STRATEGIC GUIDELINES OF THE ENERGY TRANSITION AGENDA (2020-2030)

We will do it!

REPÚBLICA DE PANAMÁ
GOBIERNO NACIONAL

MINISTRY OF THE PRESIDENCY
SECRETARIAT OF ENERGY


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Message
Of the Secretary

Energy transition, the big opportunity that we shouldn't miss.

In the National Energy Secretariat, we set ourselves the goal to, in the first 1000 days of our government, discuss a proposal of the Energy Transition Agenda that leads the execution of policies in the short, medium and long term, whose construction has broad social, political and technical validation.

We committed ourselves from the beginning in an open and participatory configuration of the Energy Transition Agenda. That is why, we, as an official team, had different meetings and exchange ideas with various social, political, environmental companies, institutions, NGOs, and academic actors. Each of these actors has reflected on and evaluated the country's energy situation. Without this dialogue, it would have been impossible to create a truly useful, immediate, and guiding agenda. The high audience attendance and the content observed in the dialogue tables demonstrated the willingness that we as a country have to incorporate permanent participation mechanisms that favor the exchange of ideas, visions, and proposals. These dialogue tables were organized in conjunction with the United Nations Development Programme (UNDP), the Inter-American Development Bank (IDB), and with the participation of more than a hundred decision-makers who were willing to listen to each other with attention and respect.

The document that is now in your hands, formalizes the bases to formulate a participatory Energy Transition Agenda and a roadmap for the decision-making process. With the objectives of strengthening the energy sector, overcoming the obstacles that have appeared in recent years, and preparing ourselves to take advantage of the disruptive change in the world.

However, we are facing a process of technology, economic and social innovation and in the equation of sustainable development, the energy transition implies providing modern energy to those who lack it. With the installation of electricity in homes, schools, and sports centers we are offering them an opportunity to improve their life. This will ensure also an equitable development with access to modern fuels, less pollutant, free of toxic smoke to prepare their food.

It is a duty and an opportunity of all to establish a common path that allows converting the energy sector into a secure, sustainable, accessible, reliable service at affordable prices, with benefits that contribute to breaking the sixth frontier of poverty and inequality in Panama. This is the purpose why President Cortizo has called us.

Create and implement public policy that will guide us to changes in the world must not be trivial to achieve the main aims in the sector. The road to an ever-cleaner economy and free from pollutant emissions is unstoppable but it will involve significant technical, political, social, and economic efforts. **We will do it!**

Dr. Jorge Rivera Staff
National Energy Secretary

ENERGY TRANSITION
as an economic recovery mechanism **post-COVID19**

During the time that Panama applied the sanitary measures, at the most restrictive level possible, in order to protect our citizens from COVID-19 (April and May 2020), we carefully review the proposal of the Energy Transition Agenda and we indubitably confirmed that instead of affecting its viability and feasibility it will be good for us. In this new reality, an application of public policies and actions guidelines that inspire solidarity and sustainability will be needed to create employment opportunities, develop research and education entities, and create small and medium start-ups.

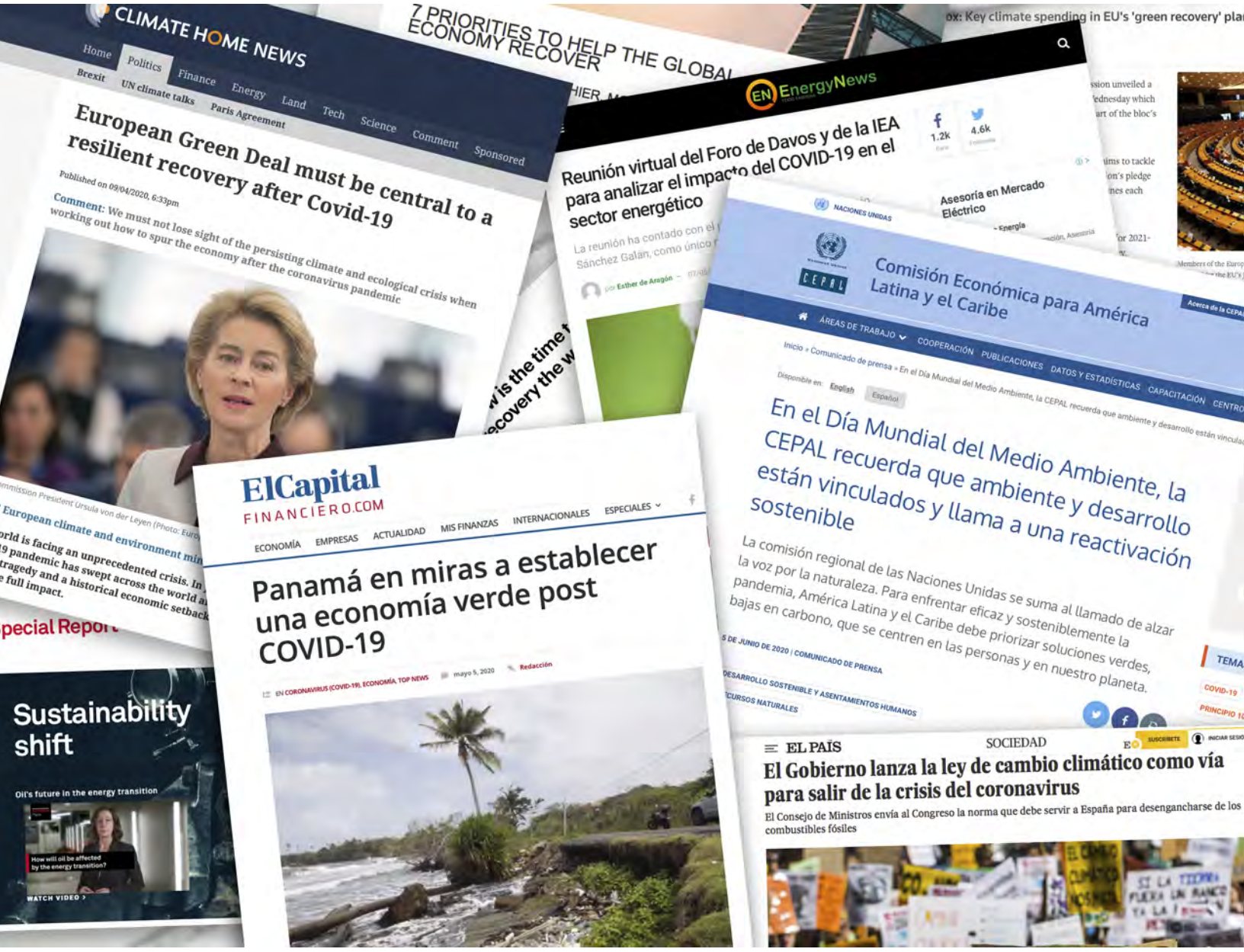
On this matter, we corroborate that we are aligned with the response to the consequences of the pandemic, which International Organizations, Countries, and Comprehensive Regions have adopted.

Panama, as well as the rest of Latin America and the Caribbean countries, have a significant advantage in terms of natural resources to implement a green recovery plan. Its great untapped potential, coupled with the motivation of several countries in the region to promote a green market, is undoubtedly attractive to project developers seeking geographic diversification and clean investments.

In this context, the energy transition agenda as a road-map sends a clear signal to the investors in moments of great uncertainty, predicted by analysts in the next years.

Having a work-specific plan under a horizon of 10 years reduces the perception of risk and attracts inversions that will create employment. These policy measures and action guidelines for energy, will not only be helpful to overtake the covid-19 crisis but also are a central core to fight against two other challenges that are still present for our generation: the climate change crisis and the inequalities that still exist.

1 https://blogs.iadb.org/energia/es/politicas-de-recuperacion-verde-y-potenciales-aplicaciones-en-america-latina/



•**These news are available in the links that you can see in the annex 2 of this document.**

Acknowledgments

The Strategic Guidelines of the Energy Transition Agenda 2020-2030 have had the contribution of various organizations, institutions, and citizens, whose contributions are a significant part of this document. Thanks in particular to the United Nations Development Programme (UNDP) and the Interamerican Development Bank (IDB) for their support from the first moment we share our vision and objectives.

In order to guarantee precision and clarity, the energy indicators prepared prior to the dialogue tables have been nurtured by joint discussions with the technical team of the Empresa de Transmisión Eléctrica S.A (ETESA) and Autoridad Nacional de los Servicios Públicos (ASEP).

Acknowledgments are also extended to each of the participants of the dialogue tables, developed for 5 days, who have helped to create this document. As well as, to those who sent their contributions during the public consultation period, after the presentation of the preliminary document, which objective was that the measures adopted with the impulse of the law or by Cabinet Resolution have the maximum participation.

Executive Summary

The starting point for the formulation of this Energy Transition Agenda is the commitment to comply with the Sustainable Development Goal of the United Nations proposed in the SDG7 and the Paris Agreement, the action plan of the President Laurentino Cortizo, the sectorial dialogue carried out in the last trimester of 2019, the NEP 2015-2050, and our comprehensive technical evaluation.

Generally, the goals involve a disengagement of the economic growth and the energy demand, with the start-up of programs that are associated with changes in energy consumer behavior.

The weight of natural gas and renewable technology increases significantly, while the demand for oil for electricity production is greatly reduced. In this context, the electricity mix will be dominated by renewable energies, although hydropower creation will continue to be fundamental in our country. Solar photovoltaic energy, wind power, the storage of energy, the digitalization of the grid, the self-supply, and even the production and use of hydrogen as fuel involve challenges to the planification and operation. An energy system like this should meet the challenge of ensuring and strengthening security supply and maintaining safe operation of the system at all times.

It is important to have policy signals or specific regulations that make it possible to reduce the demand for energy services through behavioral changes, and thereby facilitate compliance with energy-saving and efficiency objectives, beyond what technological change allows.

This Energy Transition Agenda includes sustainable mobility. Transportation has been the main responsible of the greenhouse gas emissions in Panama and we consider that the sectorial policy should be guided to create an efficient transition, in the easiest way, to the use of electric vehicles using tax incentives as a necessary tool for having sustainable mobility.

We also address energy saving and efficiency, which are fundamental in decarbonizing the economy and reducing dependence on external energy resources and price volatility.

The energy intensity in the residential sector will improve with the implementation of the Sustainable Building Regulations. The consumer will have at their disposal more efficient buildings, including social programs promoted by the National Government that will allow Panamanians to have homes built under efficiency criteria, which will produce savings in their monthly billings.

Regarding the operation of the electric system, it must allow the gradual incorporation of flexibility, a mandatory condition to facilitate the change of energy model, either with large power plants or with distributed generation, with storage, with self-consumption or without it, or under a mix of the above; without compromising the security of supply or operational security.

the transition

towards a carbon free sustainable system will change the model we know until today...

The current energy scenarios, and the future ones that arise in the energy transition, need high-level security of supply, competitivity, and sustainability. Meaning that it must have the ability to satisfy the energy demand of the consumers at any time, at a reasonable price, without producing an impact for everyone and the finance balance of the system.

The international electrical interconnections are essential to guarantee integration in the market and the creation of a single energy market. Moreover, they play an important role in reaching a decarbonized energy model adding value to the secure supply of the interconnected system.

The increase of the interconnection ability contributes to the aim of renewable participation in the energy mix. In any case, the international interconnections are special facilities with the important cost of investments, therefore a detailed analysis of cost-benefits that justifies its construction will be needed. For example, nowadays the interconnection Colombia-Panama has already been considered.

The transition to a productive system carbon-free is going to change the model that we already know. Although most of the sectors could adapt easily to these changes, even they will improve their levels of production efficiency and competitivity it is also true that other sectors or enterprises should work to adapt to these changes.

The social dimension of a fair energy transition must be completed with transparency and protection measures for the consumers and, particularly with supporting measures to the consumers considered vulnerable.

Additionally, even though the vulnerable consumers are already protected with electric subsidies as well as the use of gas for cooking, it would be convenient to analyze some aspects that would allow targeting them to the population range most in need, with the collaboration of all relevant organizations and entities.

In this sense, it is considered very important that consumers are fully informed of the conditions that entitle them to this social support, and that we advise and inform consumers about energy efficiency measures.

Finally, the Strategic Guidelines of the Energy Transition Agenda start by recognizing that the energy transition is gradual and dynamic, characterized by elements such as: the uncertainty that affects the technologies that will lead the shift towards a decarbonized energy supply in the future; the existence of multiple actors involved; the need to accumulate new theoretical knowledge; the fact that any intervention made today may bring about irreversible changes for the future, so that intergenerational interests and solidarity must be at the core of any decision-making.

It is precisely this characteristic of gradualism, which implies that in addition to all those involved in the supply chain of hydrocarbons, both liquid and gaseous, should also be incorporated into this transition process and that it manages to prepare and adapt in time to achieve optimal results in the coming years.

In view of the experience of some of the countries around us, it is advisable that the energy transition in Panama should be based on consulted elements which, in any case, should be shared by future governments in our country, so that they maintain their commitments to the objectives and strategies.

On this path, we commit ourselves to carry out the changes in a participatory, fair, and equitable manner, leaving no one behind to achieving the goals.

In addition, in order to optimize decision-making and minimize risks, it is necessary that we submit ourselves to rigorous procedures for monitoring and evaluation of results.

1 https://blogs.iadb.org/energia/es/politicas-de-recuperacion-verde-y-potenciales-aplicaciones-en-america-latina/

SUMMARY OF INTEGRAL PROCESS OF THE ENERGY SECTOR

Management of initiatives and strategy information that defines the process of elaboration and design of public policy, plans, programs and imperative guidelines, projects at all levels, that promote the integral development of the energy sector.

There is a strategic alignment among the "Conceptual Bases of the Energy Transition Agenda 2020-2030", the "Government Plan Joining Forces", contained in the "Strategic Government Plan, July 1, 2019 to June 30, 2024". https://www.gacetaoficial.gob.pa/pdfTemp/28931_A/GacetaNo_28931a_20191231.pdf

And the "National Energy Plan 2025-2050, Panama the Future we want". https://www.gacetaoficial.gob.pa/pdfTemp/28931_A/GacetaNo_28931a_20191231.pdf

RELATIONSHIP MATRIX

STRATEGIES	GOVERNMENT PLAN *"Joining Forces"*	SGP 2019-2024	DIALOGUE TABLES
UNIVERSAL ACCESS	3rd **pillar:** Competitive economy that creates employment. Area: energy 1. Expand the rural and district electrification coverage	**Strategic pillar:** Competitive economy that creates employment. Strategic area: energy Important action 85. Increase the rural and district electrification coverage. **Strategic pillar:** Fight against the poverty and inequality Strategic area: energy Priority action 125. Expand the rural and district electrification coverage.	Government proposal
RATIONAL AND EFFICIENT USE OF ENERGY	3rd **pillar:** Competitive economy that creates employment. Area: energy 6. Create an effective campaign of the rational and efficient use of the energy in the schools(energy, water, and environment)	**Strategic pillar:** Competitive economy that creates employment. Strategic area: energy/environment **Main task:** Energy6: Create an effective campaign of the national and efficient use of the energy in the schools(energy, water, and environment) Environment 3. Include the environmental education in the schooling programs.	Roundtable about the rational and efficient use of the energy.
ELECTRIC MOBILITY	3rd **pillar:** Competitive economy that creates employment. Area: environment 8. Boost a pilot scheme of electrification of the public transport	**Strategic pillar:** Competitive economy that creates employment. **Main task:** 8.Boost a pilot scheme of electrification of the public transport (electric bus, 3 line of the tube)	Discussion table of institutionalist.
DISTRIBUTED GENERATION	3rd **pillar.** Competitive economy that creates employment Area: energy 5.Update the measures, funding mechanism and technical training in order to make accessible to everyone solar panels on their houses, residences a public offices roof.	**Strategic pillar:** Competitive economy that creates employment. **Main task:** energy 5 .Update the measures, funding mechanism and technical training in order to make accessible to everyone solar panels on the houses, residences a public offices roof. Energy-9. Promote the research for development and innovation (R&d) in renewable energy. Environment 12. Promote the diversity of the matrix energy supply by boosting the renewable energy.	Dialogue table of institutionalist.
INNOVATION OF THE NIS	3rd **pillar:** Competitive economy that creates employment Area: energy 7. enforce compliance by operators with the quality standards of the public electricity service. 9. Promote the research for development and innovation (R&D) in renewable energy. 10. Encourage the independent commercialisation as an alternative for the effective competence that will reduce the prices. Area: environment 12. Promote the diversity of the matrix energy by boosting the renewable energy	**Strategic pillar:** Competitive economy that creates employment. Strategic area: energy/public infrastructure. **Main task** Energy-4: Guarantee an efficient process of ETESA in its role of the high voltage transmission. Public infrastructure 1. Strategic planification in the public investments, following the economic development and social pillar of the country.	Discussion table of institutionalist. Discussion table of the energy matrix supply and environment taxes. Discussion table of the grid Discussion table of energy tender.
INSTITUTIONAL STRENGTHENING	3rd **pillar:** competitive energy that creates employment. Area: energy 2. Strengthen the Energy Secretariat as an entity of the public policy about energy. 3. Have an effective coordination and planification from the Energy secretariat and an efficient audit from the ASEP. 4.Guarantee an efficient process of ETESA in its role of the high voltage transmission. 8. Strengthen in a technical, administrative, and budgetary way the Centro Nacional de Despacho (CND)	**Strategic pillar:** The good government **Main task:** 1. Create a strengthen program of the planification skills. 2. Develop some methodological guides to formulate the strategic plan, public polies, programs, and projects. 3.Create a performance evaluation system for government management, a tool to evaluate the performance of public investment by obtaining key performance indicators for plans, programmes, and projects. **Strategic pillar.** 2. Strengthen the Energy secretariat as an entity of the public policy about energy. 3. Have an effective coordination and planification from the Energy Secretariat and an efficient audit from the ASEP.	Discussion table of institutionalist Discussion table of rational and efficient energy use.

