# NATIONAL STRATEGY FOR ELECTRIC MOBILITY

# PANAMA

REPÚBLICA DE PANAMÁ — GOBIERNO NACIONAL — | MINISTERIO DE LA PRESIDENCIA Secretaría de Energía | ONU medio ambiente | WORLD ENERGY COUNCIL PANAMA | Euroclima+ | Financiado por la Unión Europea | REPÚBLICA DE PANAMÁ — GOBIERNO NACIONAL — | MINISTERIO DE AMBIENTE

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# ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| **ACODECO** | Authority for the Protection of the Consumer and Defense of Competition |
| **ADAP** | Automobile Dealers Association of Panama |
| **ASEP** | National Public Service Authority |
| **ATTT** | Land Transit and Transportation Authority |
| **CND** | National Dispatch Center |
| **BCBRP** | Meritorious Fire Department of Panama |
| **CO2** | Carbon Dioxide |
| **CTCN** | Climate Technology Center and Network |
| **ENSA** | Elektra Noreste S.A. - Utilty company |
| **ETESA** | Electric Transmission Company S.A. / Empresa de Transmisión Electrica S.A. |
| **GEI** | Greenhouse Gases |
| **Gg CO2e** | Giga grams of Carbon Dioxide equivalents |
| **GFEI** | Global Fuel Economy Initiative |
| **IFARHU** | Institute for Training and Use of Human Resources |
| **INEC** | National Institute of Statistics and Census |
| **INADEH** | National Institute for Professional and Human Development Training |
| **ITSE** | Specialized Higher Technical Institute |
| **JTIA** | Technical Board of Engineering and Architecture |
| **MEDUCA** | Ministry of Education |
| **MEF** | Ministry of Economy and Finance |
| **MiAmbiente** | Ministry of Environment |
| **MICI** | Ministry of Commerce and Industries |
| **MIRE** | Ministry of Foreign Affairs |
| **MINSA** | Ministry of Health |
| **MIVIOT** | Ministry of Housing and Land Use Planning |
| **MOVE** | Regional Platform for Electric Mobility progression in Latin America |
| **MOP** | Ministry of Public Works |
| **MUPA** | Municipality of Panama |
| **NDC** | Nationally determined contributions |
| **NAMA** | National appropriate mitigation action for each country |
| **ONEP** | United Nations Environment Programme |
| **PGBC** | Panama Green Building Council |
| **ppm** | Parts per million |
| **SENACYT** | National Secretariat for Science, Technology and Innovation |
| **SIN** | National Interconnected System |
| **SNE** | National Energy Secretariat of Panama |
| **UP** | University of Panama |
| **UTP** | Technological University of Panama |
| **VE** | Electric vehicle |
| **WEC** | World Energy Council |

# FOREWORD

This document has been developed by the United Nations Environment Programme (UNEP) at the request of Panama's Ministry of Environment and National Energy Secretariat, with the support of Euroclima+. This strategy was developed with the valuable support of the Panama National Member Committee working group for electric mobility of the World Energy Council (WEC Panama). Similarly, to carry out this strategy the consultant Maxim Rebolledo was contracted and fulfilled the role of facilitator and principal author of this document.

# ACKNOWLEDGMENTS


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# DISCLAIMER

# INTRODUCTION

Keeping in line with its promise to reduce the greenhouse gas emissions of the transport sector, which according to recent figures make up 23.7% of Panama's emissions, the National Government of Panama is making progress in strengthening measures for mitigating and adapting to climate change.

Proof of this can be seen from actions taken to promote sustainable mobility and alternative means of transport by different Government institutions, including the Ministry of Environment, the National Energy Secretariat, the Panamanian Town Council and MiBus, in response to an increase in the use of mobile transport which, mainly use fossil fuels and thereby release greenhouse gas emissions and particulate matter that cause air contamination which affects population's health and quality of life.

To this effect, in mid-2018, the Ministry of Environment and the National Energy Secretariat requested the collaboration of the United Nations Environment Programme (UNEP), from their Latin America and the Caribbean office, for the development of a National Strategy for Electric Mobility. This request was achieved, thanks to the support of Euroclima+. The objective of this strategy is to enhance and unify programs developed by the Government and private sector to tackle challenges faced on the subject of mobility and quality of life in the country's cities, through electric mobility. This, enhanced by a comprehensive vision that seeks to improve mobility by prompting the use of public transport and facilitate mobility by non-motorized means.

For this, a Coordination Committee was established with the participation of:

- Ministry of Environment
- National Energy Secretariat
- WEC Panama
- MiBus
- Panama Canal Authority
- ADAP
- Panama City Town Council
- ASEP
- ATTT

Similarly, the coordination committee along with relevant actors and institutions defines the subject areas:

1. Education, Investigation and Development.
2. Infrastructure for Recharging Electric Vehicles.
3. Electric Vehicle Market.
4. Incentives and Regulation.
5. Public Transport.
6. Associated Businesses.
7. Citizen Empowerment.

Throughout the process of constructing the strategy a variety of meetings were held on the subject areas with the support of the Panama Member Committee of the World Energy Council (WEC).

The National Strategy for Electric Mobility contains lines of action which serve as a guide for principal actors. These lines of actions must be carried out correctly by establishing a governance and coordination structure for the public and private sector that will oversee the implementation of the strategy through concrete initiatives.

# BENEFITS OF THE TRANSITION TO ELECTRIC MOBILITY

In accordance with the automobile registry information provided by the Automobile Dealers Association of Panama (ADAP), it is estimated that 218 electric vehicles were registered in Panama between 2011 and March 2019, 48 being electric battery powered vehicles and 170 being hybrid plug-ins. If we include conventional hybrids in the analysis we get a total figure of 1,961 electric and hybrid cars with a participating percentage of 0.83% of the total (11,292) vehicles registered in the year of 2019, between January and March.

Emissions emanating from the combustible mobile sub-sector make up 23.7% of the country's total emissions and 40.8% of the energy sector's emissions[ii]. This indicates that de-carbonizing terrestrial transport must be one of the primary policy pillars for reducing emissions in order to combat climate change in Panama.

Panama is in the process of reporting progress and amplifying the ambitions of its climate action or NDC, through which it seeks to make commitments in the transport sector; the current NDC goals for the energy sector, are for the year 2030, and so 2030 has been set as the target year for the implementation of this electric mobility strategy. Electric mobility is key for mitigating emissions of the transport sector, hence its contribution could be included in the NDCs and be presented as an appropriate mitigating action taken by Panama or NAMA. Implementing this electric mobility strategy requires a significant amount of financial resources which could be found by establishing clear goals for the transport sector that would help form potential contributions to the mitigation of greenhouse gases.

This scenario obliges us to prepare for a transformation of the transport sector and the introduction of more efficient vehicles. Electric vehicle technology offers more efficiency compared to internal combustion engine vehicles.

Panama has been active in implementing electric vehicle pilots and developing import incentives. Nevertheless, further stimulation will be needed in order to achieve the proposed goals.

Electric vehicles present an interesting opportunity for the country as well as the world for reaching the described goals. Electric mobility has increased its environmental and economic efficiency in a short period of time which will help in reducing GHG emissions, especially if their energy is obtained from a mix of increasingly renewable sources.

The creation of conducive conditions and the coordination of public policies will be needed to ensure that the development of electric mobility occurs in such a way that its benefits can be fully taken advantage of. A large-scale adoption of electric mobility will encompass the energy, environmental and transport sectors. As well as the possible contribution of the consumer energy consumption and emissions goals mentioned, the impact of mobility are also relevant topics of public health. The development of electric vehicles brings a series of advancements such as connected and autonomous vehicles, the internet of things, and the way in which people travel, subjects that are of importance today and will experience a boom in the coming years.

Despite their energetic and environmental efficiency, electric vehicles contribute to traffic just like conventional ones, and for this reason it is crucial that such technology is developed in conjunction with efforts to make transport more efficient. In this sense electric buses are an interesting alternative that complement the strategy and align with efforts in areas seeking to maximize efficiency and achieve sustainable mobility, such as mass transportation including Metro lines and the recuperation of public spaces, among others.

# METHODOLOGY

The strategy is a joint effort of Panama's public and private sector, the elaboration of which entailed meetings and consultations being held with specific agendas of discussion, among those:

**1.**The participative process which was initiated by a workshop to summon key actors involved, inviting them to give their support for the strategy.

**2.**Six meetings were held with the coordinating committee for the purpose of evaluating products and ensuring that the strategy's contents remain consensual.

**3.**To discuss specific topics the following subject specific meetings were held:

- Regulations, Standards and incentives. Participants: ASEP, PGBC, SNE, MiAmbiente, ATTT, WEC Panama, UN.
- Education. Participants: UTP, INADEH, ITSE, ENSA, ADAP, Bavarian Motors, Celsia, SNE, WEC Panama, UN.
- Infrastructure. Participants : ABB, BMW, ENSA, WEC Panama, UN, House of Batteries, SNA, BYD, Celsia, ADAP, Naturgy.
- Fleets. Participants: Banco General, ENSA, TRASERVI, BYD, WEC Panama, UN.
- Financing. Participants: Commercial bank and development bank. WEC Panmama, BID, UN, Banco General.
- Insurance. Participants: WEC Panama, Banco General, SURA, ASSA, UN.

**4.** Meetings were held with the following principal actors of the strategic sectors:

- National Energy Secretariat
- Ministry of Environment
- WEC Panama
- UN Environment
- Automobile Dealers Association of Panama (ADAP)
- MiBus
- Bavarian Motors
- BYD
- Electrobike

**5.** Three surveys were conducted to determine the different parameters relevant to the strategy. The surveys were:

- Open survey to determine the barriers and opportunities for the growth of electric mobility in Panama.
- Members survey conducted by ADAP to determine its vision with respect to the inclusion of electric vehicles in its offers.
- Survey for manufacturers of the different makes distributed by ADAP to determine the availability of electric models for Panama.

In the wake of this joint effort four strategic pillars have been identified, each has its own goals and specific lines of action that are to be executed in accordance with four priority levels which determine the urgency of execution for the optimum advancement of the strategy. The four pillars are:

1. Governance
2. Standards
3. Strategic Sectors
4. Education

24 lines of action which are the result of meetings of the coordinating committee, information obtained by key actors, needs raised in topic tables and research into global and regional tendencies, are presented in the strategy. For an enhanced commitment to the strategy there are two additional elements that accompany the lines of action: responsible actors and priority. Firstly, when convenient, the lines of action included have been separated according to the mode of transport because the approach for carrying out the strategy is not the same for private fleets, public fleets and fleets of mass public transportation. For each line of action a list of the required actors for its development is made, with the leader for the execution of such actions being identified first. Similarly, priority should be given to the lines of action that enable the creation of an execution schedule for the strategy once the commitments for executing such actions can be made.

# GOALS OF THE STRATEGY

Using historical databases on the behavior of Panama's automobile market, vehicles effciency in the transport sector, projections for the electric vehicle international market and the emissions of the transport sub-sector within Panama's energy sector, a projection which serves as a basis for the goals of the national strategy for electric mobility has been created. For more details on the premises used can be referred to in Annex A.

