico del proyecto correspondiente, indicando si procede o no el reconocimiento del incentivo fiscal para su debido trámite.

La Autoridad Nacional de los Servicios Públicos anualmente fijará los valores referidos en los acápites b, c y d, y cualquier variación de los mismos, mediante resolución que será publicada en la dirección www.aspp.gob.pa y remitirá a la Dirección General de Ingresos la certificación de la vigencia de la concesión o licencia correspondiente, como requisito indispensable para la aplicación del incentivo fiscal.

ARTICULO 6. Aplicación del incentivo fiscal en el Impuesto sobre la Renta por inversión directa.

Una vez recibido el informe técnico al cual se refiere el acápite f del artículo 5 del presente Decreto Ejecutivo, la Dirección General de Ingresos procederá a la expedición del Incentivo Fiscal que corresponda reconocer exclusivamente para el pago de Impuesto sobre la Renta liquidado en la actividad, de la siguiente manera:

a. Cuando se trate del desarrollo de proyectos nuevos o que aumenten la capacidad de producción de energía de sistemas de centrales de mini hidroeléctricas y por el desarrollo de proyectos nuevos o que aumente la capacidad de producción de energía de sistemas de centrales de otras fuentes renovables de hasta 10 MW, la aplicación del crédito referido se realizará por un periodo de 10 años a partir de la entrada en operación.

A tal efecto, el crédito fiscal dimanante de la inversión directa podrá aplicarse hasta el cien por ciento (100%) del saldo que resulte de restar el impuesto causado menos el crédito de arrastre producto de impuestos pagados por adelantado.

b. Cuando se trate del desarrollo de proyectos nuevos o que aumenten la capacidad de producción de energía de sistemas de centrales de pequeñas hidroeléctricas, de sistemas de hidroeléctricas y por el desarrollo de proyectos nuevos o que aumente la capacidad de producción de energía de sistemas de centrales de otras fuentes renovables de más de 10 MW, la aplicación del crédito referido se realizará por un periodo de 10 años a partir de la entrada en operación.

A tal efecto, el crédito fiscal dimanante de la inversión directa podrá aplicarse hasta el cincuenta por ciento (50%) del saldo que resulte de restar el impuesto causado menos el crédito de arrastre producto de impuestos pagados por adelantado.

El incentivo fiscal a que se refieren los numerales 2 y 3 del artículo 10 de la Ley 45 de 2004, no podrá ser transferido, cedido, compensado, ni aplicarse en otras actividades del contribuyente. Los contribuyentes que se acojan al beneficio del incentivo fiscal indicado en estos numerales y adquieran bienes susceptibles de depreciación, no podrán deducir como gasto de depreciación el 25% del monto de los activos fijos reconocidos como incentivo, para la determinación de su renta neta gravable.

Se entiende que la depreciación será aplicada al saldo que resulte de restar del 100% de la inversión directa total realizada en la obra civil y electromecánica, el 25% del monto de los activos fijos reconocidos como incentivo fiscal.

ARTÍCULO 7. Del Control y Fiscalización de los Certificados de Reducción de emisiones de dióxido de carbono (CO₂).

El concesionario o licenciatario se compromete a llevar a cabo todos los trámites para registrar el o los proyectos, como proyectos de Mecanismo de Desarrollo Limpio (MDL), los cuales serán presentados por la ANAM como parte de la cartera de proyectos MDL del país. La Dirección General de Ingresos del Ministerio de Economía y Finanzas, llevará un control de los créditos y exenciones que de conformidad con la Ley 45 de 2004, se reconozcan y/o apliquen, así como de los Certificados de Reducción de Emisiones de Dióxido de Carbono Equivalentes (CER's de CO₂ equivalentes) que haya logrado vender el concesionario o licenciatario antes o después de haber entrado en vigencia la referida Ley, en cuyo caso irá deduciendo el monto de las ventas de estos certificados, del saldo del incentivo fiscal en el respectivo proyecto.