CHAPTER one

General context

It is only possible to understand the challenge that entails the design of an energy policy in Panama, analyzing the circumstances of the current sector. As well as the trends in long term at a national and international level.

In recent years, the international energy situation has been marked by different phenomena. First, we have seen a technological revolution in the renewable energy field. Also, non-tradition fossil fuel, like shale gas, is changing the historical component of the energy matrix of the countries.

Added to the impact of these technological changes is the growth in the exchange of energy in international markets, through regional energy integrations. On the other hand, the incorporation of electricity into new activities lays out challenges related to the increasing of the electricity demand and the energy efficiency potential.

A third phenomenon is the concern of the international community that seeks to decarbonize the world energy matrix in order to sufficiently reduce greenhouse gas emissions, fight against climate change and global warming.

IMPORTS AND EXPORTS

MWh 2020

	EXPORTS	IMPORTS
JANUARY	40,463.89	45,086.38
FEBRUARY	50,897.51	10,832.32
MARCH	60,614.07	14,370.84
APRIL	49,928.06	1,378.41
MAY	59,029.83	615.43
JUNE	48,508.79	9,894.06
TOTAL	**309,442.15**	**82,177.44**

Source: Monthly report of ASEP

We are facing an imminent change in the global oil market, which with the impact of the Covid19 pandemic has only been accelerated. Foremost, the gradual but steady decline of oil as a fossil energy source concentrated in regions of dominant economic and political power, represented by its producers (USA, Middle East, Russia). On the other hand, the electrification of the economy consolidates the strategic importance of interconnected regional electricity systems and markets interconnected by high voltage transmission networks, where the primary sources are much more diversified (wind, water, sun, sea, hydrogen), and the technological, digital and knowledge components are becoming an asset (batteries, panels, applications, smart meters, 5G telecommunications networks, among others).

Additionally, we must consider the impressive resurgence of the role of green hydrogen gas, as a fuel in the XXI century, in those activities where electrification is not competitive.

In this new model, we can find two main characteristics that shape the most important geopolitical adjustment since the end of the cold war. First, the increasingly consolidated role of the People's Republic of China as the biggest supplier of materials, products, technology, equipment, and supplies for the electric and digitals system. Secondly, the weight of the environmental agreements regarding the fight against climate change.

In this new geopolitical context, the objective of this transition agenda is for Panama to consolidate itself as a regional hub for green energy, not only in infrastructure or services but also in the generation of knowledge, taking advantage of the appropriate energy policy measures and our geographical position as the main natural resource.

The current scenario in our country shows us that during the first semester of 2020, 60% of the electric generation came from renewable energy sources (primary hydroelectric power, wind power, and solar power), and the rest from fossil resources and to a lesser extent self-consumption.

The figures publicized at the website of the Autoridad de los Servicios Públicos (ASEP) informed that Panama has an installed power of 270 MW of wind power, 194 MW from solar parks, and 38MW from solar energy in self-consumption status.

The entry of natural gas would allow the substitution of coal and oil for a less polluting source in hopes that the prices of renewable energy, particularly solar, can be sufficiently competitive so that their use becomes massive.

The entrance of natural gas would allow the substitution of coal and oil for a less polluting source in hopes that the prices of renewable energy, particularly solar, can be sufficiently competitive so that their use becomes massive.

Additionally, renewable energies depend on the natural cycles (night-day, local weather), therefore their availability is variable and intermittent, which makes it necessary to have more backup power plants to ensure continuity of service.

Backup power plants signify an additional cost to remunerate standby power plants (gas, oil, or hydroelectric plant) or battery systems, which would only operate when there is no wind or sun. Natural gas power plants could fulfill this role.

However, an important challenge to emphasize is that electricity generation is not the main emitter of greenhouse gases (GHG) in Panama, or of other pollutants that come from the energy system. The Republic of Panama imports 22 million barrels of oil equivalent (BOE) (finished products such as gasoline, diesel, bunker), which only 10% corresponds to the consumption of power plants (this can vary between 8-12% depending on the hydrology).

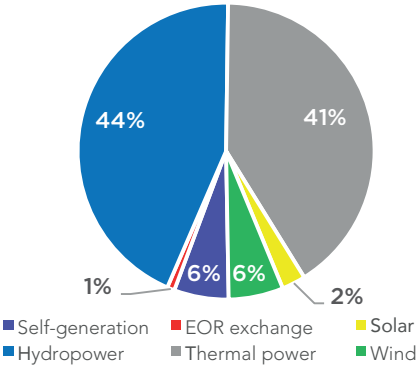
65% of the consumption of petroleum-derived fuels (diesel and gasoline) in Panama is attributed to the almost 1 million motor vehicles (private vehicles, buses, trucks) that circulate on the streets of our country.

It is important to underline that the transportation sector represents 51% of the national emissions (preliminary data) according to the Inventory of Greenhouse Gases of the Energy Sector of 2017, developed by the Ministry of Environment and the National Energy Secretariat.

Moreover, vehicles are also the largest emitters of particles and other pollutants in addition to producing other harmful effects on health (e.g. noise). Therefore, if we want to reduce emissions and improve the quality of urban life, the priority falls on the transportation sector.

Panama has the largest wind farm in Central America (270 MW). Also, even though solar generation still represents a small contribution to the grid it is rapidly increasing its usage in residential and businesses due to the regulatory incentives within the distributed generation sector.

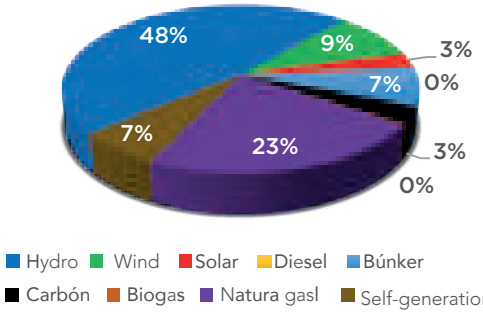
ELECTRICITY GENERATION BY TECHNOLOGY BY 2019



Source: ASEP report

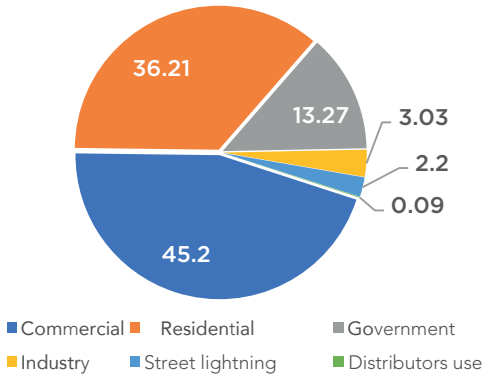
ELECTRICITY GENERATION BY TECHNOLOGY 1st SEMESTER of 2020

Total: **5 326 GWh**



Source: ASEP report

DISTRIBUTION OF ENERGY SALES BY CONSUMER SECTOR YEAR 2019



Source: ASEP report

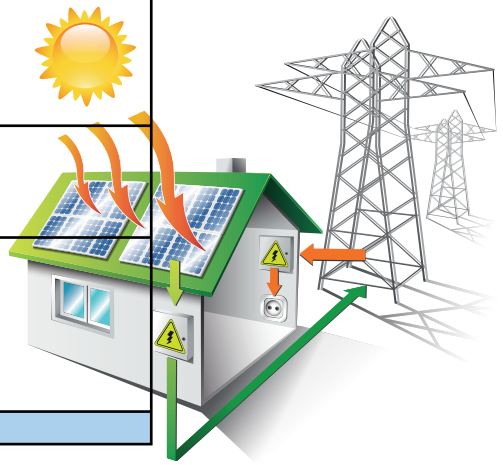
It is expected, before the end of 2020, the entry of a 66 MW wind farm located in the province of Coclé, and more than 150 MW from solar PV parks in the provinces of Chiriquí, Coclé, and Herrera. The increase of solar panels will continue as long as their prices remain low enough to compete with the conventional electricity supply.

According to preliminary data based on the monthly inventory of electricity generation developments, COVID-19 mitigation efforts have causes delays in the commercial operation dates of several contemplated power generation projects. Based on average delays, these projects will start operating in 2021.

One aspect to consider for the deployment of solar energy in housing architecture. It was never thought that roofs could be used to place electricity generators. At present, the construction of individual, multi-family, and neighborhood homes is not designed for the installation of solar panels on their roofs. In addition, the slope of the roof is important for optimal use of the radiation. Therefore, we must think of new cities and new ways of constructing homes and buildings to ensure solar panels' success.

PHOTOVOLTAIC SYSTEMS INSTALLED FOR SELF-CONSUMPTION

ENTERPRISE/RATE	NUMBER OF CLIENTS	INSTALLED CAPACITY (kW)	PERCENTAGE OF INSTALLED CAPACITY
EDECHI	**110**	**4,506**	
BTD	17	1,642	
BTH	3	164	**11.9%**
BTS	82	1,249	
MTD	8	1,451	
EDEMET	**592**	**18,702**	
BTD	98	9,335	**49.2%**
BTS	457	3,337	
MTD	37	6,031	
ENSA	**274**	**14,813**	
BTD	68	8,608	
BTH	1	12	**39.0%**
BTS	187	1,622	
MTD	17	4,491	
MTH	1	80	
TOTAL	**976**	**38,021**	**100%**



Source: ASEP- September 2020

The National Energy Secretariat considers that energy efficiency plays an important role from a public policy point of view. In this sense, the labeling program for the importation of energy-efficient appliances was launched in January 1st, 2020. In June 2019 with the objective to incentive a more rational use of energy and to reduce our carbon footprint, the Sustainable Building Regulation for new constructions was approved and the National Electric Mobility Strategy was presented to the Cabinet Council.

The next steps are a labelling plan for transportation vehicles and tax incentives for the acquisition of electric and hybrid vehicles by Panamanians. The commitments made by our country in the Paris Agreement are contained in what is known as the Nationally Determined Contributions (NDC). This is an ethical commitment, not mandatory, in our country and does not imply sanctions for non-compliance.

Meanwhile, the current commitment of the Republic of Panama in this regard is that 30% of the installed capacity of the electricity matrix should come from other renewable energy sources such as wind, solar and biomass. It is important to note that the NDC is currently under review and update with a view to increasing its ambition. This is why, from the energy sector, we are at the right time to positively influence the technological development that leads to

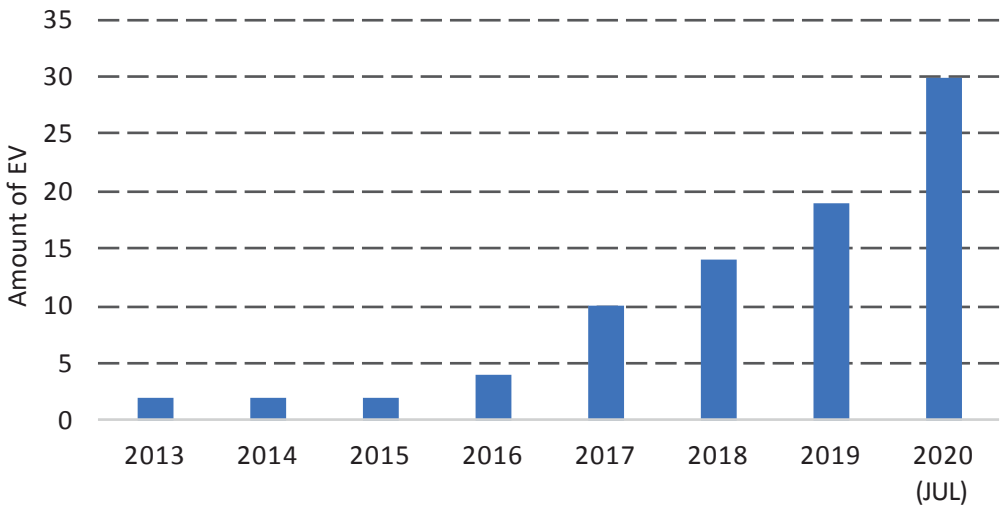
decarbonization, coupled with digitization giving us the way to implement the energy transition and thus actively contribute to the mitigation of climate change.

The National Energy Secretariat establishes the guidelines for energy policy in the long-term in a market economy environment. In this sense, it is not a centralized and mandatory planning process in which the State decides when, where, what size, and what technology new plants will be built.

In accordance with our laws, investments in generation are at the risk of the private sector through a public bidding scheme for the best price offered. The expansion plans seek to anticipate in the long-term the main sectoral trends to establish public policies that guide private and public investment to achieve sustainable development of the energy sector.

The massification of renewable energies requires a revision of the entire energy system, not just electricity. From a public policy point of view, it is necessary to review laws and propose new ones as well as review taxes, incentives, and subsidies that distort the market. On the other hand, adopt new norms and regulations in all sectors of the national economy with a long-term perspective in a highly variable international landscape, in a country that currently depends on energy imports.

Amount of Electrical Vehicles in Panama



Source: Statistic updated in July 2020-ADAP

Environment and Energy Transition

NDC – ENERGY- ENERGY TRANSITION AGENDA 2030

In 2015, at COP21 in Paris, states parties of the United Nations Framework Convention on Climate Change (UNFCCC) adopted the Paris Agreement, which establishes a global framework to avoid the dangers of climate change by limiting global average temperature under 2°C and making efforts to limit it to 1.5°C. It also aims to strengthen the capacity of countries to cope with the impact of climate change and support them with their efforts.

The Republic of Panama ratifies the Paris Agreement with Law Nº 40 of September 12, 2016, and submitted to the UNFCCC Secretariat its First Nationally Determinate Contribution (NDC1) in April 2016. This action was consistent with the provisions of paragraph 22 of Decision 1 /CP.21, which "invites the Parties to communicate their First Nationally Determined contribution no later than the date of submission of their respective instrument of ratification, acceptance, approval or accession to the Paris Agreement."

Objective

Enhance countries capabilities to face the impact of Global Warming and support their efforts.

In the NDC1, Panama presents post-2020 commitments in the Energy and Land Use and Land-Use Change and Forestry sectors, through public policies focused on emissions reduction and absorption of greenhouse gases (GHG) with targets to 2050.