## By the year 2030

**10%-20%**

### Private Vehicles

of the total of the fleet of private vehicles will be electric

**25%-40%**

### Of the Sales

of private vehicles will be electric vehicle sales

**15%-35%**

### Of Buses

of authorized fleets will be electric

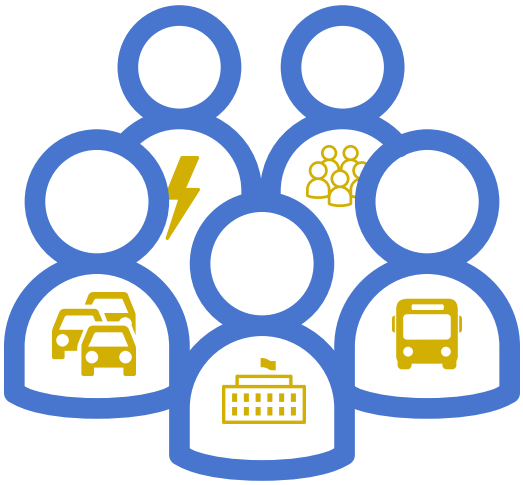
**25%-50%**

### Of the Public Fleets

shall be composed of electric vehicles

# LINES OF ACTION FOR THE STRATEGY

# First Strategic Pillar: Governance



1. Put in place a permanent programme for multi-sector governance and coordination of electric mobility in Panama.

- **Line of Action 1:** Inter-institutional Governance.
- **Line of Action 2:** Public-Private Governance.

# Specific Actions

## 1 HIGH Priority

Following the introduction of the National Electric Mobility Strategy each line of action should be entrenched in the development of activities as well as objectives and specific indicators created associated to such, accompanied by an execution schedule of the coordinating the activities. These additional actions will fulfil a complete implementation of the strategy.

**Responsible actors:** SNE / MiAmbiente / ATTT / Town Council / ASEP / National Assembly / MiBus

## 2 HIGH Priority

Evaluation and identification of opportunities for improvements to the existing legal and regulatory framework of the transport sector that will allow the implementation of the National Electric Mobility Strategy.

**Responsible Actors:** SNE / MiAmbiente / ATTT / Town Councils / ASEP / National Assembly / MiBus

# Line of action 1

Establish the inter-institutional arrangements for the governance of the transport sector.

## Interinstitutional Governance

In order to execute the strategy there must be institutional structure capable of coordinating its execution. This group should possess financial and human resources, along with the capacity to call upon other government agencies in order fulfill the key points of the strategy.

The SNE attended to the first step of this need by forming an inter-institutional group via Resolution 4169[iii], of February 12th 2019, which created the Intergovernmental Commission of Electric Mobility. There are plans for this commission to coordinate the execution and monitor Panama's National Strategy for Electric Mobility (ENME) following UNEP's support for the development of the National Energy Strategy, with the following institutions:

1. A representative of the National Energy Secretariat.
2. A representative of the Ministry of Environment.
3. A representative of the Municipality of Panama.
4. A representative of the Land Transit and Transportation Authority (ATTT).
5. A representative of the National Public Service Authority (ASEP).
6. A representative of Transporte Masivo de Panama, S.A. (MiBus).

## Line of action 2

Encourage the involvement of the private sector, academia and civil society (e.g. electric companies, financial sector, importers and assemblers, consumers).

## Public-Private Governance

A large group of public and private actors assisted efforts to elaborate this strategy. From the public sector two groups stand out as generating much input in electric mobility. They are WEC Panama and ADAP. In the commission of electric mobility WEC Panama's purpose is to promote and spread knowledge on electric mobility through international campaigns and studies for which it has co-directed round-table meetings on subject matters of the strategy.

## Specific Action

### 1 High Priority

To consolidate the periodic participation of governmental, education and private sector institutions at discussions that guarantee that the subjects of governance, standards, standardization and education remain coherent with the reality of the country from a governmental and industry perspective.

**Responsible Actors: SNE / MiAmbiente / ATTT / Town Council / ASEP / WEC Panama / ADAP / UTP / UP / Chamber of Commerce, Industry and Agriculture / APEDE**

ADAP was a great help in identifying the existing automobile park and the current and future offers using its own information and surveys at a local and national level.

The implementation of the National Strategy for Electric Mobility requires the participation of the private sector, the government should encourage and facilitate the development of private incentives in the realm of electric mobility and give signals that guide such initiatives in a way that aligns them with the National Strategy and that in turn receives feedback from the private sector to reinforce and unify public and private efforts, thereby achieving a synergy that facilitates the deployment of electric vehicle technology throughout the country.

# Second Strategic Pillar: Standards

1. **Update and create instruments for standardizing** and promoting electric vehicles and disincentivizing of the use of combustible fossil fuels.

- **Line of Action 3:** Incentives (fiscal and non-fiscal).
- **Line of Action 4:** Maximum limit on emissions, minimum performance and tagged vehicles.
- **Line of Action 5:** Technical vehicle inspections (revised) including emissions measurement.
- **Line of Action 6:** Instruments for carbon pricing (carbon tax, cap and trading or others).
- **Line of Action 7:** Insurance, homologation and interoperability.

2. **Develop the standards and regulations needed** to develop the **infrastructure, commercialization and operation** of electric mobility.

- **Line of Action 8:** Promotion of the inclusion of charging stations within new edifications and urban development plans.
- **Line of Action 9:** Guidelines as to the payment for charging services of EVs.
- **Line of Action 10:** Electric network and charging of vehicles.
- **Line of Action 11:** Regulations and standards for charging infrastructure.
- **Line of Action 12:** Commercialization of electricity for charging EVs.

3. Promote **financing mechanisms** and new businesses and venture models associated with electric mobility.

- **Line of Action 13:** Financing studies on the feasibility and formulation of projects.
- **Line of Action 14:** Financing the replacement of fleets - Development Bank.
- **Line of Action 15:** Finance and insurance for individual consumers and for fleets - Commercial Bank

4. Guarantee the **environmental sustainability** of the transition to electric mobility.

- **Line of Action 16:** Management of old vehicles.
- **Line of Action 17:** Management of batteries.

# Line of Action 3

Update and create (fiscal and non-fiscal) incentives to promote the use of electric vehicles.

## Fiscal and Non-fiscal incentives

Following the results of the fiscal incentive implemented via Law 69 of 12 October 2012 and given the impact it has had on the importation of electric models, this type of incentive should be studied again. It is recommended that consultations take place with ADAP and other private sector actors as to the attractiveness of a fiscal incentive law and finding a type which would bring about the greatest impact on the importation of electric vehicles. Fiscal incentives which allow for exceptions as to selective tax for the consumer, the ITBMS (Tax on Property and Service Transfers) over importation and the ITBMS over the sales have been debated. These possibilities joined with the possibility of importing new electric models that are manufactured by the car brands operating ADAP and other makes like BYD over the next 3 years, could bring about an incentive which closes the price gap between electric vehicles and internal combustion engine vehicles.

It is necessary to create such incentives in order to accelerate the transition to electric vehicles of the transport sector, these incentives should be structured in a way that targets the entire supply chain and all stakeholders, and be attractive to importers, distributors and customers as well as private parties interested in offering charging services.

The incentives should be aimed at bridging a clearly identified gap, and should include mechanisms for verifying and evaluating the impact of the incentive. These incentives should rely on a calendar of implementation which sets clear conditions for investors and establishes the gradual reduction of the incentives until the point at which the objectives of the incentives have been achieved and the technology can compete without incentivization.

As well as the fiscal incentives, indirect stimulants that influence buyer decision-making at the point of choosing a vehicle should be considered. In this sense various mechanisms exist which could be put into place:

1.Preferential Parking. Parking spaces marked out for the use of electric vehicles can be created for shops and offices throughout the country. These parking spaces could also have facilities for charging vehicles, offering this service additionally.

2. Exclusive lanes. In Panama many important roads are being expanded and exclusive lanes with access permitted to more efficient vehicles for a time frame could be considered. The same could be done for existing roads, thereby creating an attractive option that would reduce time users spent in traffic. The implementation of exclusive lanes for buses would be most favorable since it would allow electric buses to be included for routes that, normally, could not be used by vehicles of this technology because they are too routes or not favorable for other reasons.

## Specific Actions

### 1 HIGH Priority

Carry out studies as to the effect on the economy and vehicles market of diverse fiscal incentive alternatives for electric vehicles, chargers and associated equipment, incorporating the environmental component.

**Responsible actors: SNE / MiAmbiente / MEF / National Assembly / Vehicle Importers**

### 2 HIGH Priority

Evaluate the alternative non-fiscal incentives that exist and create the most effective incentives; the alternatives should be analysed, considering ease of implementation, expected benefits and the establishment of a priority list for implementation; developing an itinerary of non-fiscal incentives based on an economic evaluation that allows for the selection of candidates and times limit for each incentive.

**Responsible Actors: SNE / MiAmbiente / Municipalities / Vehicle Importers / ATTT**

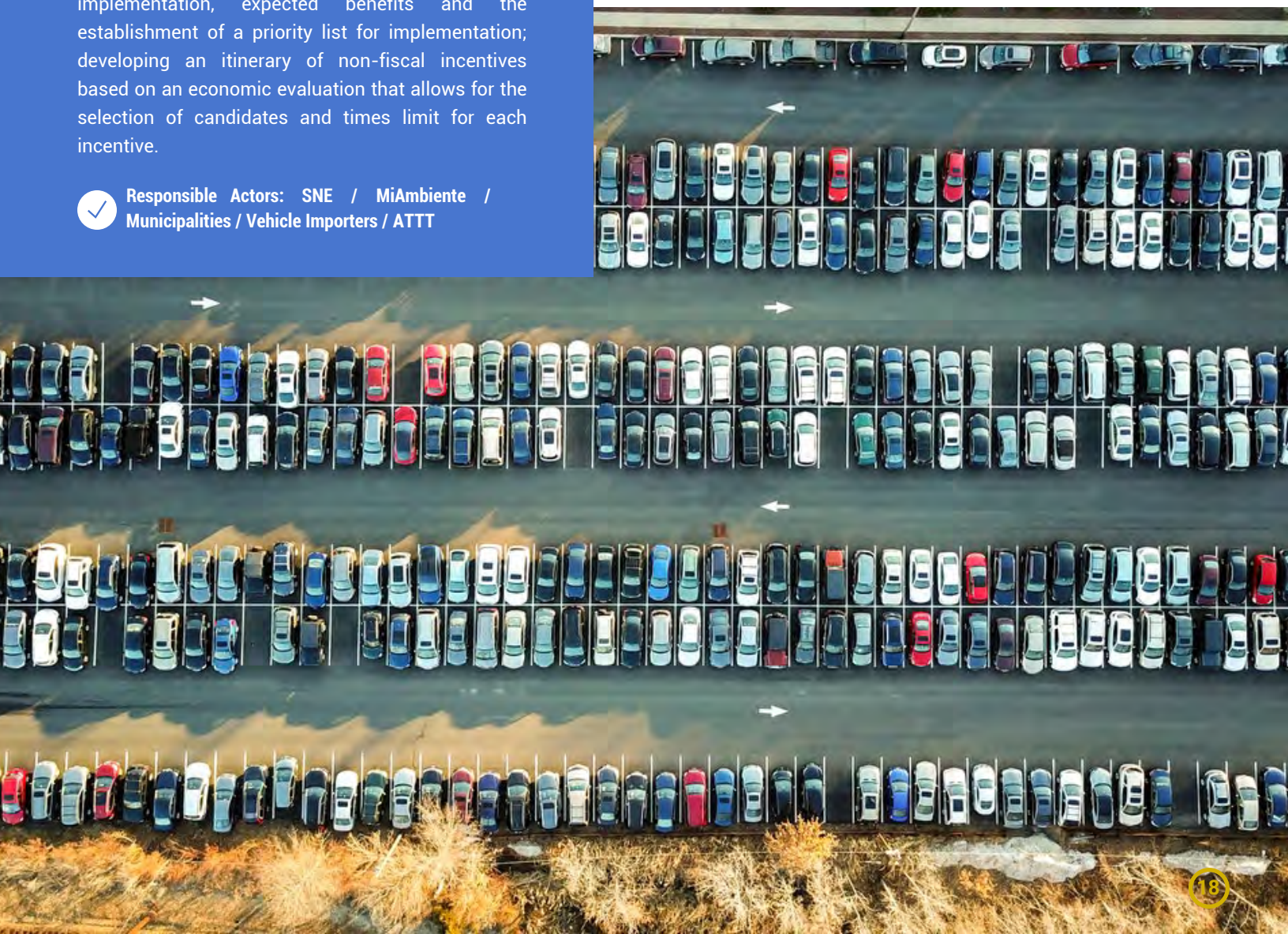
## Line of Action 3

Update and create incentives (fiscal and non-fiscal) for promoting the use of electric vehicles.