En atención al Artículo 12, ordinal 1, de la Ley 45 de 2004, el Concesionario o Licenciatario beneficiario de la Ley 45 de 2004, deberá colaborar, en coordinación con la Autoridad Nacional del Ambiente, con los programas y planes oficiales de mejora y conservación de la cuenca o áreas respectivas de influencia del proyecto, incluyendo, pero no limitado, a los servicios ambientales y los trabajos de reforestación o de lucha contra la erosión y desertificación, con el objeto de conservar los recursos naturales del país para las generaciones futuras. La Autoridad Nacional del Ambiente establecerá la forma, y las condiciones de la colaboración del Concesionario o Licenciatario.

Los desarrolladores de los proyectos realizados al amparo de la Ley 45 de 2004, de acuerdo al Artículo 12, ordinal 2, deberán respetar los derechos de los afectados y contemplar la adecuada mitigación de los aspectos sociales como medida indispensable para lograr la armonía entre la población, el ambiente y los requerimientos del desarrollo nacional.

ARTÍCULO 8. Del Crédito por inversión directa en infraestructuras de uso público.

La Dirección General de Ingresos reconocerá y aplicará un crédito fiscal al Impuesto sobre la Renta liquidado en la actividad en un periodo fiscal determinado, por un máximo del cinco por ciento (5%) del valor total de la inversión directa en concepto de obras, que después de la construcción de sistemas de centrales de minihidroeléctricas, sistemas de centrales de pequeñas hidroeléctricas, sistemas de centrales hidroeléctricas, sistemas de centrales geotermoelectricas y sistemas de centrales de otras fuentes nuevas, renovables y limpias, que hayan iniciado su construcción después de la entrada en vigencia de la Ley 45 de 2004, se conviertan en infraestructura de uso público, tales como carreteras, caminos, puentes, alcantarillados, escuelas, centros de salud y otras de similar naturaleza. A tal efecto, se debe solicitar el reconocimiento del crédito a la Dirección General de Ingresos del Ministerio de Economía y Finanzas y para ello se deberá:

- a. Comprobar que han construido, de conformidad con la Ley N° 45 de 2004, un sistema de centrales de mini hidroeléctricas, sistema de centrales de pequeñas hidroeléctricas, sistema de centrales hidroeléctricas, sistema de centrales geotermoelectricas, o sistema de centrales de otras fuentes nuevas, renovables y limpias.
- b. Aportar el Informe de Evaluación sobre la utilidad efectiva de operación de la infraestructura y que determine que el bien a transferir al Estado es para uso público; así como el avalúo de las mejoras. Tanto el Informe de Evaluación como el avalúo serán realizados por la entidad pública que recibe la obra correspondiente en coordinación con la Contraloría General de la República y el Ministerio de Economía y Finanzas.
- c) Pruebas autenticadas de que el debido traspaso del bien, se ha llevado a cabo sin costo alguno para el Estado.
- d) Demás requisitos legales propios de las solicitudes y peticiones.

ARTÍCULO 9. De la Exoneración de Impuestos de Importación a que alude el numeral 1 del artículo 10 de la Ley N° 45 de agosto de 2004.

El reconocimiento y aplicación de la exoneración del Impuesto de Importación, aranceles, tasas, contribuciones y gravámenes de importación se debe solicitar en forma previa ante la Autoridad Nacional de Aduanas.

Dicha solicitud debe sustentarse con certificación emitida por la Autoridad Nacional de los Servicios Públicos (ASEP) en la cual se haga constar que la persona natural o jurídica mantiene vigente una concesión o licencia al tenor de la Ley 45 de 2004. En el caso del desarrollo de centrales particulares de fuentes nuevas, renovables y limpias de hasta 500kW se

requerirá una certificación expedida por la Secretaría Nacional de Energía, que indique que la persona natural o jurídica califica para la exoneración respectiva.

ARTÍCULO 10. Vigencia. El presente Decreto Ejecutivo entrará a regir a partir de su promulgación en la Gaceta Oficial.

FUNDAMENTO DE DERECHO. Ley N° 45 de 4 de agosto de 2004.

COMÚNIQUESE Y CÚMPLASE.

Dado en la ciudad de Panamá, a los 10 días del mes de Junio de dos mil nueve (2009).

MARTÍN TORRIJOS ESPINO

Presidente de la República de Panamá

HECTOR E. ALEXANDER H.

Ministro de Economía y Finanzas