Specifically for the energy sector, the contribution to climate change mitigation was based on the promotion of the use of other types of renewable energy sources: "by 2050, 30% of the installed capacity of the electricity matrix should come from other types of renewable energy sources"; requiring an investment of approximately 2,232 million US dollars.

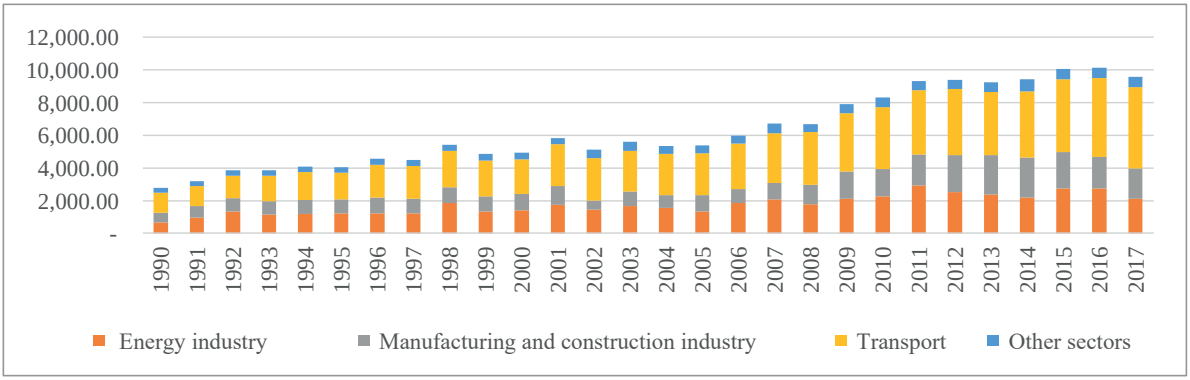
To achieve its ambitious long-term goals, the Paris Agreement included a five-year cycle to increase the ambition of the climate action over time. On this matter, Panama has arranged international no reimbursable financing through technical assistance with the help of international organizations in order to update its NDC and increase ambition.

In the Energy Sector, the aim is to meet the goal mention above, by even increasing the ambition, as part of the update process of the NDC of the Paris Agreement. This involves the review and update of the goals included in this report and the creation of a tool to monitor the measures and progress of the goals included.

For this purpose, the following activities are being carried out: Construction of the sectoral inventory time series, Development of the Trend Scenario, Moderate Scenario, Panama Zero Carbon Scenario, and definition of the contribution and percentage of emissions reduction in the sector.

As a reference, it is shown the behavior of the energy sector emissions (Figure, from 1990 to 2006 a constant fluctuation is observed. However, from the 2007 to 2016 there is a constant increase caused mainly by the increase in electricity demand and number of vehicles in circulation. In 2017, there is a decrease principally caused by the increase of renewable sources in electricity generation.

Figure. Total GHG emissions from Fuel Burning Activities (kt CO2 eq).



By subcategory, series 1990-2017. Source: self-elaboration of the Department of Climate Change of the Ministry of Environment with the support of the Department of Electricity of the NES.

DIALOGUE TABLES:

Energy Transition: We will do it!

The Energy Transition is a reality!

The transition towards decarbonization, digitalization and a democratization will imply changes in the way energy is produce and consumed. On September 23, for 5 consecutive days, experts and society, with the facilitation of the United Nations Development Program, participated in the dialogue tables of the **"Energy Transition: We will do it!**

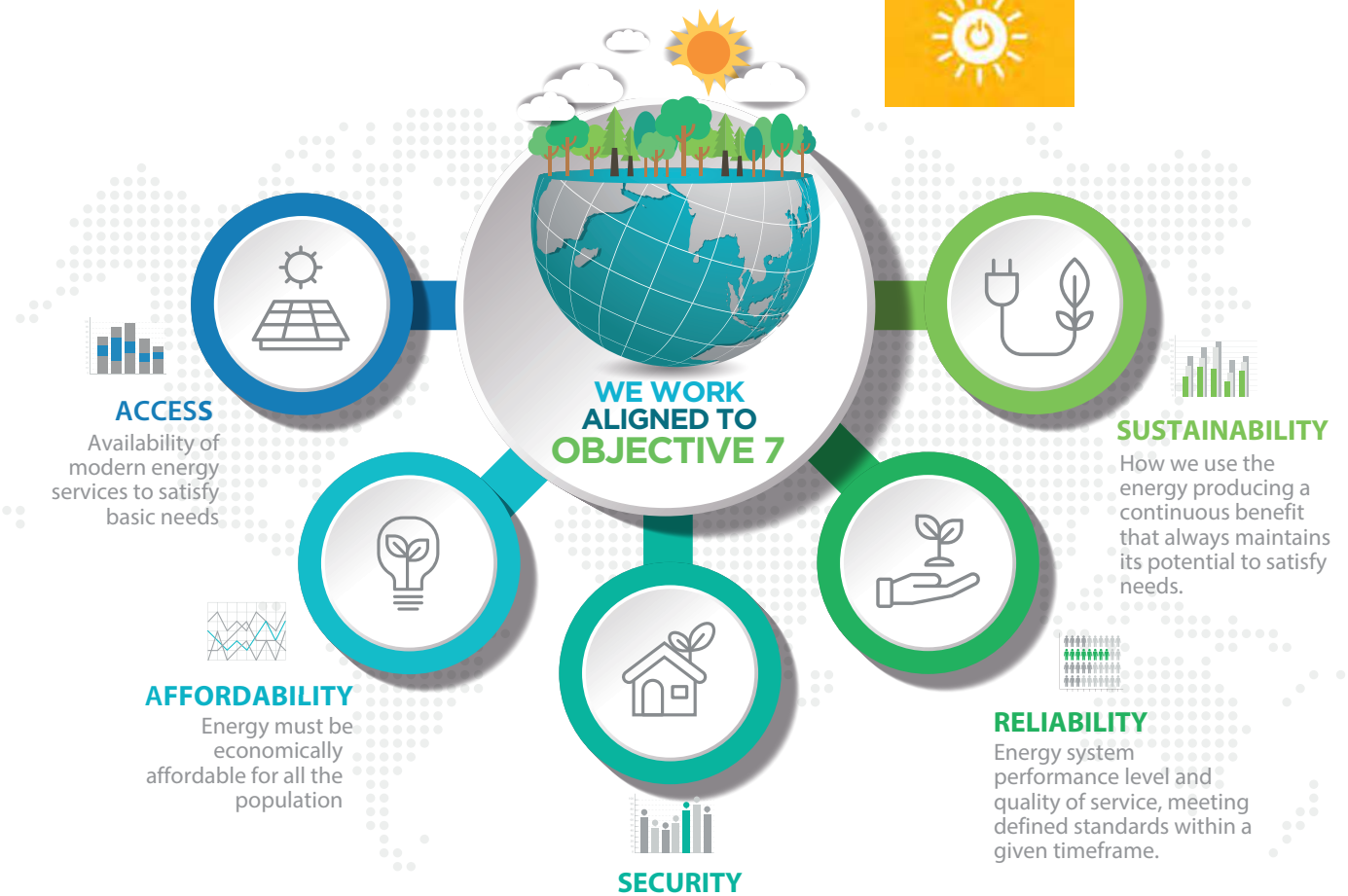
The transition towards decarbonization of our energy model is nowadays, a reality and this transformation must be solid and flexible. A planned transformation that will require all available technologies to ensure the supply at all times.

This new model presents important challenges which demand extensive analysis and discussions. Doctor Pablo Corredor and engineer Javier Rodriguez, specialists in the electricity and hydrocarbon sector respectively, opened the conference by laying out some of the main subjects to be covered:

How can a balance "polluter pays" principle be designed? What role will consumers play in the future? How could the environmental tax be proposed to send correct signals to the market? How to accelerate electric mobility?

Complete report of the dialogue tables:
http://www.energia.gob.pa/2019/10/mesas-de-dialogo/

FOR THE DEVELOPMENT OF THE DIALOGUE TABLES, WE FOLLOW THE SUSTAINABLE DEVELOPMENT GOALS USING THE PILLARS OF THE SDG7



ACCESS
Availability of modern energy services to satisfy basic needs

AFFORDABILITY
Energy must be economically affordable for all the population

SECURITY
Effective management of the energy offer from national or foreign origin to satisfy the current and future needs of the society.

RELIABILITY
Energy system performance level and quality of service, meeting defined standards within a given timeframe.

SUSTAINABILITY
How we use the energy producing a continuous benefit that always maintains its potential to satisfy needs.

Methodology

The development of the dialogue tables is based on an exhaustive prioritization of issues in the electricity and hydrocarbons sector, identified through the application of a survey to 129 actors linked to the energy sector.

In this context, the necessity of developing an agenda that presents a guiding principle of the energy transition actions is presented.

This document sets out the main results, to become a guide for its future extension. Its consists of two stages:

First Stage:

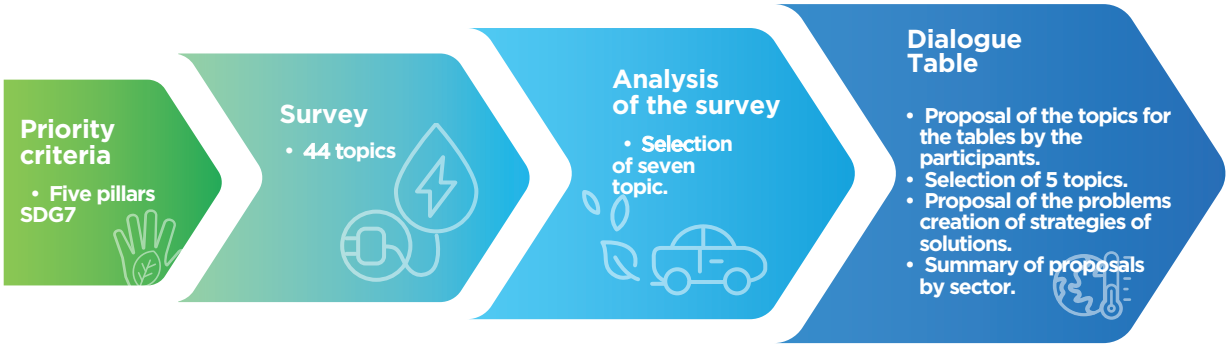
- Survey
- Data and analysis search
- Experts evaluation, dialogue tables and consensus

Second Stage:
1) Planning and preparation
2)Implementation

The activities of the first stage were done during the organization and development of the dialogue table.

Regarding the Planning and preparation stage, the present document contains a list of actions that must be carried out to achieve the objectives and deadlines, taking into account the interconnections between them and the identification of the actors.

STEPS FOR THE PRODUCTION OF THE ENERGY TRANSITION AGENDA



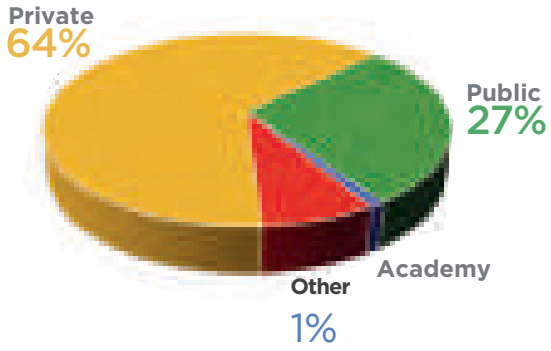
Participants

Representatives of companies, unions, associations, banks, academia, multilateral organizations, and local authorities, with decision-making power, both from the electricity and hydrocarbon sectors, were part of a dynamic group of participants.

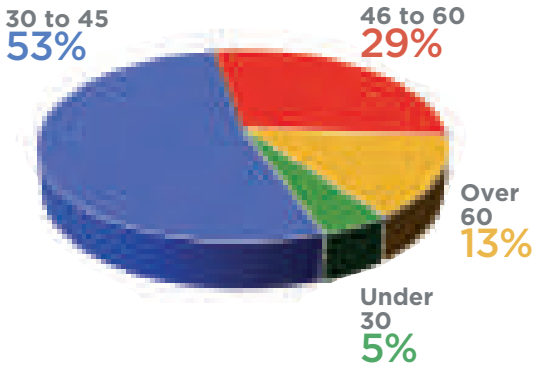
Various technical, politic, legal, financial, market, organizational requirements were part of the dialogue tables.

During the week of work there were a total of 198 participants, the charts show participation according to work setting, age range, and genre.

WORK SETTING PARTICIPATION

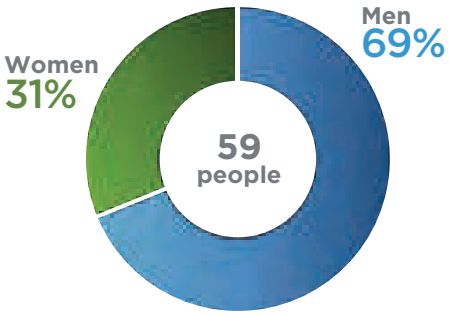


PARTICIPATION ACCORDING TO AGE



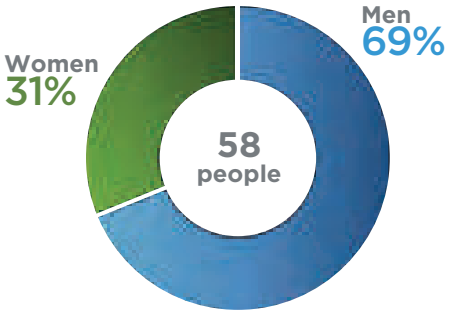
GENDER DISTRIBUTION

HYDROCARBON SECTOR



GENDER DISTRIBUTION

ELECTRICITY SECTOR



In terms of gender, 37% of the participants were women during the 5 days of the dialogue tables. We segregated participation by gender in the electricity and hydrocarbons sector working groups, as shown in the graphs. It should be noted that when analyzing the participation of women in both working groups, it is evident that we face the challenge of achieving gender equity. This becomes a task for all of us, to build the policy in a participatory way that will allow it to give greater prominence to women in the energy sector.

Natural Gas Power Plant

First in Central America located in the Province of Colon.

CHAPTER two

INSTITUTIONAL STRENGTHENING STRATEGY

The current National Energy Secretariat (NES) began its management with the creation of spaces for dialogue between the relevant direct and indirect actors in the sector, with the hope that this action allows the unification of visions, joint planning, and the search for standardization of norms, always with the welfare of the population as an end goal.

As a result of this effort, we have laid the foundations to work aligned with the Empresa de Transmisión Eléctrica, S.A. (ETESA, Autoridad de los Servicios Públicos (ASEP), the Ministry of Social Development (MIDES), the Ministry of Environment (Mi Ambiente), the Office of Rural Electrification (OER), the Ministry of Economy and Finance (MEF), and the Ministry of Education (MEDUCA), among others, to link efforts and improve our operations in order to achieve our goals.

The primary objective of the Institutional Strengthening Strategy is to propose, with a short and long-term vision, measures and principles to improve the formulation and execution of policies, and the sectoral planning, regulation, oversight and operation. In addition, from a transversal point of view, promote R&D&I activity, transparency and the participation and accountability of all the agents involved. In this way, it is proposed to recover predictability, capacity to attract investment, and the approach towards sustainable development.

The strengthening proposal seeks to: adapt institutions to the changes and new challenges that have arisen in the last decade; stipulate the role of each institution and the effective and open interaction between institutions; and align and harmonize the institutional framework to the planning and implementation of energy policies appropriate to our characteristics.

The institutional strengthening that this coordination produces in compliance with the mandates of each entity, allows us to include in this document and therefore in our work plans the Institutional Strengthening Strategy, for the execution of measures to be taken in the short, medium, and long term in order to meet the needs of our population.

Likewise, when talking about institutionalism, we must include a close relationship with international organizations such as SICA, ECLAC, IDB, USAID, OLADE, WB, UNDP, CABEI, CAF, IRENA, IEA, UNEP, CIDES, IEEE, WEC, among others.

Considering the importance of this instrument for the coordination of efforts, meetings of the "Energy Cabinet" were established, conform of public entities related to the sector, who under permanent coordination, communication and monitoring channels continuously follow up on the progress of indicators and goals.