## Fiscal and Non-fiscal incentives

3. Preferential tariffs at toll roads. Many people live or work in places that require the use of toll roads for access. A temporary incentive for the use of toll roads that results in a saving for the user, could encourage the decision to acquire a more efficient vehicle.

4. Reduction in the price of license plates and vehicle inspections. The payment of license plates is currently linked to the cost, type and use of the vehicle, as established by the municipal agreement No. 40 of the 19th of April of 2011 [IV]. Various categories could be included for more efficient vehicles by granting them a reduction in the annual price of the license plate. Likewise, this incentive could be applied to the cost of the revised vehicle required for circulation in the country.



## Line of action 4

Establish maximum emissions and a minimum performance requirements for vehicles (according to vehicle type), including tagging and standard testing methods.

## Maximum emissions limit and minimum performance and vehicle tagging

Given the success of electric and electromechanic tagging equipment that the Panamanian government currently promotes through the National Energy Secretariat and the General Directorate of Standards and Industrial Technology, Ministry of Commerce and Industry, tags that enable a purchaser to monitor the amount of emissions emitted by a vehicle and its efficiency should be created for imported vehicles. This should be done in a way that will cause such factors to influence the purchaser's decision-making. Likewise, along with the informative aspect, the regulations must establish the minimum accepted performance requirements for vehicles imported to the country (by category or type of vehicle). This would create a barrier for less efficient cars, which would indirectly help to make electric vehicles more competitive compared with internal combustion engine motor vehicles.

Panama has legislation relating to vehicle emissions but is yet to implement it. It is necessary to do so by, for example, revising the established limits and updating them periodically; this will form a barrier to inefficient and highly contaminating vehicles, which would make an electric vehicle substitution a favourable option.

With respect to used (second-hand) cars entering the country, efforts must be made to decrease the importation of vehicles that do not comply with the emissions levels standards like those enumerated in the 95 law blueprint which indicates any used cars entering the country should be in perfect condition as to the mechanics, electrics, framework and chassis and its contaminating gas emissions should be within the permitted limits, in a way that unifies all the requisites for safety and that complies with current legislation in terms of environmental contamination.



## Specific Actions

### 1 HIGH Priority

Implement standards of vehicle emissions, including penalties for vehicles that exceed established limits.

**Responsible Actors: SNE / MiAmbiente / Vehicle Importers.**

### 2 MEDIUM Priority

Establish a minimum energy efficiency index for new vehicles that are introduced to form a part of the country's vehicular fleet.

**Responsible Actors: SNE / Management Committee for the Energy Efficiency Design Index / Vehicle Importers / ATTT**

### 3 MEDIUM Priority

Demand that all cars imported into the country have vehicle tagging and comply with established limits (emissions and efficiency), creating or adopting standards which relate to testing methods for determining the efficiency and requirements of cars.

**Responsible Actors: SNE / MiAmbiente / MICI / ATTT / Vehicle Importers / Customs / ACODECO**

### 4 LOW Priority

Establish zero emissions zones, with facilities for mobilities (electric bicycle rental) that are integrated into the peripheries of public transport.

**Responsible Actors: Town Council / MIVIOT / SNE / MiAmbiente / MINSA**

## Specific Actions

### 1 HIGH Priority

Review and update the legislation that currently governs the procedure for vehicle inspections ensuring that emissions limits are in line with international reality and Panama's international commitments.

**Responsible Actors: ATTT / MiAmbiente / MINSA / National Assembly**

### 2 HIGH Priority

Create mechanisms needed for the modernization of permitted workshops or create a new network of workshops which possess the sampling equipment required for the measuring vehicle emissions.

**Responsible Actors: ATTT / Private Sector**

## Line of Action 5

Modernize and implement technical vehicle inspections which include the measuring of GHG emanating from vehicles in an effective way.

# Technical vehicle inspection (revised) with emissions measurements

Measuring of emissions during the process of reviewing vehicles for circulation in Panama is already included in Panamanian Legislation. Article 10 of Law No. 36 of May 17, 1996 [v] establishes that during the annual vehicle inspection the ATTT must ensure compliance with the maximum emissions levels permitted for vehicles. Furthermore, executive decree No. 38 of 2009 establishes the limits on permitted emissions and the process for measuring them.

As a reference, within BID's "Plan Integral de Movilidad Urbana Sustenable para el Área Metropolitana de Panamá – PIMUS" ("Integrated Plan for Sustainable Urban Mobility for Panama's Metropolitan Area") documentation, the FINAL REPORT – PHASE 2., "Capítulo 3. Diagnóstico" ("Chapter 3. Diagnostic"), pages 3-503 to 3-545[vi] a detailed analysis of a technical vehicle inspection and the measuring for GHG emitted by a vehicle is provided, and links the ATTT to a future Manager for Metropolitan Mobility that could be responsible for the monitoring points and vehicular control and of standards of emissions by vehicles.

An effective mechanism for the performance of technical vehicle inspections and implementing the measurement of emissions must be established. For this, the Land Transit and Transportation Authority should reevaluate the current reviewal mechanism. This line of action requires investment in infrastructure and measurement equipment for which it is the ascertainment of finance (based on the potential for mitigating emissions) and the creation of public-private alliances to enable the implementation of the system at a national level effectively will be needed.

# Line of Action 6

Evaluate the possibility of implementing carbon pricing instruments (carbon taxing, emissions entitlement selling/ auctioning) (excluding intially cargo vehicles and private transportation that contributes to the economy and that impacts the cost of food and services).

# Carbon Pricing Instruments (Carbon Tax, Cap and Trade, among others)

The National Energy Plan 2015-2050 recognises that "Combustible fuels of fossil origin cause environmental, social and economic harm, locally and globally, a price which is not factored in to the costs of production and as a result creates negative externalities that distort real prices of energy.The assignment of a price for carbon involved in energy production, in a market environment, is an adequate mechanism for incorporating the externalities that are generated by the production of energy from a fossil origin. In this sense, fiscal policy is an economic policy instrument known for its effectiveness in "correcting" the costs of the energy in a way that these reflect the reality."[vii]

An analysis carried out in the study "Establishment of a base line for the economy of combustible fuels for light vehicle in Panama" summarizes the intention of actors involved to find ways to reduce emissions. This study by IEA raises the following policies for the Republic of Panama, among others:[viii]

1. Taxing of vehicle based on CO2. Through this policy, a tax on vehicles at their registering stage is imposed based on their CO2 emissions, subsidizing those that have a very low or zero emissions level.
2. Vehicle traffic tax based on CO2. Like the previous policy, this tax motivates the use of more efficient vehicles by proposing to assign an annual tax to vehicular traffic based on CO2 emissions. This policy should be designed with great care due to the need for establishing a dynamic for the control and standardization of tests, in a way that enables the evaluation of all vehicles operating in such conditions[ix]. In Panama an annual traffic tax is charged which is between B/.29.00 to B/.150.00 depending upon the price of the vehicle.

## Specific Actions

### 1 HIGH Priority

Produce studies on the impact, feasibility and adjustments of a legal and regulatory framework for implementing mechanisms for pricing carbon in the country; these studies should evaluate different alternatives (based on international experience) and suggest the best mechanisms to be adopted for Panama's condition.

**Responsible Actors: SNE / MiAmbiente / MEF / National Assembly**

### 2 MEDIUM Priority

Create laws for implementing the carbon pricing mechanisms of the transport sector.

**Responsible Actors: SNE / MiAmbiente / MEF / National Assembly**

## Line of Action 7

Develop regulations for electric vehicles with the result of defining the minimum safety, homologation and interoperability parameters for the importing process or the final local assembly or production process.

## Safety, Homologation and Interoperability

Panama is a consumer of automobile markets developed in other countries. As such it is important to understand that at this time this isthmus is open to vehicles being imported which have no nationally established standards that guarantee safety and interoperability standards. The regulation of both factors is important and requires the consent of importers, international organizations and agreements with countries most advanced as to electric vehicles because at present diverse international panels exist that are working to create the standards required for developing the electric vehicles industry to expand to the diverse global economies.

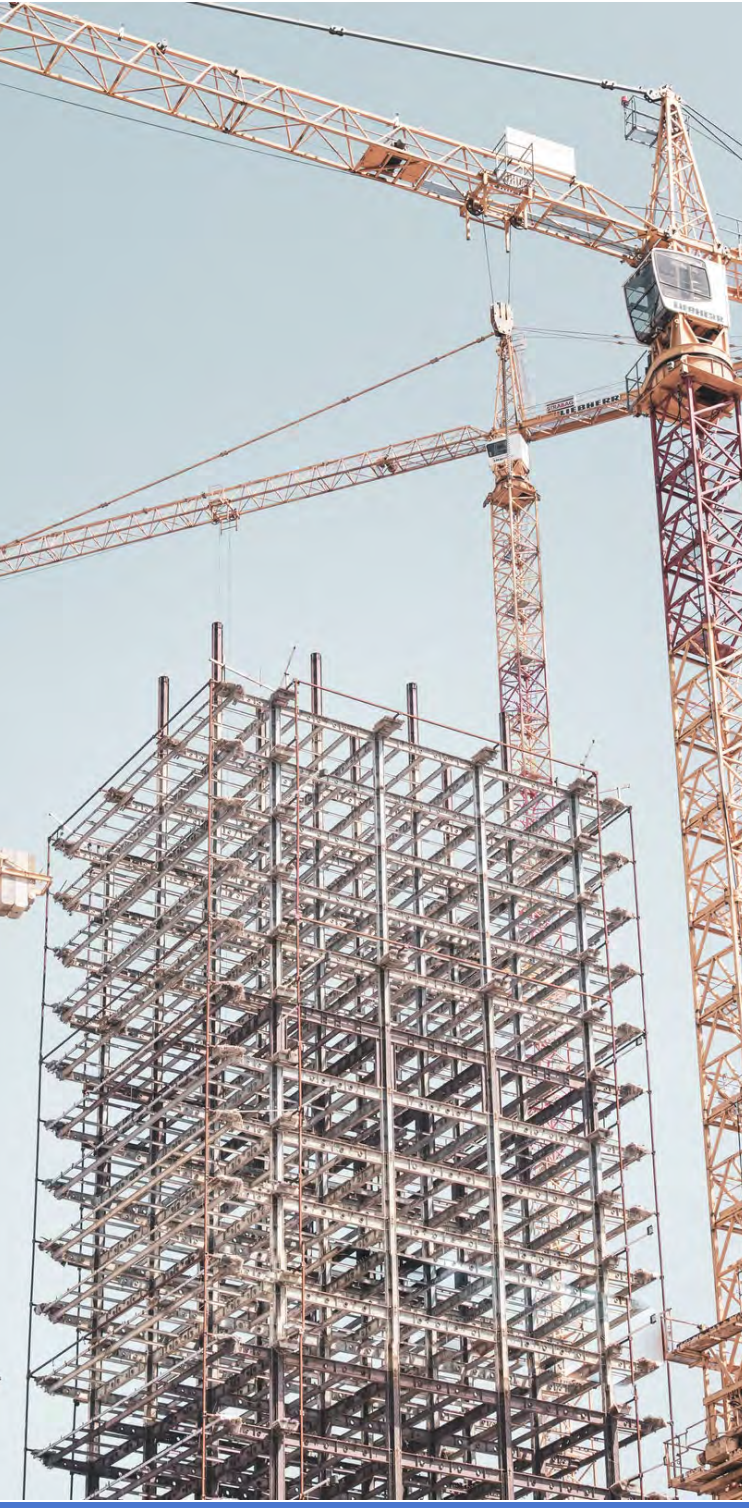
In terms of safety, minimum parameters should be established in the regulations of the response and training team of the staff of the Meritorious Fire Department of Panama, for the response to electric vehicle fires. This is needed because the action required in response to such differs to that required for an internal combustion engine vehicle fire.