The main action guidelines identified to strengthen the institutional framework are:

- Revision of the institutional framework
- Energy planning
- Energy information system
- Digitalization of NES processes
- Energy culture
- Strategic Communication - transversal to all of the above

the institutional strengthening proposal seeks to: adapt institutions to the changes and challenges that have emerged in the last decade; stipulate the role of each institution and the effective and open interaction between the institutions...

In the medium term, the country is envisioned as the Energy Hub, developing electricity based on renewable energy, hydrogen, and/or biofuels in the region; taking advantage of the geographical position and the vast experience in logistics and financial activities; and the application and dissemination of knowledge.

The development of a roadmap will be necessary to prepare technical, economic, and legal feasibility studies for the introduction of hydrogen and other green sources in the energy supply for the domestic market, as well as the development of an international market based in Panama. Likewise, the technical basis will allow us to identify and develop the legal and regulatory instruments necessary for the green hub to become a reality in the medium term.

In this sense, the institutional strengthening of the energy sector requires the adoption of tools for the systematization of the projects contained in the action guidelines of the electricity and hydrocarbon sub-sectors.

Complementary to the above, we present the details of these action guidelines.

ACTION GUIDELINES	VALUE PROPOSAL	NATIONAL INDICATORS TO BE IMPACTED	AXES	OBJECTIVES	ACTORS
INSTITUTION STRENGTHENING	The NES is the governing body of our country's energy policies, so it must be robust enough to constantly monitor, analyses, and project the sector's situation. By strengthening the institution with the necessary infrastructure, training technical staff and digitalizing information, we will be able to respond to the country's energy needs. The Institutional Strengthening Strategy will allow us to fulfill our role more efficiently.	1. Research and development expenditure (% of GDP) 2. Energy performance indicators 3. Installed STI infrastructure 4. Citizen participation in energy culture and education (number of activities implemented per year) 5. Regulation supporting energy efficiency, access and renewable energy (ratified/non-ratified) 6. Quality of education (% of energy topics in the academic curriculum) 7. Transparency and policy stability (transparency indicators) 8. Waiting time for fuel quality approvals, import and use of fuels	4D	Review of the institutional framework	NES, ASEP, ETESA
			1D	Energy planning	NES, MEF, INEC, MIN . PRESIDENCY
			2D	Energy information system	NES, MI AMBIENTE, INEC/CONTRALORIA
			2D	Digitalization of NES processes	NES, MIN. PRESIDENCY, AIG
			2D	Inspection	NES, MICI, MI AMBIENTE, MI NSA, ACODECO, BCBP, UTP, Hydrocarbons´ market stakeholders
			4D	Energy Culture	NES, MIN. OF THE PRESIDENCY, MIN. OF CULTURE, MEDUCA

STRATEGIC COMMUNICATION	Communication in the public administration must respond to the need to fulfill and satisfy the citizens' right to be informed and to inform management.	Communication has a fundamental strategic dimension, it links the entity with its environment and facilitates the execution of its internal operations, providing the user with the necessary information.	1. Creation of a favourable environment in the networks and mass media on responsible consumption, savings, efficiency, renewable energies, electric mobility, among other topics of the Energy Transition Agenda. 2. Making www.energia.gob.pa a landing page with concrete information on the Energy Transition Agenda.	Strategic secretariat of state communication, entities, unions, social communication media

Objectives and action guidelines

For a public policy to be of quality, it must include orientations, mechanisms, and action guidelines that allow progress towards a democratically defined political objective with the participation of the community.

We list action guidelines leading to a secure, inclusive, competitive, and sustainable energy sector, whose benefits extrapolate to all areas of Panamanian life.

Power Sector Transition Agenda

Nowadays, the power sector is undergoing a drastic revolution similar to the Industrial Revolution of the 18th century, where civilization transition from the use of carts and horses to vehicles powered by internal combustion engines, and from the use of candles to the power system we know today.

The Energy Transition is a concept that arises in response to the necessary adaptation to counteract the climate damage produced since the industrial revolution. Due to the excessive use of fossil fuels, which emit pollutants into the atmosphere, today humanity has the task of reversing the damage caused to ensure a sustainable future for future generations.

Aware of the challenge, since the increase in the Earth's temperature must be limited to 1.5°C, drastic actions must be taken, such as the decarbonization of the energy system. Panama, as a signatory of the Paris Climate Agreement, joins this task in a comprehensive, progressive, and consensual manner. Therefore, in addition to the 5 pillars of Sustainable Development Goal 7: Affordable and clean energy that framed the dialogue tables, in the Power Sector Transition Agenda the change of the sector's model was included in the concept known as the 4D's, which seeks:

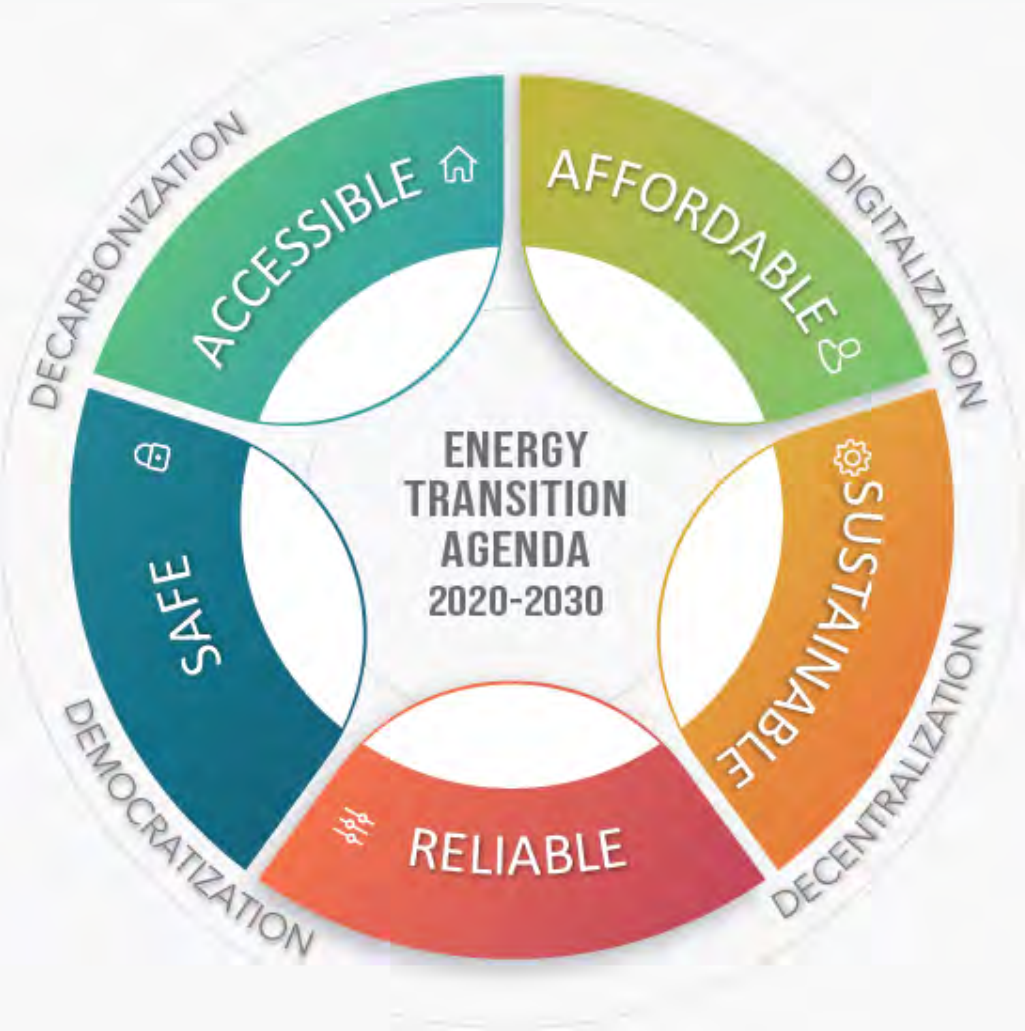
1.Decarbonization: for a greener footprint
In general, decarbonization implies that we will need to take two major actions:

- Transfer the demand of industrial, domestic and transport applications that currently use fossil fuels to electricity, aware that the application of measures for the rational and efficient use of energy is essential to reduce this electricity demand.
- Increase the share of renewable energies, which implies major challenges in all elements of the energy matrix: generation, transport, distribution, and consumers.

2. Decentralization: the usage of small-scale technologies
The decrease in the costs of small-scale renewable technology is changing the paradigm of the sector, bringing electricity production closer to the centers of consumption, diversifying the energy matrix, integrating renewable generation technologies and storage capacities that will be a relevant factor towards the complete transition to electric mobility.

3. Democratization: Consumers' power
At the international level, decentralization enables the incorporation of the consumer himself, in the figure of the 'prosumer', producer and consumer at the same time. As an active actor in the sector, the 'prosumer' has the power to consume energy or sell it when he has surpluses. This bi-directionality leads to significant changes in the paradigm of the conventional model of the power sector.

4. Digitalization: the road to the Industry 4.0
Data processing and analysis have a central role in the new sector model and are essential to developing the decentralization and democratization strategies. In addition to the tasks of network supervision, system stability, demand management, and forecasting of renewable production, digitization allows the creation of new business models based on knowledge and the value of the data.



01

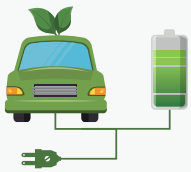
STRATEGY
UNIVERSAL ACCESS

02

STRATEGY
RATIONAL AND EFFICIENT USE OF ENERGY

03

STRATEGY
ELECTRIC MOBILITY



04

STRATEGY
DISTRIBUTED GENERATION

05

STRATEGY
INNOVATION OF THE NIS

Taking into consideration the above, the National Energy Secretariat has established an Energy Transition Agenda with 5 strategies for the electricity sector:

1. Universal Access: With the objective of closing the energy poverty gap and bringing energy to more than 93,000 Panamanian families;
2. Rational and Efficient Use of Energy: Based on the UREE Law, seeking to do more with less;
3. Electric Mobility: Reducing dependence on imported fossil fuels, contributing to the health of the population and care for the environment;
4. Innovation of the NIS: Addressing the needs of the sector through technological innovation, and regulatory and legal updating;
5. Distributed Generation: Allowing the population to take control of their energy, promoting renewable energies within everyone's reach.

The strategies related to the Rational and Efficient Use of Energy, the Innovation of the National Interconnected System (NIS), and Distributed Generation are based on the results of the participation of sector's agents in the Dialogue Tables. The Electric Mobility strategy is a commitment that will have a great impact on our independence from fossil fuels, and finally, the Universal Access strategy is the national government's main priority.

It is important to highlight how four of the five strategies seek to create public policies and recommendations for the benefit of the end-customer, either by bringing energy to those who do not have it, by being efficient, or by introducing technology.

1. Universal Access Strategy

Electricity can be considered a human right that 93,000 Panamanian families still do not possess. To create this access to electricity, new technologies and innovations will be implemented. In addition, it is proposed to educate and empower young people and women community leaders to help sustain future investments. The Universal Access Strategy will set the guidelines that will help us to illuminate the last mile.

This strategy will be developed by implementing 6 priority action guidelines:

- Implementation of new cooking technologies.
- Technological innovation aimed at difficult to reach areas
- Implementation of renewable energy technologies in rural areas
- Mini-grids to provide access to unserved and outside of concession areas
- Empowerment of community leaders for the management of energy supply systems.
- Women-Energy Nexus

The universal access strategy seeks to be a roadmap that, from a public policy perspective, complements the actions of the Office of Rural Electrification (OER), which has among its medium-term tasks to electrify communities in surrounding areas through grid extension projects, mini-grids, and isolated systems. Although Panama has substantially increased investments in rural electrification projects in recent years (US $25 million annual average), at this rate it is estimated that universal access will be achieved by 2039, considering that new investments in the order of $350 million are required to cover the electricity access deficit in the country and achieve universal access.

According to the supporting document of the Universal Energy Access Programme developed by the IDB for Panama (PN-L1155), 3,948 communities or villages (46,259 rural households) will not have the possibility of accessing energy services under the current concession schemes. For these communities, it is necessary to provide cost-effective solutions that include the extension of grids and technologies based on electricity supply with storage and using hybrid systems based on Non-Conventional Renewable Energy Sources (NCRE). Previous experiences have shown that to ensure the success of these technological solution's investment, the relationship with the community and local governments is crucial. Because of this, the access strategy has two components focused on the empowerment of young people and women as family leaders. This strategy will allow, in the short, medium, and long term sustainability in the projects and an educated community with energy awareness. This strategy will contribute to the connectivity of the entire Panamanian society and establish improvements to the quality of life of Panamanians. This is why the approach proposed is comprehensive, bringing energy and new opportunities to domestic consumption, agriculture, health posts, schools, water pumping systems, community centers, all through the Colmena Plan. In addition, it seeks to improve the quality of life and health of Panamanians who still cook with firewood, a figure that according to the World Bank was still around 11% in 2016.

The universal access strategy will be based on the previous action guidelines; however, there are a series of actions in the areas of institutions, regulations, education, information technology, research and development, financing, and the role of private enterprise, among others, that will have to be addressed and included in the details of this road map once it is specifically worked on.

2. Rational and Efficient Use of Energy Strategy

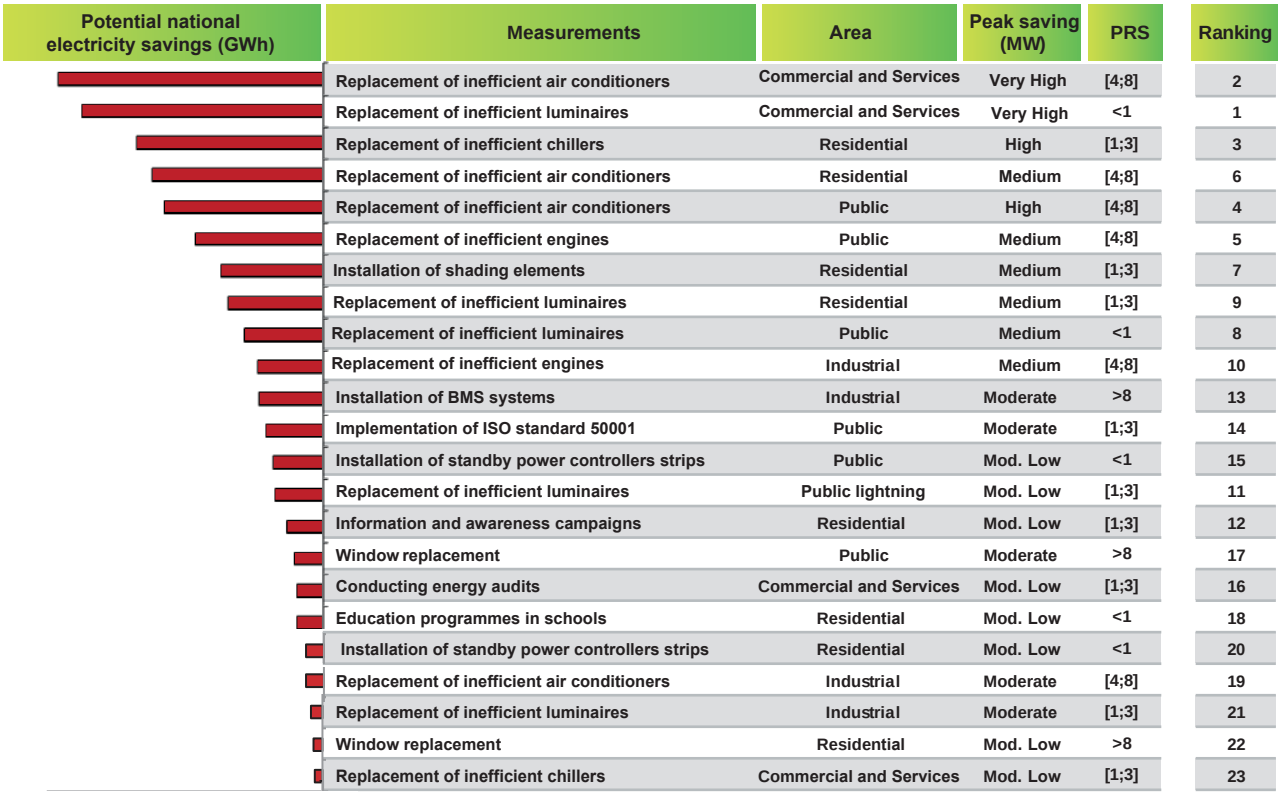
“The electricity bill is getting higher and higher!”, “It is getting hotter every day, I need air conditioning!”. These are some of the comments we hear every day. The solution is rational and efficient use of energy. Through education, we will ensure that Panamanians become energy literate. We will implement standards and technical regulations so that commercially available equipment meets an acceptable level of efficiency. Also, we will seek financial mechanisms to make efficient equipment affordable for all Panamanians. The Strategy for the Rational and Efficient Use of Energy is the roadmap for our country to become energy efficient and to achieve more with less.

This strategy will be developed by implementing 8 priority action guidelines:

- Energy efficiency standards and technical regulations
- Energy managers
- Implementation of non-conventional technologies for direct energy use
- Financing mechanism to promote energy efficiency measures
- Implementation of the Sustainable Building Regulation
- Energy end-use monitoring
- Accreditation of companies that offer energy services and certification of professionals
- Education, promotion and dissemination of rational and efficient energy use.

The National Strategy for the Rational and Efficient Use of Energy represents progress in compliance with the general guidelines established in the national policy contemplated in Law 69 of 12 October 2012 and regulated by Executive Decree No. 398 of 19 June 2013. This strategy also challenges us to build a roadmap that allows us to accelerate compliance with the commitments made and fundamentally create the necessary bases for the program to be sustainable and updatable over time.

There are different alternatives to lead our country towards the rational and efficient use of energy and the challenge we face is deciding which new measures should be promoted, taking into consideration their savings potential and the cost-effectiveness of their implementation. The National Energy Secretariat has studies where the application of Energy Efficiency (EE) and Demand Management measures have been studied for our country (see figure). Those that have been prioritized for the development of public policies have been chosen using three variables, i) the potential electricity savings of the measure on the national electricity consumption (GWh), ii) potential savings of the measure on the national electric power distribution (MW) and iii) simple payback period (payback).



Potential national electricity savings (GWh)	Measurements	Area	Peak saving (MW)	PRS	Ranking
	Replacement of inefficient air conditioners	Commercial and Services	Very High	[4;8]	2
	Replacement of inefficient luminaires	Commercial and Services	Very High	<1	1
	Replacement of inefficient chillers	Residential	High	[1;3]	3
	Replacement of inefficient air conditioners	Residential	Medium	[4;8]	6
	Replacement of inefficient air conditioners	Public	High	[4;8]	4
	Replacement of inefficient engines	Public	Medium	[4;8]	5
	Installation of shading elements	Residential	Medium	[1;3]	7
	Replacement of inefficient luminaires	Residential	Medium	[1;3]	9
	Replacement of inefficient luminaires	Public	Medium	<1	8
	Replacement of inefficient engines	Industrial	Medium	[4;8]	10
	Installation of BMS systems	Industrial	Moderate	>8	13
	Implementation of ISO standard 50001	Public	Moderate	[1;3]	14
	Installation of standby power controllers strips	Public	Mod. Low	<1	15
	Replacement of inefficient luminaires	Public lightning	Mod. Low	[1;3]	11
	Information and awareness campaigns	Residential	Mod. Low	[1;3]	12
	Window replacement	Public	Moderate	>8	17
	Conducting energy audits	Commercial and Services	Mod. Low	[1;3]	16
	Education programmes in schools	Residential	Mod. Low	<1	18
	Installation of standby power controllers strips	Residential	Mod. Low	<1	20
	Replacement of inefficient air conditioners	Industrial	Moderate	[4;8]	19
	Replacement of inefficient luminaires	Industrial	Moderate	[1;3]	21
	Window replacement	Residential	Mod. Low	>8	22
	Replacement of inefficient chillers	Commercial and Services	Mod. Low	[1;3]	23

The highest consumption of electrical energy in our country is due to the use of air conditioning and refrigeration. In 2019, standards and technical regulations for energy efficiency came into force, which is why it has been identified that by 2030 it will be able to reduce 370 GWh per year (14% of electricity consumption in the residential sector in 2015). Furthermore, it is forecast that installing 70 MW in installed capacity will be avoided and 1.6 Mt of CO2 equivalent to taking 30,000 internal combustion vehicles off the road, with a maximum 2-year investment recovery period. The implementation of the Sustainable Building Regulations approved by JTIA Resolution No. 035 of June 26, 2019, also predicts electrical energy savings between 15% and 20%, due to the incorporation of passive elements in the design and construction of buildings at level national.

An important challenge is to accelerate the migration towards the use of more efficient equipment and sustainable buildings. Therefore, it is important to facilitate exclusive financing mechanisms that allow consumers to have access to resources with better conditions and terms to invest in energy efficiency projects, accompanied by behavioral change strategies and education at all levels.

The private sector plays an important role in this transition towards a more energy-efficient country. By way of proof, in recent years there has been commitment and interest from many actors that ensures that a robust roadmap can be built where everyone is empowered by the strategy.

In a changing world due to technological innovation, the increased purchasing power of the country's inhabitants, and new business models, it is important to bear in mind that the measures promoted at this time will have to be updated to follow signals given by the market and the behavior of the different consumer sectors.

3. Electric Mobility Strategy

Transportation contributes to 25% of the polluting emissions causing global warming; if we want to reverse the damage caused to our planet, we have to look for innovative solutions. Electric mobility is a technological response to replace conventional vehicles and reduce our carbon footprint. By implementing the Electric Mobility Strategy, we are preparing to put the Panamanian transportation sector on the road to decarbonization.

This strategy will be developed by implementing 5 priority action guidelines:

- Standards and regulations necessary for sustainable electric mobility.
- Implementation of electric mobility in vehicle fleets
- Environmental sustainability
- Incentives and financing for electric mobility
- Promotion and knowledge dissemination about electric mobility. The National Electric Mobility Strategy was published in Official Gazette N°28892-A, under Cabinet Resolution N° 103 (October 28, 2019) and the above-mentioned programs have been prioritized for implementation in this five-year period.

The National Electric Mobility Strategy is the flagship strategy of the Energy Transition Agenda as it is the first to be officially approved by the Cabinet Council. This strategy arises from a public consultation exercise, in which government, private enterprise, and academia worked together to establish the goals and schedule of activities that will acquire this technology viable for the majority of Panamanians by 2030.

It is important to highlight that, of the industrial, residential, commercial, and transport sectors, the latter was the largest consumer of energy in 2019 with 47.4% of total consumption and responsible for the consumption of 60.3% of the oil derivatives imported. It is due to these high figures and the fact that Panama does not produce fossil fuels, that migrating the transport sector from oil derivatives consumption to electricity consumption, in a country where electricity production is mostly clean and produced by national natural resources, is our best option.

The National Strategy for Electric Mobility (ENME, for its acronym in Spanish) does not seek to replace the entire combustion engine vehicle fleet with an electric one, as this would not be sustainable. The objective is to be an environmentally friendly complement to the development of the Panama Metro lines in the capital city and a cleaner vehicle alternative for the rest of the country's urban cities. This is why, within the strategic sectors, the public transport fleet has been prioritized, and nowadays the National Energy Secretariat is working closely with Mi Bus evaluating the transition of public buses to electric ones as an initial step in the implementation of The National Strategy for Electric Mobility.

Actors from several sectors (power sector, transportation, government, finance, private enterprise, academia) form the Inter-institutional Commission for Electric Mobility (CIME, for its acronym in Spanish), space for action where the priority activities of ENME in regulatory, financial, educational, research and technological development issues where implemented. Thus, in the CIME the socio-political viability of the strategy was prepared to achieve the objectives, with concrete actions and measurable results.

The energy transition agenda does not rule out evaluating other vehicles based on natural gas, biofuels, or hydrogen cells (in the long term) for agro-industrial activities or in places where electromobility is not cost-effective. However, our priority will be the implementation of the ENME.

4. Distributed Generation Strategy

Having the control and capacity to self-supply our own energy needs is already a reality; the development of technology for low-scale electricity generation has been the trigger for the prosumer era. Such a radical paradigm shift requires financial support, research, and in-depth system analysis. The Distributed Generation Strategy presents initial actions towards the transition of the Panamanian prosumer electricity system.

This strategy will be developed by implementing 4 priority action guidelines:

- Self-consumption
- Smart grid for renewable communities
- Financing and incentives
- Legal, normative, and regulatory aspects

The term distributed generation refers to including electricity generation at the points of consumption. Today, various types of electricity generation technology are in use for this purpose depending on the potential of the area. In Panama, photovoltaic

technology is the most widely used due to its characteristics and cost-effectiveness. Moreover, other technologies such as biomass will undoubtedly play a role in the medium term in agro-industrial areas or areas close to landfills where the waste-to-energy concept could be applied. In addition, advances in information and communication technologies are the key component for boosting distributed generation, as they add more intelligence to electricity systems and enable the use of energy-related information to boost new businesses.

In Panama, a conservative version of distributed generation has been in place since 2016, allowing the use of end-user generation in the form of self-consumption. As of July 2020, there is 37.1 MW of installed photovoltaic capacity, which represents 2.3% of total demand (1/5 of the maximum allowed by regulation). The distributed generation strategy would lead to the greatest change in the Panamanian electricity sector in the last 20 years since the end-user would become more active. Its potential success would be a disruptive change since a portion of the demand, which would normally be supplied by the conventional electricity generation park, would be self-supplied. This is where the National Distributed Generation Strategy ties in with the National Electric Mobility Strategy, as it would be migrating the energy consumed by the transport sector from imported fossil fuels to national electricity. Additionally, this strategy is related to the National Strategy for the Innovation of the National Interconnected System (NIS) because it increases the complexity in the planning and operation of the NIS and the need to implement a road map for smart grids in the country.

For these reasons, the four action guidelines described above are proposed as a priority for this strategy. However, surely during the development of the roadmap other action guidelines will emerge in the areas of research and development, technical and professional training, planning, digitalization, paperwork, distribution network capacities, among others, which will also have to be evaluated and included in this strategy.

advances

in information and communication technologies are the key components to promote distributed generation.

5. Innovation of the NIS Strategy

The integration of renewable energies in the generation system, as well as the intelligent network control and the future entry of large-scale energy storage are causing us to rethink the structure, operation, and commercialization of the power system.

The Innovation of the National Interconnected System (NIS) Strategy has the objective to ensure the safety and reliability of the Panamanian power system.

This strategy will be developed by implementing 5 priority action guidelines:

- Flexibility and storage in the NIS
- Smart transmission and distribution networks
- Power quality
- Adjustments in the electricity market
- Legislation and institutional framework

In recent decades, at the international level, large-scale power systems have undergone major changes due to the introduction of renewable energies.

However, the challenge posed by global warming is forcing us to be more aggressive in the transition from fossil fuel-based power generation to cleaner sources. The major constraint to the growth of non-conventional renewables is no longer price, due to their competitiveness, but their intermittency. To accommodate the increase of renewable energy the power system will need to increase flexibility through investments in transmission, storage (battery and green hydrogen), and demand response.

In Panama during the first half of 2020, 46.48% of the installed capacity was produced by hydroelectric power plants, 41.46% thermoelectric power plants, 5.05% solar parks, and 7.01% wind farms. Undoubtedly, Panama still has wind and solar potential that could contribute to the decarbonization of the grid. As long as solar and wind farms are complemented with energy storage systems to provide firm power to the grid and meet the requirements of security of supply. The Innovation of the NIS Strategy will identify existing barriers and propose a roadmap to make this type of alternative technically, regulatory, and legally viable.

The National Energy Secretariat currently has a roadmap on smart grids, which aims to provide key information to help entities in Panama's power sector make better decisions regarding investment in technology. Based on an analysis of the entire environment of Panama's power sector, 3-technologies were selected with the higher impact on the challenge of achieving the sector's priority objectives in the use of technological solutions in the short, medium, and long term. The three technologies selected for having a high impact on the challenge of achieving the sector's priority objectives are i) Integration of renewable energy sources; ii) Distribution automation systems; iii) Creation of energy management systems, including smart metering. In the Innovation of the NIS Strategy, the necessary instruments will be developed to implement this roadmap in the medium term.

In addition, the Innovation of the NIS Strategy will seek, from a public policy perspective, to support and work together with the regulator to solve the existing problem of the quality of energy supply at the distribution level. It is known that the quality standards to be met by distribution companies have been clearly described by the regulator and have become increasingly stringent over time.

The operation and maintenance of distribution networks are the full responsibility of the concessionary companies and compliance with quality standards provides incentives for companies to improve their management since any program must be based on the penalty avoided. However, the problem of service quality persists and is increasing in some areas of the country, so it is imperative to develop a strategy to resolve this situation.

In summary, the National Energy Secretariat presents a challenging Transition Agenda with 5 working strategies for the power sector, distributed in 28 priority action guidelines. The action guidelines will be implemented through a roadmap comprised of a series of pilot projects, studies, and research that will allow us to make recommendations and dictate energy policy guidelines at the national level. It is important to highlight that the National Strategies proposed are based on research, technological development, innovation, and digitalization.

As can be seen in the following image, the changes ahead of us comprehensively impact the energy sector, so the development and implementation of the national strategies and the energy transition agenda itself require a similar approach.

1. https://blogs.iadb.org/energia/es/el-futuro-post-pandemia-transicion-energetica/

Energy
[Accessible + Affordable + Reliable + Safe + Sustainable]

Smart Grid

Access	UREE	**MOVE**	Distributed Generation	Innovation of the NIS

Demand Management	Energy Storage	**Blockchain**	Digitalization	Micro-grids	Green Hydrogen
Digital Twin	Virtual Generator	Marine Renowable Energies	Automation	Energetic Services	Cybersecurity
Big Data	Internet of Things **(IoT)**	Smart home appliances	Smart Homes	Advanced Measuring Infrastructure	Others

Technology surveillance for energy storage systems

Energy storage systems are a crucial element that will change the future of the power sector. Significant progress has been made in the last decades to achieve cost-effectiveness in advanced electrochemical batteries, as they show applications for small, medium, and large scale systems (e.g. transport storage, quality of service improvement services in low-voltage grids, or the potential of batteries to delay or replace new investments in power plants or high-voltage transmission infrastructure). However, as shown in the figure, there is a variety in the types of energy storage and their applications, so we must keep constant technological surveillance and prepare the Panamanian sector to introduce them in due course as they will certainly play an important role in each of the strategies proposed in this document.

	ELECTRIC		MECHANICS			ELECTROCHEMISTRY			CHEMISTRY	THERMIC
	Super capacitors	SMES	PHS	CAES	Flywheels	Sodium sulphide	Lithium ions	Redox flow	Hydrogen	Molten salt
possible applications by technology										
Power quality	✓	✓			✓	✓	✓	🤞		
Energy arbitrage			✓	✓	🤞	✓	✓	✓	🤞	✓
NCRE integration		✓			✓	✓	✓	✓	✓	
Emergency back-up					✓	✓	✓	✓	🤞	
Demand flatttening			✓	✓		✓	✓	🤞	🤞	🤞
Time shifting			✓	✓		✓	✓	🤞	🤞	🤞
Load leveling			✓	✓		✓	✓	🤞	🤞	🤞
Emergency start-up						✓	✓	✓	🤞	🤞
Seasonal storage			🤞	✧					🤞	🤞
Rotating reserve		🤞			🤞	✓	✓	🤞	🤞	
Network expansion			✓	🤞		✓	✓	🤞	🤞	🤞
Grid stability	🤞	✓			🤞	✓	✓	🤞		
Voltage regulation	🤞	🤞			🤞	✓	✓	✓		
End-userservices	🤞	🤞			🤞	✓	✓	🤞		

✓ Proved
🤞 Promising
✧ Possible

Source : interviews, Schmidt et al. (2019), Das et al. (2018).