## Specific Action

### 1 HIGH Priority

Produce the minimum safety, homologation and interoperability parameters for vehicles imported to the country. These parameters should be in line with automobile technology available in the country and region. By working together a legislative bill could be produced in a suitable time period.

**Responsible Actors:**
**ATTT / MICI / JTIA / SNE / ASEP / BCBRP / Vehicle Importers**



## Line of Action 8

Include national certificates within the Plans for Urban Development, Sustainable Construction Regulations and the placement of electric vehicle recharging infrastructure within the Territorial Organization Plans.

# Promoting the inclusion of Charging stations in new buildings and urban development plans

Charging points must be included in current construction efforts, like those in the Regulations for Sustainable Buildings promoted by the SNE and the Eco Protocol of the Panama Green Building Council, in order to promote sustainable construction. The simplified regulations of the UREE law (The Law for Rational and Efficient Energy Use) do not currently include charging points for electric vehicles, but in its next phase of implementation, this aspect should be included given that it appears as one of the active measures mentioned in the Sustainable Construction Regulations.

## Specific Actions

### 1 HIGH Priority

For the next phase of implementation of the Sustainable Construction Regulations make the inclusion of electric charging points in new buildings a priority.

### 2 MEDIUM Priority

Include charging infrastructure for electric vehicles and the promotion of non-motorized mobility means in the urban development and territorial organization plans.

**Responsible Actors: Municipalities / MIVIOT / SNE / MiAmbiente / Real State Project Developers / CAPAC**

## Line of Action 9

Establish guidelines and regulations for electric vehicle in terms of charging services, and not electricity.

## Guidelines for the payment of charging services for electric vehicles

The possibility of making payments according to length of time was discussed in conversations with ASEP who are developing a procedure for regulating the installation of chargers and measuring consumption of electric vehicles, in affiliation with a network of chargers or other means that do not involve the collection of payments for electricity and by which Law 6 would not be breached.

The most appropriate mode of collecting payments for a charging network would be a topic for the initiative and creativity of the private sector, for which discussions as to the creation of a follow-up system for maintaining registers, statistical information and for maintaining order in the commercial activity should no doubt take place.

Ideally an open protocol system for collecting payments would be appropriate for managing all providers of the service.

## Specific Actions

### 1 MEDIUM Priority

Create innovative business models that make investment in electric vehicle charging stations feasible.

**Responsible actors: Private Sector**

### 2 MEDIUM Priority

Supervise compliance with Panamanian law and incentivize the creation of methods for the collecting of payments that allow for the growth of electric mobility. Methods of payment found in other countries where periodically paid membership program allows members to charge in any one of the affiliated charging points could be emulated. Charging by time or other services that companies could be incentivized to invest in charging infrastructure can also be evaluated.

**Responsible actors: MICI / SNE / ACODECO / Town Council / National Assembly / Electricity Distributors / Private Sector**

## Specific Actions

### 1 MEDIUM Priority

Through existing and complementary studies the possibility of additional demand to the system and how this would effect the national interconnected system should be raised. Additionally, optimal sites for the installation of rapid charging stations should be mapped.

Produce a projection of the increase in demand and consumption, such as the impact that the use of electric vehicles will have on the demand curve. Determine the requirements as to adequacy in terms of quantity and quality of energy of distribution networks, as well as the potential to harness the electric charge from cars to inject back into the electricity grid.

**Responsible actors: SNE / Electricity Distributors / UTP / UP / Private Sector**

## Line of Action 10

Evaluate the requirements for a distribution network and the impact on electricity demand that the mass use of electric vehicles would have.

## Electricity Network and vehicle charging

The charging of electric vehicles in a country like Panama will be predominantly of a slow charging rate due to the relatively short distances that are covered in most cases. Such charging would be concentrated during night time and throughout the working day. There would be a low impact on demand and consumption in the first years of electric mobility. To illustrate these examples can be found in various scenarios analyzed in Annex B.

In the case of other sectors like public and selective transport and for long journeys between provinces, it is possible that rapid charging points will be needed that must be taken into account in plans for distribution networks. For this purpose a study by the UTP, funded by SENACYT, seeking to identify the impact of electric mobility on the Panamanian electricity grid, focusing on the extra demand presented to distribution networks, already exists.

# Line of Action 11

Establish the technical regulations for infrastructure dedicated to catering, supplying, operating and availability of electrical energy for use in the transport sector.

## Regulations and standards for Charging infrastructure

Panama currently has 9 charging points. These charging points attend to different types of connection, thus, worries created by not knowing whether it will be possible to charge an electric vehicle is still a real problem for the country.

One of the needs identified during the initial workshop and first meeting in terms of charging infrastructure, is standardizing both the slow charging and rapid charging infrastructure. Due to Panama not having a car industry nor any electronic component factories it is essential to provide chargers that can charge through Type 1, Type 2 and GB/T connectors because these are the three most predominant technologies in the market for slow charging electric vehicles and Combo 1, Combo 2, Chademo and GB/T chargers for fast charging vehicles as these are the predominant technologies for the fast charging sector of the charging infrastructure market. This would ensure that the participation of different makers of vehicle would not be limited, broadening scope for fair and transparent competition that will only benefit the mass of electric mobility.

## Specific Actions

### 1 MEDIUM Priority

Regulate a standard for charging stations for slow and fast charging electric vehicles for public use within the country. Including the type of charger and permissions for installing individual or commercial charging stations.

**Responsible Actors: MICI / SNE / JTIA / ASEP / ADAP**

### 2 MEDIUM Priority

Promote pilot tests and share the results in order to demystify the subject of autonomy and anxiety of multiple charging points.

**Responsible Actors: SNE / JTIA / ADAP / ATTT**

## Specific Actions

### 1 HIGH Priority

Conduct studies that determine the need for establishing exclusive rates for charging electric vehicles and make proposals for modifying existing regulations as to marketing and applying tariffs for electricity to be used in the transport sector.

**Responsible Actors: Distribution Companies / SNE / ASEP / Private Sector / UTP / UP**

### 2 HIGH Priority

Conduct studies that determine the need for establishing exclusive rates for fleets of buses under authorized concessions.

**Responsible Actors: Distribution Companies / SNE / ASEP / Private Sector / UTP / UP**

### 3 MEDIUM Priority

Establish regulations for the installation of commercial vehicle chargers and collecting of payment for consumption of electricity by a vehicle.

**Responsible Actors: ASEP / SNE**

### 4 MEDIUM Priority

Identify the necessary technical, economic and safety standards, taking into account the development of technical studies including those that analyse implementation in other countries, looking also at the input on the part of national actors involved.

**Responsible Actors: ASEP / SNE / JTIA**



## Line of Action 12

Develop technical and marketing studies with an end to defining the operative, commercial and tariff structure for the use of electric energy for highway transport.

## Marketing of electricty for charging EVs

As well as identifying standards, those in charge of providing installation services for private and public charging centres should be identified in order to incentivize an increase in charging infrastructure. For now distribution business have had the greatest participation in the development of the ENME and have installed the most charging points, but there already exists private businesses that have installed chargers and are showing an interest in playing a further important role in the following steps of the strategy. It is necessary to establish standards for the management of charging centres which define a process for handling payment for energy transactions in a way that would enable transparency in this new market, thereby promoting the establishment of new charging points. Furthermore, within the framework for collecting payments for electric vehicle charging services ASEP has stated that only distributors and large clients (with certain restrictions) are legally entitled to sell energy. For this reason, assuming that Law 6 would remain the same on this matter over the following years, private business that look to dedicate themselves to charging electric vehicles should create business models and sales strategies that comply with national regulations.

Regulations for selling electricity for charging electric vehicles is of high importance given that clear rules are needed for those that wish to dedicate themselves to such an activity and allows them to develop in an orderly way.

The need, or lack of it, for establishing a special rate for charging electric vehicles is a possibility that must be evaluated. Such a decision must be based on studies that indicate whether or not they are needed, as well as the type of modifications required for regulating and rates. It is important that the rules dedicated to activities in charging vehicles are clear given that the possibility of charging private stations, distributed throughout the country, will depend on the regulations.

Bus fleets currently receive a subsidy for the fuel they consume. Likewise, it would be beneficial to evaluate the possibility of applying a special rate for charging this type of vehicle, because they, above all must be charged using rapid charging point and must pay high costs in charging because of demand at peak and out of peak hours.

## Line of Action 13

Finalize agreements with development bank organizations to gain technical support needed for performing studies as to the implementation of each of the lines of action of the electric mobility strategy.

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# Financing of studies as to feasibility and formulation of projects

Soon after the Paris COP21 and having been established as a driver of climate change action, the development bank has demonstrated a greater interest in climate change financing for capacity building[x], particularly in developing countries like Panama, to help them achieve their GHG mitigation goals in accordance with studies and with professional cooperation in areas such as electric mobility. This was also manifested at meetings held for the elaboration of ENME, where electric mobility was a topic of priority.