H2 = hydrogen, RES = renewable energy source, RE = renewable energy, SMES = superconducting magnetic energy storage, PHS = pumped hydro storage, CAES = compressed air energy storage. All by their acronyms.

Note: The World Energy Council (WEC) has reviewed the available literature for the table presented. In their review, the technology specifications vary greatly depending on the source.

Source: Five steps to energy storage, WEC

Finally, it is important to point out that the proposed Agenda has been presented and aligned with government institutions since it is important to make the best use of the state resources, which can be achieved by joining forces and working as a team.

In the following section, we show a summary of the projects we will execute with clear milestones and measurable results. It is important to emphasize that the NES develops pilot projects and studies based on technical cooperation, which is why the relationship with international cooperation partners who share our vision of energy transition is fundamental.

ENERGY TRANSITION AGENDA
Power Sector

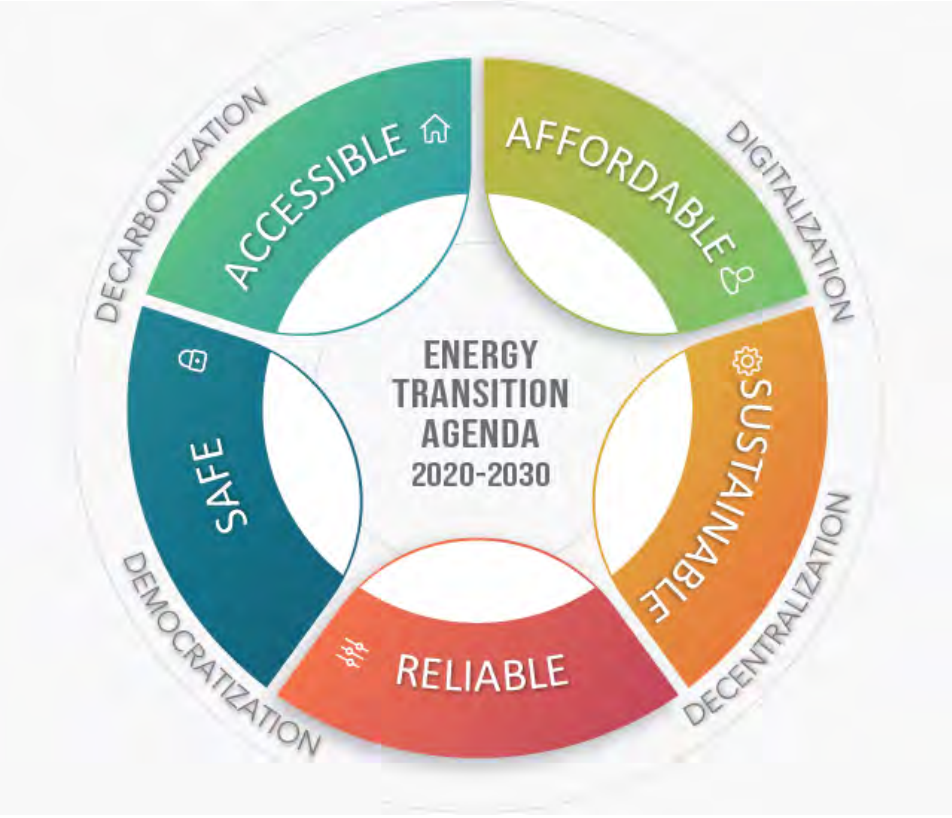
ENERGY TRANSITION AGENDA
Power Sector

Transition Agenda for the Hydrocarbon Sector

Despite its emergence in the world economy at the beginning of the 20th century, oil and its derivatives continue to have a singular strategic value in the economy of any country. The control of its production, distribution, storage, transport, and processing has been, for more than a century, a priority public policy for every nation.

Panama geographical location and its adequate air and seaport infrastructure are great advantages that current position it as a regional logistics hub. Additionally, the significant foreign investment made in recent years in the Liquefied Natural Gas-based power sector, the existing capacity in the Fuel Free Zones for the storage, re-export, and distribution of hydrocarbons, and with the formulation of an appropriate policy, Panama can consolidate its position as a regional energy hub and emulate other important centers such as Houston in the United States, Perth in Australia, Dubai in the United Arab Emirates and Singapore as far as energy is concerned.

The energy transition agenda that the NES is proposing, in addition to the 5 functional strategies prioritized in the electricity sector, aims to formulate this Strategy in the hydrocarbons sector to strengthen the role of sector planning with a 2030 horizon, incorporating the concepts of sustainable development, and establishing the road-map for the adjustments that the hydrocarbon sector must undertake, and the legal and regulatory changes that must be developed for its consolidation as an energy hub, in turn reinforcing the regulatory capacity (regulations, oversight, etc.) of the NES to improve the quality, sustainability and prices of these energies, as well as their contribution to the generation of quality jobs.



In consideration of the above, we have identified 2 fundamental strategies within the Strategic Guidelines of the Energy Transition Agenda:

1. Panama as an Energy Hub

Define a national hydrocarbons policy that promotes competition to improves the quality and prices of the various energy sources available.

After the Panama Canal's expansion, the fundamental changes in the world market for liquefied natural gas (LNG) particularly favor Panama. The capacity of regasification facilities will be a key aspect for Panama to become an energy hub for its region.

This strategy will be developed by implementing 6 action guidelines:

- Installation of the Hydrocarbons Committee
- Long-term plan integrating the role of the power sector with hydrocarbon and renewable energy planning in the country.
- Legislation for the LNG business providing for free access to infrastructure
- Clear regulation for the export business as a key element of the LNG value chain.
- Promote supply to Central America and the Caribbean from Panama.
- Articulation of a National Hydrocarbons Policy with external advice and the sector's stakeholders.

2. Modernization of the regulatory framework

The modernization of the hydrocarbon sector is not static; in order to be sustainable, the success of the transformation depends on its adequate adaptation and growth. It is a sector that has managed to operate with a regulatory framework that is almost 2 decades old, and this requires a comprehensive review to create opportunities and adapt to a new market. We must rebuild and strengthen what already exists and add what is missing. Today, the foreseen future is different from the end of 1987, when the first law regulating this activity was passed, which requires a comprehensive evaluation and adaptation of the regulatory framework, keeping its fundamental bases.

The sustainability of the sector and its ability to create competition by attracting investment in a timely manner, resulting in efficient and competitive prices, requires looking at the long term. In particular, the changes that are proposed or implemented need to look beyond the short term.

This strategy will be developed by implementing 3 action guidelines:

- Creation of the Hydrocarbons Sectoral Committee
- Comprehensive review of existing laws and decrees, including those that are relevant to the sector.
- Analysis of international regulatory frameworks

ENERGY TRANSITION AGENDA
Hydrocarbon Sector

Strategies	Value proposal	National indicators to be impacted	Axes	Lines of action	Actors
1. Panama as an energy hub	Panama's geographical position and the business opportunities associated with the Panama Canal and the fuel storage facilities that the country has, gives us a competitive advantage to offer services to the region, contributing to the fulfilment of the sustainable development objectives of Panama and the region.	1. trade logistics (% of fuel exports) 2. commitment to international agreements (signed/unsigned agreements) 3. access to capital 4. foreign direct investment, net capital inflows (balance of payments, US$ at current prices) 5. industrial competitiveness 6. contribution to GDP (% annual growth	4 D	Development of a National Hydrocarbon Plan	NES, MICI, BBC, AMP, MI AMBIENTE, MARKET ACTORS
				Assessment of the country's capacity and opportunities to consolidate as a regional hydrocarbon distributor and supplier	NES, AMP
				Institutional strengthening in the negotiation of the country's oil and natural gas resources	NES, MICI
			1 D 4 D	Formalization of strategic alliances with the countries of the region	NES, MIRE, MINPRES
			1 D	Encourage the use of storage infrastructure for biofuels re-exports.	NES,ACP, MARKET ACTORS, AMP
2. Modernisation of the regulatory framework	The NES is the governing body for the petroleum products market and regulations must be adapted to market developments, technological changes and new players. In addition to strengthening the role of the NES in the different regulated activities.	1. Legislation (laws, decrees, approved norms) 2. Transparency and political stability (transparency indicators)	4 D	Updating of Decree No. 36 of 17 September 2003 and its amendments	NES, MICI, BBC, AMP, MIAMBIENTE, MARKET ACTORS
				Adaptation of regulations for new activities related to natural gas	NES, MICI, BBC, AMP, MIAMBIENTE, MARKTET ACTORS
				Updating of the technical regulations for liquid fuels and gas	NES, MICI, MARKET ACTORS

What comes next?

CHAPTER three

Quick Wins

INSTITUTIONAL STRENGTHENING

Planification

Program: Short and long term planning

National Energy Plan (vision 2020)

Objective: Update the national energy plan.

Reason: The energy matrix of Panama's growth and diversity have been affected if we compare it with what was presented in the Energy Plan of 2015. For multiple reasons, the implementation of numerous programs, and the introduction of renewable energies have been left behind, causes why it is necessary to update the Energy Plan.

Significant Actors: NES, Mi Ambiente, ETESA, ASEP

Result Indicators: Publication of the NEP updated, number of outreach activities, number of people who know about the plan.

General Activities:	month 1	month 2	month 3	month 4	month 5	month 6	month 7	month 8	month 9	month 10	month 11	month 12
Assessment of the current state of the energy plan 2015-2050												
Popular referendum to identify the subject of interest.												
Design the generation and demand scenarios.												
Make simulations of different scenarios.												
Asses the results and choose the proposal scenario.												
Write the updated energy plan.												
Present the results.												

Digitization and optimization of processes

Digitized platform to streamline processes and improve the statistical system for monitoring product movements (MD, re-export, bunkering).

Project: Digitized platform to streamline processes and improve the statistical system for monitoring product movements (MD, re-export, bunkering).

Objective: a digitized platform that would significantly reduce the costs and mobilization time of processors within the institution. It would streamline and simplify permits and licenses to provide market players better response capacity and keep them informed of the status of processes.

Moreover, developing an application for the collection and processing of statistical information will provide timely, accurate, and reliable information. This information will be helpful for the agents involved in the market, both in the introduction of fuels from abroad and the distribution for the domestic market, the marine market, and exports.

Justification: As part of the functions granted to the Hydrocarbons Directorate in DG 36 of September 17, 2003, point 14, it says textually: collect, request, and receive reports and statistical data from all economic agents that intervene in the introduction, import, storage, distribution, and marketing of petroleum products.

Nowadays, we don't have systems that allow the streamline of procedures or the compilation of statistical data of the movements of the Fuel free zone. At present, the information is collect and process manually and it is not generated promptly, which makes it prone to errors.

Process: These digitized projects consist of developing an app that can process and collect information of the sales modules in the domestic market, and movements in the Free Fuel Zones and its users. Through these projects, the sector agents could upload monthly statistics information using the website and a password to ensure security. This way the NES could receive the information immediately.

Furthermore, it is common that digitized platforms require continuous improvements and optimization to incorporate new processes and make the system and payment through electronic banking more robust.

Digitization and data processing

Activities	month1	month 2	month3	month 4	month 5	month 6	month 7	month 8	month 9	month 10	month 11	month 12
Meeting for deliverables format and goal approval												
Presentation format and approved objectives												
Identification of the internal process flow in the NES												
List and raw data of the NES process												
Flow process document (actual version: flow chart and description of process)												
Collection of the versions of each process in just one chart.												
Meeting with the actors of each process in order to unify criteria and raise optimization solutions.												
Meetings with the actors of each process to assess the proposal (modified version of the process)												
Meeting to unify criteria with the informatic division of MINPRES												
Flow analysis of the process of optimization												
Flow diagram elaboration - modified version of the process.												
Meetings with the actors of each process to assess the proposal (modified version of the process)												
Final presentation of the flow process (process version)												
Development of the flowchart- modified version of the process.												
Evaluation, reformulation and strengthening of the web page to migrate the user to a service portal.												
Work table to implement a Software for the NES created by AIG, MINIPRES and NES												
Develop a software of all the process that will allow the optimization, audit, processing, information, and management.												
Unification of the process as a unique way to integrate all the institutions involved in the NES process.												

Quick Wins

POWER SECTOR

Strategy: Rational and Efficient Use of Energy
Action guideline: Funding mechanics to promote measures of rational and efficient use of the energy.

1. Identification and accompaniment of state institutions with high energy consumption towards a conversion to the figure of Large Users.

Objective: Perform studies related to the possible implementation of a program to promote the conversion of Large Users in those governmental institutions where it would be possible.

Panamanian legislation for the electricity sector, Law 6 of February 3, 1997, establishes the option for large consumers to freely negotiate the terms and conditions of energy supply with other market agents or to avail themselves of the terms and conditions established for clients in the regulated market. The figure of a Large User is defined as any natural or legal person with a maximum demand greater than 100 kW per site.

Justification: In the last years, there has been a significant development in the Large Users Panamanian market. This has produced benefits in the prices of the electric power and in the reduction of CO2 emissions, thought exclusive hiring of renewable energy, solar and wind. By doing so, it has promote a social and economic development to prevent the environmental pollution, keep the ecologic balance and evade the destruction of the ecosystems.

In addition, there are government institutions that, due to their electricity consumption, could choose to negotiate their own electricity rates and the type of technology to contract. However, for decision making, technical validation is required to quantify the costs and benefits of this option, in each particular case.

Significant actors: NES, state entities

Result indicators: number of state entities turned to Large Users.

General Activities:	month 1	month 2	month 3	month 4	month 5	month 6	month 7	month 8
Request and collect the electric bill of the last 5 years of the state entities in order to identify those with high energy consumption*								
Elaborate a technical-financial feasibility study for each of the institutions with high energy consumption that comply with the law to become large users.								
Elaborate a technical-financial feasibility study for each of the institutions with the highest energy consumption that accomplish the law in order to become large customers.								
Accompany state institutions in carrying out the corresponding public tenders.								

*The time to carry this activity is subject to modifications.

Strategy: Innovation of the NIS

Action Guideline: Wholesale market

2. Development of a transitional mechanism to guarantee a strategic reserve.

Objective: Guarantee the security of supply of the National Interconnected System.

Justification: One of the responsibilities of the NES is to guarantee the security of the energy supply nationally. In anticipation of uncertainties that may affect the system during the upcoming energy transition, we must assess the need for a strategic power reserve.

Significant actors: NES, ASEP, ETESA-CND

Results indicators: recommendations of the proposal

General Activities:	month 1	month 2	month 3	month 4	month 5	month 6
Delimitation of the consultancy scope and the consultant hiring process.						
Configuration of the international teamwork						
Monitoring during the process of consultancy						
Evaluation of the results						
Presentation of the ASEP formal recommendation						

Strategy: Universal access
Action guideline: Women-Energy Nexus

3. Training for women community leaders for the installation and maintenance of photovoltaic panels.

Objective: Provide technical training to volunteer women living in hard-to-reach areas to become installers, maintenance personnel, and trainers in photovoltaic technologies for self-consumption usage.

Justification: In Panama, in 2019, we still have 93,000 families who did not have access to power. In countries like India, women are leaders and have assumed the role of maintaining the solar plants that give energy to the communities. We consider that in our country, the women leader at home can assume a similar role in the maintenance and effectiveness of the installations.

Significant actors: NES, INADEH, Office of the First Lady of Panama.

Results indicator: Number of trained women , number of beneficiary community.

General Activities:	month 1	month 2	month 3	month 4	month 5	month 6	month 7	month 8	month 9
Sign an agreement of cooperation with national and international organizations to promote an Action guideline for training in energy issues.									
Design an action guideline for training suitable for the volunteer women of the beneficiary community.									
Identify the women that will benefit from the guideline action.									
Train technically volunteer women of the action guideline as installer, maintenance personnel and trainers.									

Strategy: Electric Mobility
Action guideline: Incentives and funding for electric mobility

4. Bill that grants incentives to the electric mobility.

Objective: Promote the update and creation of tax incentives to support the use of electric vehicles.