## Specific Actions

### 1 HIGH Priority

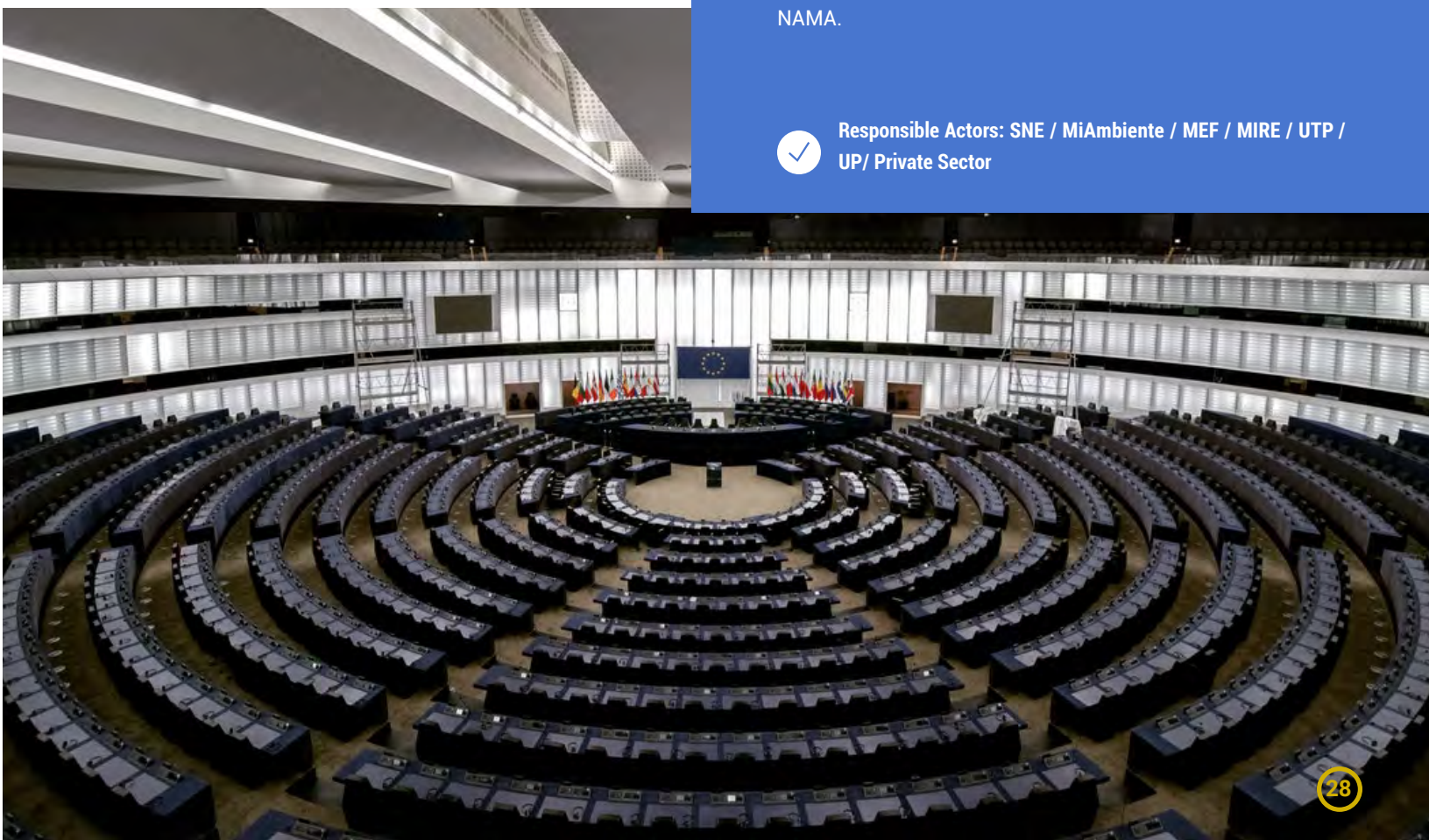
Review the list of suggested studies needed in order to progress on to the next steps of ENME (Next Steps Section of this document) to multilateral development banks that have shown interest in collaborating with our country. Finalize recruitment or professional support agreements as soon as possible so that the strategy's development progresses without losing the initial impulse generated by it.

**Responsible Actors: SNE / MiAmbiente / ATTT / MiBus / ADAP / Electric Distributors**

### 2 HIGH Priority

Develop NAMAs for the different sectors mentioned in this strategy and make applications to Climate Funds, such as the Green Climate Fund (GCF) and the Global Environment Facility (GEF), in order to obtain the resources required for the electric mobility studies required as a preliminary phase for each NAMA.

**Responsible Actors: SNE / MiAmbiente / MEF / MIRE / UTP / UP/ Private Sector**



## Line of Action 14

Promote support agreements for development bank financing mechanisms for the replacement of governmental fleets.

# Financing for the replacement of fleets - Development Bank

The provisions contained in the Paris Agreement accelerate and amplify the availability of financial resources for climate action within a context in which multiple initiatives to expand the magnitude and reach of finance is already registered. Accordingly, large finance institutions have committed to increasing the scale of their finances and investments in renewable energies, low emission intensity transport and agriculture; infrastructure resilience and innovative technologies. This provides an opportunity to obtain climate change financing for sectors such as Panamanian transport which has the greatest impact on producing contamination in the country.

International funds exist that are willing to provide the financing for projects that have the potential to radically transform, for example, the mass replacement of vehicle fleets by the government.

The use of instruments like the NAMAs for projects that provide a new structure for mitigation against climate change are key for accessing finance with favorable terms for high potential with respect to mitigation against climate change that may not present returns on the investment sufficiently favorable to obtain loans through private banks in order to access the required funds.

## Specific Actions

### 1 HIGH Priority

Organize discussions between the authorities that control concessions for buses and the intergovernmental commission of electric mobility with multilateral development banks to examine the possibility of replicating more electric buses for the existing fleets replacing outgoing units and covering additional capacity.

**Responsible Actors: SNE / MiAmbiente / MEF / MIRE / MiBus / ATTT**

### 2 MEDIUM Priority

Perform feasibility studies and impact studies tha reflect the benefits of the replacement of governmental vehicle fleets, in order to create substitution projects that can opt for financing from climate funds and the multilateral development bank.

**Responsible Actors: SNE / MiAmbiente / MEF / MiBus / UTP / UP**

## Line of Action 15

Promote the creation of new commercial banking products to catalyze the electric mobility and facilitate the financing of fleets.

# Finance and insurance for individual and fleet consumers - Commercial Bank

During the meetings on the subject of banking, the representative of the commercial bank indicated that this banking sector responds to changes in the market, and accordingly, the creation of banking products dedicated to financing projects for the acquisition of electric vehicles fleets and products for individual consumers would occur once electric mobility in Panama has been sufficiently stimulated. Similarly, insurance companies that participated in meetings dedicated to the subject expressed that to create a competitive environment for insurance deals dedicated to electric vehicles maximum stimulation must take place.

The private bank must also be borne in mind as a viable option for financing fleet replacement projects that have been shown to have a good economic return by economic feasibility studies. This type of finance is preferred in cases where the initial investment in electric mobility could be high but a cyclical lifespan analysis shows that the electricity rates and diminishment of maintenance costs enable an accelerated repayment of the financial product allowing for greater requirements in terms of deadlines and interest.

## Specific Actions

### 1 MEDIUM Priority

Get commercial banks and insurers present in Panama involved in the execution of the strategy, present projections as to the introduction of electric vehicles to demonstrate that there will be the demand required to generate offers of products dedicated to electric mobility.

**Responsible Actors: ABP / Association of Insurers / ADAP / Inter-Governmental Commission**

### 2 MEDIUM Priority

Produce a cyclical lifespan analysis for fleet replacement projects which aim to determine whether any provide better economic performance and so could be the object of financing mechanisms from the private bank.

**Responsible Actors: SNE / MiAmbiente / MEF / MIRE / MiBus / ATTT**

## Line of Action 16

Develop the guidelines for the integral management of the replacement vehicles and their parts.

## Management of old vehicles

This will be based on Law 33 of 30 May 2018[xi], which establishes the Zero Waster policies and a framework of action for the management of waste. Following the ruling principal of the law of "Shared Responsibility" the industries, importers, distributors, commercial consumers and whichever manager of public or private waste are part of a social co-responsibility. With respect to transport in Panama this represents a great commitment in terms of management of waste given that hundreds of abandoned cars are found in the cities of the country.

An adequate management of the "scrapping" of vehicles would provide a key indicator in measuring efforts to decrease individual car use, replacing it with public transport, pedestrian alternatives or cycling.

## Specific Actions

### 1 MEDIUM Priority

Explore gaps in Law 33 regulations to ensure that different components associated with electric vehicles, particularly their batteries, are treated in a way that least impacts the environment. Work will be carried out with importers and representatives of the recycling industry to find solutions that are feasible for discard and reutilization.

**Responsible Actors: SNE / MiAmbiente / MINSA / Municipalities / AUUD / Vehicle Importers**

## Specific Action

### 1 MEDIUM Priority

Amend Law 33 or create a new legislation to manage vehicular waste in a way which guarantees the adequate treatment of used vehicle parts.

**Responsible Actors: SNE / MiAmbiente / MINSA / Municipalities / AUUD / Vehicle Importers**

## Line of Action 17

Elaborate a plan for the integral management of electric vehicle batteries at the point they do not meet operating requirements for mobile appliances.

## Management of batteries

Like conventional vehicles, electric vehicles produce a series of waste products such as lubrication oils, tyres and scrap at the end of their working lives. Additionally, they count on a set of batteries which must be adequately managed in order to prevent the cause of health impacts on people and the environment. According to Law 33 of 30 May 2018 the reutilization or valorisation of components permitted and currently discussed in the variety of technical fields must be found to allow for the recuperation of components to be used in manufacturing of new batteries or the reutilization of stationary components as a backup.

# Third Strategic Pillar: Strategic Sectors

Promote the execution of electric mobility across strategic sectors.

Objectives:

1. Introduce electric mobility as part of the process for **modernization of fleets of public entities** of the country.
   - **Line of Action 18:** Official fleets.

2. Advance with the process of **electrification of private fleets** within the country.
   - **Line of Action 19:** Private fleets.

3. Promote the **electrification of fleets within other strategic sectors** such as taxis, distributors, industries and heavy equipment.
   - **Line of Action 20:** Fleets strategic sectors.

4. **Transform public transport:** establish the bases for the gradual electrification of new tenders.
   - **Line of Action 21:** Fleets of Buses.

# Specific Actions

## 1 HIGH Priority

Analyze the current governmental fleet (types of vehicles, millage, age of fleets, fuel costs, etc.), evaluate the financial feasibility of the substitution of internal combustion engine vehicles with electric vehicles and the requirements of charging points to establish a plan/programme of replacing vehicles.

**Responsible Actors: SNE / MiAmbiente / MEF / Governmental and Autonomous Entitites**

## 2 HIGH Priority

Carry out studies and establish the potential for working vehicles (pick-up type) from the governmental fleet to be replaced (creating a significant demand for this type of vehicle) and perform the approach with suppliers in order to achieve offers of such.

**Responsible Actors: SNE / MiAmbiente / MEF / Governmental and Autonomous Entities**

## 3 HIGH Priority

In writing up for buying/acquiring of government vehicles, introduce efficiency and emissions standards of greater or equal rigour to that established as a minimum for the Country.

**Responsible Actors: SNE / MiAmbiente / Panamacompra / Governmental and Autonomous Entities**

## 4 HIGH Priority

Establish substitution goals and a schedule for the implementation of a internal combustible engine vehicle for electric vehicle substitution programme.

**Responsible Actors: SNE / MiAmbiente / MiBus / UTP / UP**



## Line of Action 18

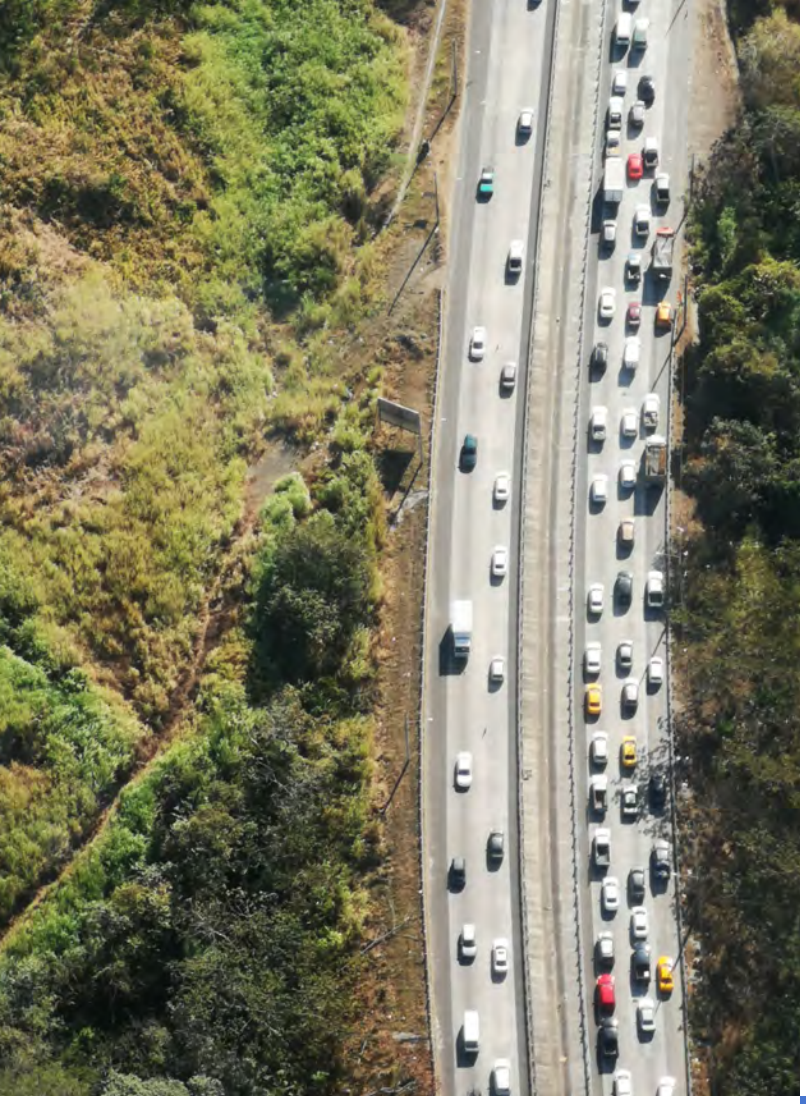
Formulate the bases for a programme for the technological replacement in the official fleets of the country, fostering the acquisition of electric vehicles for public entities.

## Official Fleets

There exists a great opportunity in the introduction of electric vehicles for the renovation of both governmental and private vehicle fleets. The government of Panama could be the principal promoting body of electric mobility through an annual replacement of its fleet vehicles.

An indirect way of promoting and educating on the topic of electric mobility which has been preferred by governments of many cities and countries which have already advanced electric mobility[xiiii] is by the example of acquiring electric vehicles for its vehicle fleets. In this way trust in the technology is generated, as well as a source of curiosity as to the functionality, it ensures that educative messages are received more attentively.

A goal of the substitution of internal combustion engine vehicles for electric vehicles and the corresponding management to make this substitution effective, is to demonstrate a commitment on the part of the government which would have an important effect in the transformation of the automotive market, promoting the demand of electric vehicles and motivating distributing businesses to offer a greater variety of models. A replacement programme for governmental fleets would represent an opportunity to positively impact the transport sector, reduce emissions, reduce operational costs, promote clean and efficient technologies and above all to mobilize investments associated with electric vehicles like maintenance works, placements and charging infrastructure.



## Line of Action 19

Create and promote alliances for the electrification of private fleets based on analysis of lessons learned, the involvement of the private sector, the finance sector and the Municipalities.

## Private Fleets

The private sector is made up of industries and shops that rely on large vehicle fleets which are composed mainly of working vehicles, light trucks and distribution lorries. Parts of these fleets could be replaced by electric vehicles, thereby encouraging such businesses to plan purchases and elaborate vehicle replacement projects, in a way that can be presented to climate funds and the development bank to obtain the financing for such. In this way the government could support these initiatives in order to obtain resources and record the reduction of emissions for the purpose of evaluating the possibility of commercial emissions rights which could be a source of income to accelerate the return on such investments.

During the process of elaboration for the strategy there are various pilots for private fleets being carried out. Since March 2018, ENSA (distribution and electricity sales business) has been testing two electric vehicle, the BYD's E5 model and made them available to their employees to test the technology[xiv]. ENSA is currently in the process of purchasing said vehicles following the success of the pilots.[xv] Bavarian Motors has begun a pilot scheme in which it is providing i3 models to various business and institutions starting with the UN Environment Programme. They currently find themselves in conversations with other businesses interested in carrying out this pilot scheme. These pilots schemes collect information that could prove useful when the moment for making decisions as to modernizing fleets of businesses involved arrives and serve as a reference for other interested businesses.

Businesses like the Panama Canal Authority have already carried out studies as to the replacement of their internal combustion engine vehicles with entirely electric vehicles. In the case of the canal, vehicles are changed periodically which provides enough time for planning the replacement of each vehicle.

## Specific Actions

### 1 HIGH Priority

Encourage the private sector to undertake substitution programmes of fleets for electric vehicles and facilitate access to financial climate/green and development funds which can support the necessary investments.

**Responsible Actors: SNE / MiAmbiente / MIRE**

### 2 MEDIUM Priority

Present results of electric mobility pilots analysing them in line with the objective of replacing vehicle fleets of private sector businesses.

**Responsible Actors: SNE / MiAmbiente / Town Council / Private Sector**

## Line of Action 20

Create and promote alliances for the electrification of fleets for other strategic sectors, including distribution, industrial and heavy equipment sectors.

## Strategic sector fleets

In addition to the private sector, the sector that has advanced most in renovating fleets of electric vehicles is the selective transport sector. Between January 2019 and May 2019, an E5 model car and an E6 model car covered more than twelve (12) thousand kilometres as taxis in the performance of technical tests in the Province of Colón in order to verify the operation of these vehicles as part of a system of selective transport; these test were carried out via the company TRASERVI and the public transport businesses Radio Taxi Auténtico, Servicio de Taxi Auténtico, Sindicato Auténtico de Taxis de Colón and Radio Taxi Atlántico.[xvi] As well as this, TRASERVI, ENSA and BYD are already working with selective sector businesses of the Provinces of Coclé, Veraguas and Chiriquí to incorporate these electric mobility initiatives into the public transport of the Republic of Panama. All initiatives facilitated by the selective transport businesses are part of the public transport modernization process which has been developed in accordance with what is stipulated in Resolution OAL-56 ATTT of the 15 January 2018, and Resolution OAL-469 ATTT of 21 August 2012, in which concepts and guidelines for the benefit of public passenger transport are defined following the Republic of Panama's public contracting regime.

Furthermore, a BYD E6 model electric vehicle is running as a test vehicle on the Cabify shared journeys platform. Furthermore, another 29 units are being submitted for mechanical and electrical tests before being sold for use on journey platforms such as Uber and Cabify.

With respect to heavy equipment the development of electric (and autonomous) lorries for ports, in conjunction with automatic port cranes which considerably increase the efficiency of movement of loads within ports is being carried out. This technology is growing and given that Panama is the most important in our region for port activity, it can take advantage of the technology's implementation in order to boost competitiveness.


## Specific Actions

### 1 MEDIUM Priority

Incentivize the creation of quotas of new electric taxis through the ATTT. Create agreements with dealers or borrowers of quotas in order to establish the lowest price possible for quotas of electric vehicles.

**Responsible Actors: SNE / MiAmbiente / ATTT / MICI**

### 2 LOW Priority

Facilitate alliances between electric vehicle providers of the distribution, industrial and heavy equipment sectors with businesses that could potentially benefit from this technology, with a view to improving the productivity of various sectors that generate state revenue.

**Responsible Actors: SNE / MiAmbiente / ATTT / MICI**

### 3 LOW Priority

Organizing the selective public transport sector and establishing standards appropriate for the use of vehicles that do not release emissions. Evaluate changes to be made to existing regulations in order to distinguish between electric vehicles.

**Responsible Actors: SNE / MiAmbiente / ATTT / MICI**

# Line of Action 21

Evaluate the operational conditions of bus routes with the aim of establishing the technical financing and environmental feasibility of introducing electric bus fleets with operating certificates.

# Fleets of Buses

In August 2018 the Panama Town Council put in place a pilot and evaluation project of the technology in conjunction with MiBus, BYD has acquired a 6.35 meter length K7M model electric bus for a temporary period for a route specifically established between Plaza 5 de Mayo and the Casco Antiguo, in line with this initiative the National Energy Secretariat, the Ministry of Environment, the Panama Town Council and MiBus, with the support of the UN Environment and funds from the Climate Technology Center and Network (CTCN), are developing a study to evaluate the pilot project and any alternatives that exist in terms of technology and combustibles for public transport, with the objective of establishing the bases for the transition to clean and efficient public transport.

The company TRASERVI has a second pilot project and Ruta Urbana Colón, a business of the taxi sector, has in conjunction with BYD and ENSA performed technical tests covering more than six (6) thousands kilometers in the Province of Colón with a bus that is 12 meters in length in order to verify the operation of these vehicles as part of a collective transport system in the city of Colón. Along this line, TRASERVI is developing a concrete project with ENSA and BYD for acquiring and incorporating four (4) buses that are 12 meters in length and two (2) buses that are 9 meters in length to for rounds of the collective public transport modality Ruta Urbana de Colón, S.A.

The pilot projects seek to evaluate the operational conditions and performance of the buses in Panama and to identify any barriers and operative, technical or financial opportunities that could be benefitted from at the point that bus replacement programs are created.

These initiatives should form part of the preliminary studies for determining the bus routes that electric buses can be operated on, in addition to this study a project for the substitution of existing fleets by incorporating new electric buses will need to be formed in order to achieve sustainable development.

Given their operating characteristics, buses are the most obvious candidates for incorporating electric vehicles given that the return on their invest is fastest which makes them more attractive to organizations that finance such projects. This in turn would help significantly reduce spending on subsidies for combustible fuels which buses currently use (allowing these funds to be used for incentives which would bring about a greater impact on the public transport system). For this a clear goal with defined dates and a substitution schedule is key in formulating such projects (for studies, investment in equipment, infrastructure, strengthening capacities, etc) would be key, as would acquiring the resources through climate and development funds.

Resolutions OAL 056 and OAL 469 of the ATTT don't only define concepts and guidelines for the benefit of the passenger public transport service under the regime for hiring contractors for the Republic of Panama to those who have been nominated as selective and collective public service who currently count of the right to exploit / use the service by means of a Borrowing Resolution; within the Borrowing Marco Contacts negotiated, there is also established the obligation of these public transport businesses to present and establish in coordination with the ATTT their Fleet Renovation plan. This creates a proportional element for the formulation of a Fleet Renovation plan which incorporates a strategic sustainable migration to 100% electric vehicles for public transport of the Republic of Panama.

# Line of Action 21

# Fleets of Buses


## Specific Actions

### 1 HIGH Priority

Carry out an evaluation as to the operational conditions of bus lines with the aim of determining the technical, financial and environmental feasibility of introducing electric buses.

**Responsible Actors: Bus Fleets in possession of an Operating Certificate / SNE / MiAmbiente / ATTT / MEF / Town Council /MiBus**

### 2 HIGH Priority

Incorporate the maximum emissions and minimum yields to be issued for the import of vehicles in the parameter of MiBus's bidding process and imports/acquisitions of other providers of mass transport (which are of MiBus).

**Responsible Actors: MiBus/ SNE / MiAmbiente / ATTT**

### 3 HIGH Priority

Establish a programme for the electrification of public services buses which includes goals and technical criteria, financing and operating mechanisms.

**Responsible Actors: SNE / MiAmbiente / Bus Fleets in possession of an Operating Certificate / ATTT/ Town Council / MEF /MIRE / MiBus**

# Fourth Strategic Pillar: Knowledge and Education

Promote the dissemination and knowledge on electric mobility.

Objective:

1. Strenghten **Research, Technological Development and Innovation** (R+D+I) capacities with respect to electric mobility.
· **Line of Action 22:** Development and innovation research.

2. Strenghten the curriculum for **professional technical training** y and higher education in the subject of electric mobility.
· **Line of Action 23:** Technical information.

3. Design and execute an information **dissemination campaign** as to the benefits, incentives and plans for implanting ENME.

· **Line of Action 24:** Dissemination.

# Line of Action 22

Incorporate electric mobility into the national agendas for research, technological development and innovation (R+D+I) for which it takes charge.