Justification: In Panama, the National Electric Mobility Strategy was recently approved. A relevant point focuses on the search for incentives to facilitate the implementation of this technology in the transportation sector since the initial investment cost of electric mobility is still not competitive.

Significant Actors: NES, MEF

Indicator results: Draft bill already presented.

General Activities:	month 1	month 2	month 3	month 4	month 5	month 6
Create the Inter-institutional commission for the electric mobility headed by the NES (CIME)						
Identify the tax and non-tax incentives that could be granted						
Hold meetings with the MEF-DGI to validate the viability of the incentives evaluated.						
Writing and presenting the draft bill.						
Approval						

Strategy: Rational and Efficient Use of Energy
Action guideline: Programme: Implementation of no conventional technologies.

5. Solar thermal energy action plan.

Objective: Create the National Solar Thermal Panama Programme (NSTPP) that will manage the measures and actions necessary to develop and strengthen a local thermal solar technology market that is reliable, with quality and security for the user.

Reason: The consumption of domestic hot water for bathing and washing in the residential sector in Panama rises to 91 million liters per day, 2.8 million liters per day in the hotel sector, 830,000 liters per day in the health sector, and no less than 7.5 million liters per day in the industrial sector. It is estimated that for water heating 1,147,293 MWh per year are required, which are normally supplied by electricity or liquefied petroleum gas. This mechanism generates an economic impact for users and has a direct impact on greenhouse gas emissions.

Harnessing the solar thermal potential identified in the country through solar water heating systems can generate the following benefits:

i). Annual saving of 762,075 MWh per year, equivalent to the annual energy of a 160 MW thermal power plant. At the end of the 15-year lifetime of the installed SWHs, 11,431,125 MWh will have been saved; ii). Avoiding the emission of 162,325 annual tons of CO2 into the atmosphere and, at the end of the 15-year useful life of the installed SWHs, the emission of 2,434,875 tons of CO2 will have been avoided; iii). The creation of employment, with 11,494 new jobs related to the installation and maintenance of this area of SWH equipment; iv). The development of a Panamanian solar water heater industry generating more employment and local production; v). Annual savings between 37.5 and 58 million USD per year in electricity and LPG subsidies Saving between USD 37.5 and 58 million per year in electricity and LPG subsidies; vi). For users, savings of USD 111 million per year for displaced electricity and LPG.

Significant actors: NES, Mi Ambiente, MEF, MICI-DGNTI, TUP, SENACYT, CAPES, SIP, JTIA

Results indicators: Resolution that creates officially the National Thermo Solar Panama Programme (NTSPP, and amount of square meters of solar water heating systems installed.

General Activities:	month 1	month 2	month 3	month 4	month 5	month 6	month 7	month 8	month 9
Creation, implementation, and execution of the NTSPP with and organizational structure that will facilitate the development of the action plan.									
Encourage academic institutions to offer study programmes for training and certification professionals in solar thermal energy.									
Promote and implement a programme of undergraduate and postgraduate scholarships for the development of national human resources.									
Creation, implementation, and execution of a thermal solar energy committee to develop a new regulation and an update of the measures.									
Legal adoption and certification of the technic regulation.									
Development and diffusion of awareness-raising materials									
Design and execution of a diffusion plan to promote the funding incentives and mechanism.									
Promote with the thermal solar technology supplier the ethic regulation									
Promote and encourage the undertaking of local manufacturers and fitters that create solar thermal heaters.									
Coordinate with local banks for specific lines of financing for the purchase and commissioning of solar thermal systems.									
Monitoring and planning of the action plan with reference to objectives									

Strategy: Rational and Efficient Use of Energy
Action guideline: Education, promotion, and dissemination of measures about rational and efficient use of the energy

6. Inclusion of topics involving sustainability and rational and efficient use of energy in the academic curriculum of schools.

Objective: Promote education about sustainability and energy efficiency topics in the school.

Reason: The National Energy Secretariat proposes to the Ministry of Education to find mechanisms that allow us, as a whole, to integrate energy topics in the Panamanian education system. This year the scope of the project would consist of the proposal to modify the academic curriculum and training for teachers on the subject.

Significant actors: NES, MEDUCA

Result indicators: number of modified study programs, number of teachers trained.

General Activities:	month 1	month 2	month 3	month 4	month 5	month 6	month 7	month 8	month 9
Review the content of the academic curriculum of MEDUCA.									
Development of the proposal to modify of the academic curriculum, including a proposal of the didactic material (theoretical and laboratory) necessary to dictate the topics.									
Evaluation and feedback of the proposal made by MEDUCA staff.									
Training for teachers on energy topics.									
Presentation and confirmation of the results.									

Strategy: Distributed generation
Action guideline: Self-supply

7. Feasibility study of a pilot project to reduce the subsidy (gas/electric) through the inclusion of solar panels and efficient technologies in Panama

Objective: Perform a legal, technical, and financial feasibility study of a pilot project that consists of the installation of power generation units for self-consumption, and equipping residences that receive subsidized electricity tariffs (consumption < 300 kWh) and the 25-pound LPG cylinder. This way it aims to compensate for subsidized energy and gradually reduce the energy contributions and subsidies provided by the State.

Justification: According to the Subsidiaries Report in Panama as of December 2019, more than half of the power sector customers received subsidies (e.g. retired, agropastoral, politic, law 15, people with disability), representing a sum of 209 million. As can be seen, it is a significant contribution that the state makes to the electricity bill of the customers, without counting the gas subsidy of 25 lbs. It is important to the NES to evaluate, through pilot projects, the cost-effectiveness of replacing gradually household appliances and cooking equipment with purely electric systems accompanied by solar panels. This way subsidies can progressively decrease, and the state's resources used more efficiently.

Significant actors: NES, MEF, ASEP

Result indicators: Final study presented.

General Activitites:	month 1	month 2	month 3	month 4
Elaborate an evaluation of the energy subsidies that the government have delivered in the last 10 years and project them to the year 2030				
Define the type of technology with which significant energy savings can be achieved				
Detail the sample methodology to choose the residences, at national level, that would be part of the pilot project. The sample would have as variable the income, consumption, location (rural, urban, or peri-urban) and demographics of users.				
Develop pilot project opt-out forms indicating that it will no longer receive government subsidies. Importantly, it should be emphasized that participation in the pilot project is voluntary.				
Calculate the investment amount of the pilot project, based on a percentage of the projected amount to 2030, considering that a statistically significant sample of the total number of beneficiary residences should be designed.				
Define the set of indicators with which the project will be monitored from the energy, economic, financial, environmental, and social points of view which also will be used to evaluate the project and determine its viability.				
Identify the regulatory obstacle and/or from another type that could be presented to implement the project and give recommendations of how to solve them.				
Propose an implementation and evaluation chronogram of the pilot project.				
Design a scheme to pass from the pilot phase to the massification one in the pilot project. The massification scheme should include a proposal of an implementation, funding, regulation mechanism and the involved actors,				
Delivery and presentation of the results				

Strategy: Innovation of the NIS
Action guideline: Distribution networks

8. Development of a methodology that annually evaluates compliance with the quality goals of distribution companies.

Objective: Encourage the development, operation, and maintenance of the transmission and distribution network through innovative practices that allow more efficiency, intelligence, flexibility, resilience, and self-recovery and thus improve the service quality for the end-user.

Reason: The quality of the electric power in our country has been a discussion topic in the last years. Extensive power outages and voltage fluctuations have caused customers to complain to the media and relevant institutions about the quality of service. If we seek to introduce more intelligence and efficiency to the sector (electronics-based equipment that is more sensitive to voltage fluctuations) we must ensure quality to avoid excessive costs and inconvenience to the end-user.

Significant actor: NES, ASEP

Result indicator: Presented proposal.

General Activities:	month 1	month 2	month 3	month 4	month 5	month 6
Assess the quality scheme of the technical service to includes incentives and transition from penalties to compensations.						
Asses the definition of maximum limits of the indicators by region. In each region, it is defined the maximum limit for the current areas (dispersed settlement, concentrated settlement, suburban area, urban area).						
Asses the definition, during the tariff period, of a path to track indicators and measure improvements in the quality of the service.						
Asses the definition of an incentive for meeting quality service goals.						
Evaluate the inclusion in the performance indicators of the TOTEX and define an incentive for innovation measured based on targets for the reduction of said TOTEX						
Present a proposal to the ASEP and the citizenship.						

Strategy: Universal Access
Action guideline: Implementation of new cooking technologies.

9. Situational status of population cooking with wood and charcoal at the national level

Objective: Characterize the health, social and economic status of the Panamanian population that currently cooks with firewood and charcoal.

Reason: There are still Panamanians who cook primarily with firewood and charcoal, an activity that affects their quality of life as they are directly exposed to lung diseases. The identification of this population will allow us to evaluate among the new types of cooking technology the most cost-effective solution for the progressive replacement of firewood as cooking fuel.

Significant actors: NES, MIDES, INEC, MINSA, MI AMBIENTE

Result indicators: amount of families that use firewood, number of person that suffer from lung conditions (particularly women), forced expiratory volume in the first second (FEV1), use of wood/week/family, % of emissions, particulate matter (Qg/m3).

General Activities:	month 1	month 2	month 3	month 4	month 5	month 6	month 7	month 8	month 9
Request and reception of database.									
Database review.									
Mapping of areas where firewood or charcoal is mostly used									
Survey development and organization of survey team.									
Implementation of surveys and field measurements.									
Digitalization and analysis of the data collected during the surveys.									
Promotion, dissemination of the project and presentation of results to society.									
Report writing and presentation of results (partial and final).									

*The timing of this activity is subject to change.

Strategy: Electric Mobility
Action guideline: Implementation of electric mobility in vehicle fleet.

10.Cost-effectiveness study of public fleet modernization (government and buses)

Objective: Develop a cost-effectiveness study of the modernization of the fleet of public vehicles.

Justification: The National Energy Secretariat approved in the Official Gazette Resolution 103 the National Strategy for Electric Mobility. One of the key points identified when developing the Strategy is that the government should set an example for the technological changes it suggests. A crucial indicator to demonstrate the government's commitment will be the transition of the government vehicle fleet to electric vehicles.

Significant actor: NES, Mi Bus, Mi Ambiente, MEF, MICI, ASEP, World Bank.

Result indicators: Government fleet emissions baseline, number of people trained.

General Activities:	month 1	month 2	month 3	month 4	month 5	month 6	month 7	month 8	month 9	month 10	month 11	month 12
Government fleet emissions baseline.												
Characterize of the government fleet.												
Cost-benefits analysis and the impacts produced by the replacement of government vehicles to electric vehicles (EV)												
Cost-benefits analysis and the impact produced by the replacement of buses for electric buses.												
Evaluation of the purchase process and design of the specifications for the procurement of electric buses, including a the design of a financing scheme to ensure a feasible transition.												
Training in:												
1 - Management and planning of a fleet of electric vehicles (cars and buses).												
2- Evaluation of technologies and standards												
3- Tools for projection of emission's scenarios												
Presentation of results to relevant stakeholders												

Quick Wins

HYDROCARBON SECTOR

1. Panama, energy hub

Define a national policy of hydrocarbon that promotes competition.

Objective: Define the road map that allows aligning public and private efforts and establish objectives and the resources to reach them by promoting the competitiveness and sustainability of the sector.

Reason: Promote the diversification of the national energy matrix by using reliable non-traditional energy sources that minimize environmental impacts. The hydrocarbons sector and competent entities must regulate the reception, storage, regasification, transport, distribution, and commercialization of natural gas.

Process: Once the hydrocarbon committee is formed, the NES must convene extraordinary sessions with the stakeholders involved to define whether to promote the Natural gas law again or make modifications to Decree 36 to guarantee that all necessary regulations are included.

Activities	month 1	month 2	month 3	month 4	month 5	month 6
Meeting with the market actors through the work table						
Elaborate the road map and standardize it with the actors.						
Sending the document for legal review at the Ministry of the Presidency						
The document is sent to the cabinet for approval.						

2. Modernization of the regulatory framework

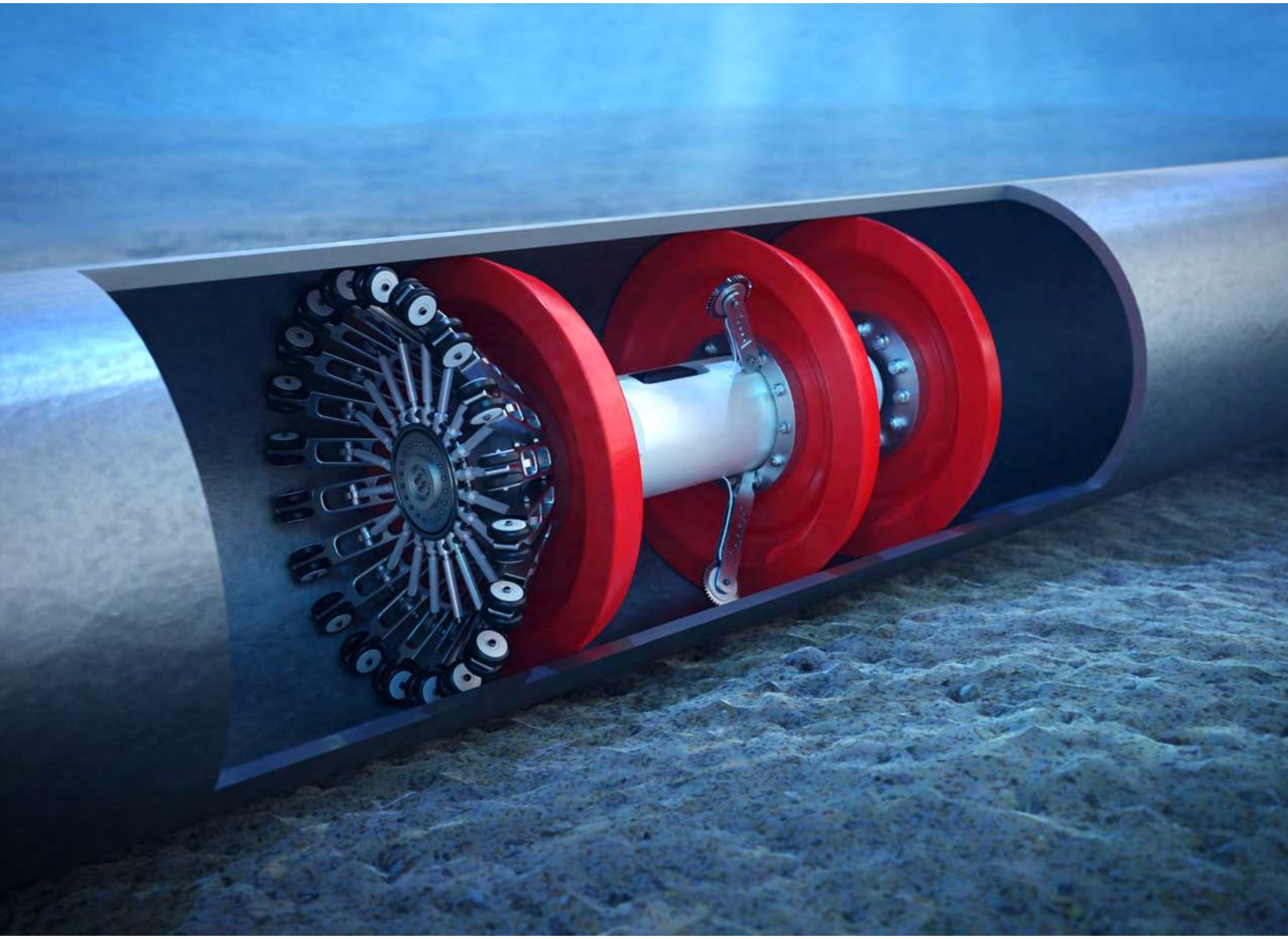
Unification and modernization of the regulatory framework

Objective: Provide sustainability, competition to the sector and promote investments in the medium and long term.