# Development and innovation research

Research as to development and innovation is fundamental for the deployment of electric vehicle technology, as well as sustainable development, because R+D+I activities enable the implementation of electric mobility projects, these activities must therefore be a drive of the National Strategy for Electric Mobility. This drive should be addressed so as to promote and include a research agenda, studies as to the technology of electric vehicles in Panama's conditions (environmental, cultural, market, among others), and the opportunities which are arise from achieving such a transformation change in the country. These studies should be include the areas such as:

- **The Environment.** Impacts on the environment, the potential to directly mitigation by reducing the use of combustible fuels, the potential to mitigation indirectly by reducing the use of oil and lubricants, among others.
- **Energy.** Increase as to demand and consumption, impacts on the demand curve, adequacies of the distribution networks in terms of quantity and quality of energy, taking advantage of opportunities to inject electricity into the grid, integration of renewable energies and electric vehicle charging, among others.
- **Health.** Impacts on health of vehicles that burn fossil fuels, potential to reduce noise pollution, improve air quality, options as to the use and discharge of batteries, among others.
- **Transport.** Studies and analysis as to routes in order to determine the feasibility of the substitution of cars of a light, utilitarian or working variety and buses which have an internal combustion engine for electric buses, methods for planning the operation of electric bus fleets, requirements and adjustments to infrastructure, technical requirements for buses to meet demands of mass transport, among others.

The development of technology and innovation should be driven, particularly if the deployment of electric mobility and the implementation of this strategy is taken into account, in a way to include mechanisms that disincentivize the use of combustible fuel engines in transport and the promotion of mass transportation, requiring new business models, the creation of products and associated services, such as applications that provide information as to the battery life and schedule in charging times to timetables, identification of the closest charging points and systems for collecting payments compatible with the various potential businesses that may provide such energy.



## Specific Actions

### 1 HIGH Priority

Identify research areas in the subjects of electric mobility (equipment, charging infrastructure, networks, platforms, communications, etc.) that should be attended to and prioritize them.

**Responsible Actors: SENACYT / IFARHU / UTP / UP / SNE**

### 2 HIGH Priority

Create a work plan for developing priority research topics and include them in the agendas of entities that carry out research such as universities, and those that promote and finance research, such as SENACYT.

**Responsible Actors: SENACYT / IFARHU / UTP / UP**

### 3 HIGH Priority

Create plans to promote and support businesses (startups) that wish to innovate in the subject of electric mobility.

**Responsible Actors: SENACYT / AMPYME**

## Specific Actions

### 1 HIGH Priority

Modify career pathways to include electric mobility in the following revision of the academic curriculum.

**Responsible Actors: MEDUCA/ UTP / UP / INADEH / ITSE / ADAP**

### 2 HIGH Priority

Create strategic alliances between car distribution businesses and training centers in order to equip training centers and offer work opportunities for graduates of these courses, prioritizing the contracting of outstanding students to businesses that contribute to such training entities.

**Responsible Actors: MEDUCA/ UTP / UP / INADEH / ITSE / ADAP**

# Line of Action 23

Promote the designing of technical training programs as part of a professional career, as well as higher education programs which address electric mobility.

# Technical training

The training of professionals to attend to the needs arising from the imminent introduction of electric mobility is a topic of priority. Electric cars and their charging infrastructure incorporate advanced technology for which conditions allowing for the training that enables technicians, engineers and graduates to implement such electric vehicle technology in an effective way are required. Investment in the design of specific courses and groups who can create training workshops to produce a professional talent pool that can be added to the labour market so as to ensure that a lack qualifications will not be a barrier to the implementation of this mobility strategy.

The education on the bachelors and master's levels would be a task for the universities that offer majors related to electric mobility, such as the Technological University of Panama and the University of Panama. Universities would be in charge of incorporating courses on electric mobility to existing majors or of creating new ones with specializations in such topics. Additionally, internships or practical tutorials on the job site of electric mobility could be annexed to these classes as well.

As part of the solution for providing technical training cooperation between governmental professional training entities, such as INADEH (National Institute for Professional and Human Development Training) and ITSE (Specialized Higher Technical Institute), and private companies, particularly ADAP (Automobile Dealers Association of Panama) is anticipated. Similar agreements that focus on delivering INADEH and ADAP's combined education have been established before. Replicating successful instances of such could accelerate the training of suitable staff for repairing and maintaining electric vehicles.

This also gives rise to the opportunity for technical training in charging infrastructure to be carried out by institutes for technical training and business that install charging points, such as energy distributors like ENSA and NATURGY along with companies like Celsia and House of Batteries, in a combined way. This also presents a precedent for cooperation between INADEH and the electricity business for the purpose of technical training of 'linemen' (technical staff who install or maintain distribution or electricity transmission networks).

## Line of Action 24

Create permanent awareness campaigns on the benefits of mobile electricity and the risks that combustible fossil fuel transport poses to health and the environment.

## Dissemination

The dissemination of knowledge and scientific information campaigns will eliminate fundamental barriers which emanate from preconceived ideas, ignorance and false information. In the subject of electric mobility there exists much disinformation and these have created doubts and myths due to the lack of information divulgence, by aiming them at different groups (the contents of these campaigns should be adequate in order to facilitate understanding and create acceptance for each group), these campaigns will allow for debate and analysis grounded on a base of adequate knowledge of the actions taking place in the subject of electric transport.

The dissemination should be designed to provide knowledge on aspects such as:

1. Benefits of electric vehicles (economical, health, and environmental)
2. Demystify the technology (autonomy and the need for charging stations, safety of the batteries, the vehicle and charger, etc.)
3. Damage caused by the use of fossil fuels (to health, the environment and the economy)
4. Existing offers on electric vehicles.
5. International trends on the commitments of businesses and countries.

Along with generating relevant information and putting it at the disposition of those who are interested and therefore quick and easy to reach, it is also helpful to generate other channels by which information can be disseminated to the general public, for this simple messages, such as those as to its relationship with energy efficiency and environmental care, must be transmitted to people who are not familiar with the concept of electric mobility.

## Specific Actions

### 1 HIGH Priority

Disseminate to the general public and to specific groups information as to the pilot projects that are and will be taking place in the country as part of this strategy. Include the promotion of electric mobility in dissemination campaigns for energy efficiency, environmental benefits and mobility that the SNE, MiAmbiente and other public entities are developing. The development of in-person and online workshops among all actors is recommended.

**Responsible Actors: SNE / MiAmbiente / MINSA / MEDUCA / WEC Panama / Private Sector**

### 2 HIGH Priority

Encourage the private sector to promote the advancements of projects related to electric mobility contained in the framework of the strategy and its goals.

**Responsible Actors: SNE / MiAmbiente / MINSA / MEDUCA / WEC Panama / Chamber of Commerce, Industry and Agriculture / Private Sector**

# CONCLUSIONS AND NEXT STEPS

# CONCLUSIONS

Panama has updated its NDCs for the year 2030, accordingly 2030 has been established as the goal year by which the electric mobility strategy is estimated to be in place. The goals established in this strategy would bring about a reduction of approximately 15% to 25% of the energy sector emissions reported in 2013, that is the equivalent of 6% to 10% of the country's total emissions. These goals will need to be measured, reported and verified periodically in order to ensure compliance in the face of changes in the development of related technology.

To ensure compliance with the established goals an evaluation of the best methods for incentivising the transition to electric vehicles from internal combustion engine vehicles must take place. Electric vehicles are currently more expensive than vehicles with an internal combustion engine. Incentives of the isolated sort, such as a regressive policy could be considered because the recipients are likely people of a higher income, and furthermore there exists more cost-efficient alternatives for reducing energetic consumption and GHG. Nevertheless, the early introduction of these vehicles will enable the development of charging infrastructure, the capabilities and knowledge necessary for their mass introduction which will occur when conditions are better, such as when prices are more competitive, thereby generating important benefits to the country, which justifies the development of certain limited incentives and the realization of pilot projects.

Fleets of buses and public and private vehicles should be the point of focus for the decisions of the country which are taken following the strategy. The use of fleets for the first wave of electric vehicles is a tactic that has worked well in other countries of the region and world for accelerating the transition of technology because it brings about acceptance of it on the part of regular market users.

The strategy should serve as a guide for short, medium and long terms action in terms of electric mobility. The effectiveness of the strategy depends on combining the strengths of the public and private sector. It is estimated that the goals being tracked are achievable, nevertheless indicators should be established to enable the escalation of actions depending on changes reached as to initial parameters.

# NEXT STEPS

**Executing the strategy**

It is not enough to merely identify the lines of action necessary, the specific actions following from these and the responsible actors. Clear guidelines must be established as to the management of the strategy and the assignment of sufficient human and financial resources in order for the goals established by the strategy to be carried out.

By creating an institutional committee capable of taking charge of generating coordination, obtaining resources, developing and controlling the detailed measures of the implementation plan, a necessary step has already been taken to ensure that the described strategy progresses. The next step in the management of the strategy would be to form a public-private group which facilitates discussions with the private sector and civil society. The details as to the form of such coordination should be analysed in depth, but it is essential to equip it with the human and financial resources necessary for the completion of its role.

An execution schedule for the strategy which takes in to account established priorities in the execution of the actions is required.

**Legal Proposal**

For many lines of action the introduction of new legislation or the amendment of existing legislation is needed. It is recommended to combine efforts to make a single legal proposal, the “Law of Electric Mobility for Panama", which will facilitate integration and accelerate necessary actions. This will also facilitate future modification once technology has advanced.

The regulation of the technology through separate pieces of legislation is also possible, but it should be supervised by the intergovernmental commission for electric mobility in order to ensure no duplicated efforts and to ensure all required points in the strategy have been covered.

**Autonomous Vehicles**

Track the progress of technology being developed in artificial intelligence and autonomous vehicles. The advancements in these fields enhance the implementation of electric vehicles as a dominant technology in transport at a global level and bring updates to lines of action present in this strategy.

**Studies:**

In the strategy there have been various required studies identified for the optimum execution of the specific actions. Amongst the mentioned studies of the strategy are:

- Analysis of the bus fleets and governmental fleets to show the benefits of replacement with electric vehicles.
- Study as to the economic impact of the use of tariffs exclusively for electric vehicles.
- Evaluation of the repercussions on health and the environment due to the use of electric vehicles in Panama.
- Analysis as to the necessity and priority of fiscal and non-fiscal incentives and their economic repercussions.
- Study of the electric network on a short, medium and long term basis for the progressive inclusion of chargers for electric vehicles.
- Economic and environmental study as to the established use of carbon pricing.

These studies should be executed as soon as possible in order to obtain a basis for measuring, reporting and verifying the indicators which each analysis would create. Using such a basis prioritised actions can be executed and results can be measured to identify points of improvement and optimize the efforts as to inclusion of electric vehicles in the country.