Justification: Updating regulations to adapt them to the evolution of the market, including variations in standards, technological changes, and new actors. In addition to strengthening the role of the NES in different regulated activities.

Process: The hydrocarbon sector is formed by public vehicle importers entities, various actors that are part of the fuel supply chain, and others that provide services to the sector. A committee must exist to agree and make adjustments to the issues of fuel quality, supply, and safe delivery.

Activities	month 1	month 2	month 3	month 4	month 5	month 6	month 7	month 8
Creation of the Hydrocarbons Sectorial Committee								
Comprehensive review of existing laws and decrees, including those that are transversal to the sector.								
Analysis of the regulatory framework of the international reference.								
Regulation draft.								
Presentation before the Government.								



CHAPTER four

Process of updating and monitoring the NEP 2015-2050

The long-term monitoring, updating, and improvement of the National Energy Plans is one of the most versatile and effective instruments in the implementation of public policies. This process creates knowledge, perspective, and an execution methodology, to the decision-makers in the institutions, of the actions to be carried out in the short, medium, and long term.

This document responds to the mandate in Law 52 of July 30, 2008, that establishes the strategic planification, and the creation of the policies of the power and hydrocarbon sectors as objectives of the NES. During the preparation of the Strategic Guidelines of the Energy Transition Agenda, the objectives of the aforementioned Law have been taken into account, as well as the continuity of programs proposed in the NEP 2015-2050, as an indicative basis for long-term planning.

Strategic planning uses scenarios to limit uncertainty, and history has taught us that ignoring or discontinuing good projects are mistakes that have a high cost for society as a whole. It is essential to update scenarios and projections supported by the analysis of past projections, which reinforce our present and future courses of action.

The results of the NEP 2015-2050 consider the direct effects of the implementation of technologies such as renewable energies, energy efficiency, electric mobility, and fuel quality, among others.

In the next table, we develop an inventory and evaluation about the progress and compliance of the public policies in the **National energy Plan 2015-2050.**

Implemented energy policies based on the National energy Plan 2015-2050	
Strengthening of the power sector in Panama	
Act on guidelines Updating of the tender to buy energy	Specific actions Current purchase measures with a new model of evaluation of the energy and power offer
Implementation of the law of rational and efficient energy use.	
Energy performs labelling	• Approved 14 Indexes for energy efficiency. Six (6) Rules and Technic Regulation of energy efficiency issued for four (4) types of AA, refrigerators, and engines
Green code for construction	• Guide of the sustainable building for Panama • Simplified method of implementation and calculus tool. • Passing and publication of the Sustainable Building Regulation (SBR) • Development programmes of the solar heater market.
UREE FUNDS	• Proposal of restructuring of the funding fund for the energy efficiency (Evaluation of the MEF)
Sustainable cities	
Urban mobility	• Pilot project of the electric bus in the Historic centre which is under the care of the Panama Municipal • Pilot project of electric bus in the centre-west area routes of Panama City. • Calculus of the base line of imported car emissions • E-mobility strategy
Other initiatives	
Energy and ecuation programme	• More than 300.000 students trained in a national level in topics about rational and efficient energy use. • In process of presenting the proposal of adding energy lessons in the curricula to MEDUCA
Reorganisation of renewable sources laws	• The law criteria of incentives by technology were kept
International interconnexions	• Feasibility studies to increase the capacity to 600MW and progress in the Third protocol. • Progress on the updated environmental impact studies for the proposed route. Bilateral talks to make feasible and execute the Colombia-Panama electricity interconnection.
Integrated management of the river basin (Use of Water Law of 1966)	• We support the elaboration of the National Plan of Hydrological security. 36 committees have been shaped from a total of 52 basins. Through Mi Ambiente the Fundación Natura strengthen the basin committees
Assignation of a price depending on the carbon content of fuels.	• Nowadays, a cooperation of the Partnership for Market Readiness has been carried out, in order to assess the alternatives to the carbon prices in the country
Hydrocarbon sector	
Regulation of the natural gas	• Draft act to standardize the provision of the public natural gas service
Petroleum and gas exploration	• Agreement for the seismic survey
Coverage of the electric demand and the entrance of natural gas as and transition fuel	• Hiring 3 thermoscouple projects basing it on natural gas
Quality of the imported fuels	• Approved resolution to decrease the sulphur level in diesel to 15ppm

Conclusions

The success of the energy transition will depend firstly on a broad alliance, including civil society, politics, science, and business to develop a convincing alternative. Also, the alliance must strengthen sectoral institutions.

This transition, although gradual, will not be without friction, since it involves a profound reordering of the current model and the structuring of the market, as is already happening in other latitudes.

To advance in the direction we want it is important to plan the route and establish a strategy that is the outcome of the contribution between the different society statements. Moreover, it is also important to establish the monitoring, verification, and transparency mechanism, and the accountability of the adopted measures.

In a context of sector development through market mechanisms, where efficiency, competition, and competitiveness are the basis of its functioning, the market does not always provide the decisions that lead to the preservation of the common good and the preferences that society demands from this sector, which is still considered a public service. Panamanian society expects the state to play a role of facilitation and regulation that corrects the market's failures and considers its interests in the definition of a solid and consistent strategy, in line with their needs, and that represents its rights as a user.

On the other hand, the three elements that need and immediate action are: i). improve and audit the investment in distribution infrastructures, ii). implement a sustainable transport system, and iii). adjust the outdated current normative in the hydrocarbon sector.

A fundamental pillar is to guarantee universal access to modern energy to the total population. Principally, in rural regions to bring a human development to those Panamanians for whom the energy transition will finally go from 19th-century conditions to the 21st century.

Finally, in the path to a developed country, it is urgent to create actions that will allow the citizenship to know and value energy by promoting a sustainable energy culture, at all levels of society, especially to our children. By doing this in a planned and systematic way, we will have a new generation of young Panamanians who are aware of the importance of sustainable energy and its role in society and the planet. Therefore, they will be interested in promoting and caring for it.

ANNEX 1

Technical cooperations

The first strategic line for planning is to have information for timely decision-making, which highlights the importance of having relevant information for the creation of public policies that allows the energy sector as a whole. In order to meet this first condition, we maintain technical cooperation for the development of the projects listed below.

Executed Projects – Year 2020

Organization/Entity	Consultancy	Description
IDB	Incentive and Support program for the transition to electric mobility	The objective of the project is to provide a set of products to support the implementation of a successful transition to electric mobility, such as the impact analysis of Panama's national electric mobility strategy and the evaluation of existing legislation and regulations.
Kigaly Coolin Efficiency Program (K-CEP)/ UNDP	Development of the Cooling down strategy plan of Panama in conjunction with the Ministry of Health (Ozone Unity)	Link technological choice and regulatory and normative developments in the Air Conditioning and Refrigeration sector to energy efficiency, thus linking them to the elimination of the substances controlled by the Montreal Protocol.
European Union cooperation (EUTAF)	Strengthening of the development capacity of a solar heater market in Panama	The general objective of this assignment is to provide assistance to reduce CO2 emissions cost-effectively by supporting the development of the SWH market in Panama. This support will be given through the development of a manual for the manufacture of solar thermal equipment, a Technical Standard for the Installation of SWH Systems, and an SWH Design Course for Trainers of Engineers and Architects from the SPIA.

Projects in execution for the agenda:

Organization/Entity	Consultancy	Description
CAEP-NDC Partnership/- World bank	Cost-benefits analysis of the substitution of diesel buses by electric buses	Provide the necessary analysis and the capacity development to propose a transition strategy for a worthwhile electric mobility. As for accelerating its use in the public transport system at a long-term.
CAE-NDC Partnership/- World bank	Cost-benefit study of the modernization of the public fleets (government)	Provide the necessary analysis and capacity development to propose a long-term and cost-effective transition strategy to electric mobility and accelerate its deployment in the public transport system.
GCF/UNEP	GCF Readiness project "moving forward with a regional approach to the e-mobility in Latin America".	In the case of Panama, there is the support of an on-site consultant to support the implementation of the ENME implementation and the coordination of CIME subcommittee.
CTNC/UNEP	Accelerating the transition to the sustainable mobility and the reduction of emissions in the metropolitan area.	The general objective of the entire project is to provide the necessary tools to better focus the use of the country's resources in its efforts to improve the sustainability of the transportation sector, without emissions of greenhouse gases or pollutants for human health. An evaluation of obstacles to the acquisition of electric vehicles in Panama is currently being developed.
IDB/OLADE	Design of the National Energy Information System	Implement the National energy information system (siePanama, for its acronym in Spanish) using an informatic application developed by OLADE, that allows automatizing storage, process, and publication of the energy information of the country.
World Bank	Evaluation of the Institutional Strengthening framework in the Power sector.	Analyze the evolution of the regulatory framework and the institutionality of the power sector in Panama after the analysis and recommendations made by the National Energy Secretariat (NES). Propose, considering the challenges and expected changes at the mid and long term, measures and principles for i) strengthening the institutional framework, particularly the medium and long term predictability, credibility, and sustainability; and ii) clarify the scope and consequences of each institution's responsibilities, related to their effectiveness and efficiency.

Organization/Entity	Consultancy	Description
IDB	Development the transitory mechanisms to guarantee a strategic reserve for the National Interconnected System	Technical support to the National Energy Secretariat (NES) in the creation of a transitory mechanism to guarantee a strategic reserve for the interconnected national System.
World bank	Concept design of the energy efficiency fund.	Technical support for: a) develop the necessary pre-feasibility studies to design and implement an EE fund, and b) structure the EE fund under the Public Private Association (PPA) that would put the effort on the privates entities.
PMR/World Bank	Project for the analysis of carbon price policies and their impacts, support for the preparation of carbon markets, MRV for the energy sector, and capacity strengthening.	Explore the different carbon pricing instruments available to the energy sector, understand which ones are most suitable for the country context and provide a clear road map to its implementation.
PMR Just in Time/ World Bank	Development of a MRV system for the energy sector	Support the South-south collaboration between Panama and Costa Rica/Jordan for the implementation of an MRV system in Panama, taking advantage and benefiting from the experience and knowledge acquired in the framework of the PMR program. The Ministry of Environment (MiAmbiente) and the National Energy Secretariat (NES) have request support to develop capacities and create a local team that will support the Panama Government to implement the MRV system in the context of the National platform to the Climate Transparency.
GEF/UNEP	Creation of a Solar Water Heater Market for Panama	Development of all necessary activities for the creation of a market for solar water heaters in Panama and the creation of pilot projects.
Austrian Development Agency/OLADE	Support to Panama to strengthen the energy efficiency financing mechanism (scrap management and disposal strategy) and diagnosis and recommendations to improve the Energy Administrators program in the public sector PALCEEII.	(1) With a view to strengthening the Energy Administrators Program in the public sector of the Republic of Panama, a general diagnosis of the current program will be develop and improvement proposals will be done that will to facilitate its implementation, generally speaking, in the public entities and once implemented it guarantee sustainability. 2) Alignment with the current programmatic development of the NES in this field in order to improve the structuring of a MRV aimed at managing emission reductions from EE improvement activities in public and commercial buildings in Panama.
ECLA	Publication of the energy Efficiency indicators base of Panama (EEIBP)	Publication of the Panamanian report of the energy efficiency indicator bases in Panama
Euroclima+/ AECID	Training for the certification of professionals and the accreditation in energy efficiency for enterprises	The project aims to create a process of professional education and training with the objective of obtaining certified professionals and accredited companies specialized in energy efficiency, which guarantee the results of the projects from their formulation, implementation and monitoring, as well as contributing to the development of each of the countries (Panama and El Salvador) as achieving the final objective of reducing GHGs and climate change impacts. It is also intended to develop national certification schemes based on ISO/IEC 17011-20-21-24-25/ISO 50001-02-06-15.

Organization/Body	Consultancy	Description
Euroclima+/AECID	Creation of the Energy balance according to the Useful energy Terms for the industrial, residential, transport and/or commercial sectors	Strengthen the technical capacity of the institutions in charge of energy planning in the management of information at the level of energy efficiency policies and plans.
AECID/UNEP	Support for the Design of the Funding Program of Solar photovoltaic energy (PV) distributed in Panama and Colombia	The project “Design of the funding Program of solar photovoltaic energy (PV) distributed in Panama and Colombia” will help the creation of a favorable environment to canalize the funding to the installation of PV solar systems distributed all over the funding community, particularly, in the commercial bank.
IDB	Feasibility study of a pilot project to decrease subsidies (gas/electric) through the use of photovoltaic solar panels and efficient technology.	Conduct a legal, technical and financial feasibility study of a pilot project that will consist of installing electricity generation units for self- consumption, as well as equipping residences that receive electricity tariff subsidies (consumption < 300 kWh) and the 25-pound LPG cylinder, in order to compensate for the subsidised energy and thus gradually reduce the energy contributions and subsidies provided by the State.
UNEP	Development of the economic impact of the ETA	Development of a "decarbonisation scenario" of the national post-COVID19 economic recovery plan, through the promotion of sustainable energy and transport, which enable economic growth and the opportunities for employment (Zero Carbon Panama report). Such actions would include the analysis of economic dynamization potential of renewable energies, distributed solar generation, electric mobility, universal access to energy, the modernization of the transmission and distribution grid infrastructure, as well as energy efficiency and strengthening of the State's capacities in energy issues; The Energy Transition Agenda will thus be integrated into the energy the measures to respond to the economic reactivation post COVID-19.
UNDP	Development of the social impact of the ETA	Development of a a qualitative and quantitative analysis about the interrelations between the sustainable energy and the agreement of the Sustainable Development Goal 7, poverty and the inequality in Panama in the framework of the Strategic guidelines of the Energy Transition Agenda 2020-2030
OLADE	Impact of climate change on energy planning: screening for the global assessment of climate vulnerability and risks of the Latin American and Caribbean energy system.	Study of the impact of climate change on energy planning: screening for the global evaluation of the vulnerability and climate risks of Panama's energy system with recommendations that would later serve for the development of an Adaptation Plan for our country.

ANNEX 2

Links to news from national and international media **after covid 19**

https://www.climatechangenews.com/2020/04/09/european-green-deal-must-central-resilient-recovery-covid-19/

https://www.cepal.org/es/comunicados/dia-mundial-medio-ambiente-la-cepal-recuerda-que-ambiente-desarrollo-estan-vinculados

https://elcapitalfinanciero.com/panama-en-miras-a-establecer-una-economia-verde-post-covid-19/

https://www.iea.org/commentaries/now-is-the-time-to-plan-the-economic-recovery-the-world-needs

https://www.energynews.es/reunion-virtual-foro-davos-e-iea-impacto-del-covid-19/

http://www.energy-transitions.org/content/7-Priorities-for-Global-Recovery

https://coalition.irena.org/-/media/Files/IRENA/Coalition-for-Action/Publication/IRENA_Coalition_COVID-19_response.pdf

https://www.bbc.com/mundo/noticias-internacional-52411543

https://www.nuso.org/articulo/reflexiones-para-un-mundo-post-coronavirus/

https://www.cepal.org/es/comunicados/la-unica-opcion-estrategica-mediano-plazo-mitigar-efectos-covid-19-la-region-es-avanzar

https://www.jornada.com.mx/2020/05/30/opinion/014a1pol

https://mobile-reuters-com.cdn.ampproject.org/c/s/mobile.reuters.com/article/amp/idUSKBN2331RB

https://elpais.com/sociedad/2020-05-19/el-gobierno-lanza-la-ley-de-cambio-climatico-como-via-para-salir-de-la-crisis-del-coronavirus.html?ssm=whatsapp

https://www.spglobal.com/platts/en/market-insights/special-reports/oil/sustainability-shift?mkt_tok=eyjpijoitnpjnvpxvtjzvfzoww1wbsisinqioijntwjodulhznvzsezuylwvy2lwuhvlatrza1riswl6dw9gajfbr09rtehiexdkvnruzmpxvnvpdmvuce1wv29mtm5nejaxue9puetrsufyeehznlzkkzvncfjwvuvunmjut2e3vgjzwxd6emp0cjy5efwvejhcdstpt3yrwxjnzetzin0%3d

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