**Indicators**

As mentioned in Line of Action 1, it is recommended that for the purpose of following-up on the strategy the intergovernmental committee should take responsibility for following up on the indicators created. Following on from this, indicators to be used are listed for calculations and projections used in the strategy, as well as some additional indicators which could contribute to a better analysis of the data generated by the increase in electric mobility in the country.

| | Indicator | Comments |
|---|---|---|
| 1 | Total of electric car/vehicles. | All types of vehicles can be tracked given that some segments could grow significantly in a few years. |
| 2 | Total of cars/ vehicles in Panama. | A single source must be set for this aspect. At the point of elaborating ENME no one authorized source exists. |
| 3 | Total vehicle sales. | |
| 4 | Total sales of electric vehicles. | |
| 5 | Number of models available in the local market. | |
| 6 | Number of outgoing vehicles | As a part of ENME it is recommended to control the scrapping of vehicles leaving from the transport system. |
| 7 | Reduction of emissions caused by the introduction of electric vehicles. | It could be an indicator with ample scope as to precision given that it could be an estimate of approximate emissions or could take into account each particular vehicle/model. |
| 8 | Percentage of reduction of emissions supported by the commitments of established countries of the NAMA or the NDC. | Taking into account the transport sector in the nationally determined contribution (NDC) and the 2030 commitments, the contributions of electric vehicles can be calculated to achieve this goal. |
| 9 | Difference in average cost of covering 100km. | |
| 10 | Number of preferred parking spaces for EVs in shops. | Considering fuel prices should increase given local taxation and gradual increase. |

# ABSTRACT OF THE STRATEGY

| STRATEGIC PILLAR | OBJECTIVE (GOAL) | | LINE OF ACTION |
|---|---|---|---|
| Governance | Put in place a permanent governance program and the multisectoral coordination of electric mobility in Panama. | 1 | Interinstitutional governance. |
| | | 2 | Public-private governance. |
| Electric Vehicle Standards | Update and create the instruments for standardizing and promoting electric vehicles and disincentivizing the use of combustible fuels. | 3 | Incentives (fiscal and non-fiscal). |
| | | 4 | Maximum limit on emissions, minimum performance and tagged vehicles. |
| | | 5 | (Revised) technical vehicles inspection with measurement of emissions. |
| | | 6 | Carbon pricing instruments (carbon tax, cap and trade) |
| | | 7 | Safety, authorization and interoperability. |
| | Develop the standards and regulations for the development of infrastructure, commercialization and operation of electric mobility. | 8 | Promote the inclusion of charging points in new buildings and urban development plans. |
| | | 9 | Guidelines as to the payment of services for charging electric vehicles. |
| | | 10 | Electric network and vehicle charging. |
| | | 11 | Regulations and standards for charging infrastructure. |
| | | 12 | Commercialization of electricity for charging electric vehicles. |
| | Promote mechanisms for financing and promoting new business models and training associated with electric mobility. | 13 | Financing studies for feasibility and formulation projects. |
| | | 14 | Financing for the replacement of fleets – Development bank. |
| | | 15 | Financing and insurance for individual consumers and fleets – commercial bank. |
| | Guarantee environmental sustainability in the transition to electric mobility. | 16 | Management of old vehicles. |
| | | 17 | Management of batteries. |
| Strategic Sectors | Introduce electric mobility as part of the modernization process the country's public entity fleets. | 18 | Official fleets. |
| | | 19 | Private fleets. |
| | | 20 | Strategic sector fleets. |
| | | 21 | Bus fleets. |
| Knowledge and Education | Strengthen Investigation, Technological Development and Innovation (R+D+I) capabilities in electric mobility. | 22 | Studies as to development and innovation. |
| | Strengthen the curriculum for technical professional training and higher education in the area of electric mobility. | 23 | Technical training. |
| | Design and execute a campaign for disseminating information as to the benefits, incentives and plans for the implementation of EMNE. | 24 | Dissemination of information. |

# ANNEX A

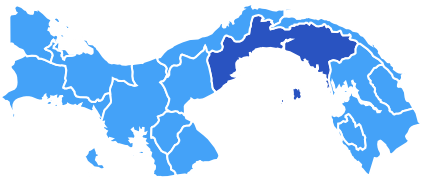
**Premises for calculating goals:**

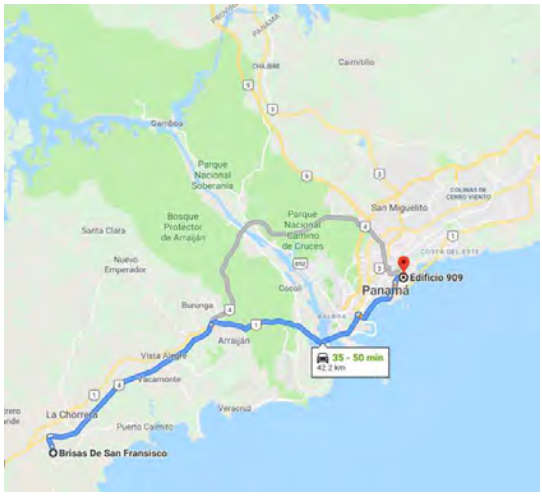
1. Based on historical data from ADAP, ATTT and INEC (1995 to 2016 with adjustments made for unrepresented years) the introduction of new light vehicles to Panama presents a growth rate of 5.5%.
2. A price parity between electric vehicles and vehicles with a internal combustion engine motor can be reached in 2021 by implementing promotion strategies and incentives for electric mobility on the part of governments, in accordance with a recent study by Deloitte[xvii]. The year 2024 will set a scene of parity without government assistance based on the development of technology. Following such premises and taking into account the initiatives of the Panamanian government the year 2022 is taken as a potential year for parity in our country.
3. Cars older than 10 years old will be removed from circulation, amounting to a total between 10,000 and 20,000 cars being struck off from the register per year.
4. According to the Global EV Outlook 2018[xviii] of the global supply of vehicles from manufacturers in 2025, an average of 25% of them will be electric. And there has already been about 250 new electric vehicle models announced for the years between 2018 and 2030.
5. According to the Global EV Outlook 2018[xix] it is estimated that an electric vehicle is between 30% and 50% more efficient [on a well-to-wheel basis] than an internal combustion engine vehicle depending on the mix of sources generated by the evaluating country. Therefore, an intermediate value of 40% will be taken for Panama.
6. Panama has assumed updated NDC targets for 2030 and this reason the same year has been established as the target year for the estimated contributions of this electric mobility strategy. This means that electric mobility can be included as a mitigating action in the stated NDC update and be presented as a NAMA of Panama.
7. Studies as to base rates of Carbon Dioxide ($CO_2$) emissions of newly registered vehicles in Panama during the period of 2008, 2010, 2012, 2014 and 2016, show that the average annual grams of $CO_2$ emissions per kilometre oscillates between 184.61 g $CO_2$/km in 2008 – 201.50 g $CO_2$/km for the year of 2016[xx].
8. For the year 2013 the entire Energy sector reported a total of 9,370.4 kt of $CO_2$ eq, that is 40.8% of total emissions. Emissions emanating from the combustible vehicle sources subsector made up a total of 3,821.6 kt of $CO_2$ equivalents, of which almost half is emitted by the land transportation category[xxi]. This indicates that decarbonization of land transport is one of the principal pivot points for Panama's policies which aim to reduce emissions in the face of climate change.
9. With emissions of 201.50 g $CO_2$/km for the year of 2016, with an annual journey for a car in Panama being 20,000 km.
10. Given the creation of additional lines for Panama's metro[xxii] and works to improve urban mobility within the country[xxiii], from 2024 the purchase of new vehicles should gradually decrease.

# ANNEX B

The charging of particular electric vehicles in a country such as Panama would be mostly slow charging due to the relatively short distances that are covered in the majority of cases . These charging loads would be concentrated at night time and during the working day, with a low impact on demand and consumption in the first years of electric mobility. To illustrate this examples of various routes have been produced.

Vehicles for analysis:
**Electric**: 21 kWh/100 km @ 0.20 USD/kWh
**Internal Combustion**: 7.8 L/100km @ 0.82 USD/L





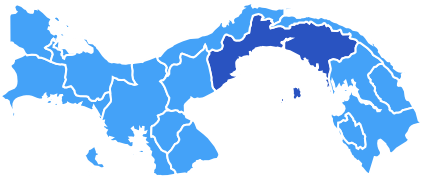

**Example 1:**

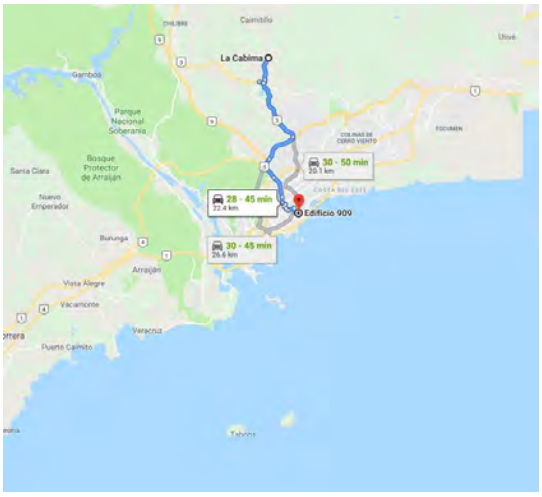
**Conditions:** Pablo Perez lives in Brisas de San Fransisco, La Chorrera and works at 50 and 74PH 909 San Fransisco street. From home to work he covers 48 km, during the day and after work he covers 3km (finding lunch, dinner or the gym), before arriving home (another 48km). In total he covers 99 km per day.

**Vehicle:** Pablo has an electric car with range of 300k. Due to the use of air conditioning, time stationary in traffic, the slops on the journey, the style of driving among other factors, the range is reduced by 25% making it 225km.

**Result:** Under these circumstances Pablo could charge his car on Sunday night (whilst he sleeps) and use his car without the need to recharge it all throughout Monday and Tuesday, returning to charge it on Tuesday night so it is ready for work on Wednesday.

This allows for a battery maintained at a minimum of 20% charge (as recommended by the manufacturer), there is no need to charge during the day and it saves B/. 2.21 per day** in comparison to a petrol car (saving approximately B/. 60.00 per month).



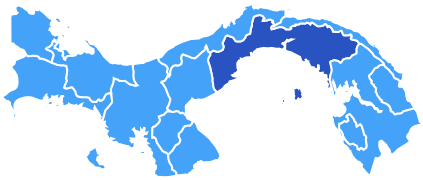


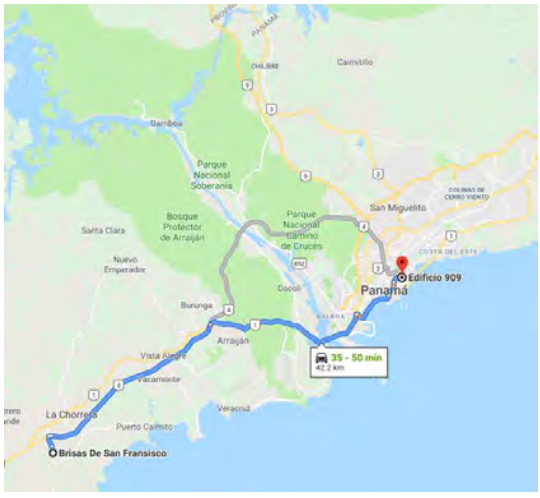

**Example 2:**

**Conditions:** Pedro Gonzalez lives in La Cabima (Praderas de San Lorenzo) and lives with Pablo, from home to work he covers 23km, he also covers 3km whilst doing a few things (lunch, dinner, gym, etc.), before arriving home. In total he covers 49 km per day.

**Vehicle:** He also has an electric car which charged during Sunday night, He then uses it throughout Monday, Tuesday and Wednesday, and even then it has more than 30% battery charge.

**Result:** Pedro also need not charge during the daytime (he can do it in this house whilst he sleeps) and it saves B/. 1/10 per day** in comparison to a petrol car (a saving of approximately B/. 30.00 each month) given that it covers half of what Pablo does, he saves more on energy for his car.






**Example 3:**

**Conditions:** Juan Vásquez lives in Marbella and work in Corozal Oueste, from home to work he covers 11km.Adding a additional trip (alternative route or a shopping trip) 3 km are added per day. In total he covers 25 km per day.

**Vehicle:** Juan has an electric car with range of 300km. Given the use of air conditioning, time stationary in traffic, slopes on the journey, the driver's style of driving among other factors, the range is reduced by 25%, making it 225 km.

**Result:** Juan could charge his vehicle Sundays by night, without the need to charge it during the week. The expenditure on energy for the charge of Juan's electric vehicle would be no more than B/. 30.00 and would amount to a monthly saving of approximately B/. 18.00.

As well as these benefits, both save more due to the maintenance costs being much more economical than is for petrol cars because there is no need to change the oil, straps nor plugs.

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