STRATEGY FOR REDUCTION OF CARBON EMISSIONS IN TRINIDAD AND TOBAGO, 2040.

Action plan for the mitigation of GHG emissions in the electrical power generation, transport and industry sectors

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List of acronyms

CBO	Community Based Organization
CCFPN	Climate Change Focal Point Network
CCGT	Combined Cycle Gas Turbine
CCMC	Climate Change Ministerial Committee
CDM	Clean Development Mechanism
CER	Certified Emissions Reduction
CNG	Compressed Natural Gas
CO_2e	Carbon dioxide equivalent
COP	Conference Of Parties
CSO	Central Statistical Office
EMA	Environmental Management Authority
ENSO	El Niño - Southern Oscillation
GCF	Green Climate Fund
GCM	Global Climate Model
GDP	Gross Domestic Product
GEF	Global Environmental Facility Trust Fund
GORTT	Government of the Republic of Trinidad and Tobago
GWh	Gigawatt hour
IDB	Inter-American Development Bank
IFC	International Finance Corporation
IKI	International Climate Initiative
IPCC	Intergovernmental Panel on Climate Change
IPP	Independent Power Producer
LCDF	Least Developed Countries Trust Fund
LDC	Least Developed Countries
LECB	Low Emissions Capacity Building
LEDS	Low Emission Development Strategies
LNG	Liquefied Natural Gas
M	Million
MEAU	Multilateral Environmental Agreements Unit
MEEA	Ministry of Energy and Energy Affairs
MEWR	Ministry of the Environment and Water Resources
MFE	Ministry of Finance and the Economy
MFP	Ministry of Food Production
MH	Ministry of Health
MHUD	Ministry of Housing and Urban Development
MLG	Ministry of Local Government
MMscfd	Million standard cubic feet per day
MPSD	Ministry of Planning and Sustainable Development
MPU	Ministry of Public Utilities
MRV	Monitoring, Reporting and Verification
MT	Ministry of Transport
MTD	Ministry of Tobago Development
Mto	Ministry of Tourism

mtpa	Million tons per annum
MWI	Ministry of Works and Infrastructure
NAMA	Nationally Appropriate Mitigation Action
NAO	North Atlantic Oscillation
NGC	National Gas Company of Trinidad and Tobago Limited
NPIF	Nagoya Protocol Implementation Fund
OECD	Organisation for Economic Co-operation and Development
Petrotrin	Petroleum Company of Trinidad and Tobago Limited
PoA	Programme of Activities
POP	Persistent Organic Pollutants
PowerGen	Power Generation Company
PPA	Public-Private Alliance
PSIP	Public Sector Investment Programme
PTSC	Public Transport Service Corporation
RCP	Representative Concentration Pathways
REDD	Reducing Emissions from Deforestation and Forest Degradation
RIC	Regulated Industries Commission
SCCTF	Special Climate Change Trust Fund
SECCI	Sustainable Energy and Climate Change Initiative
SGP	Small Grants Programme
SIDS	Small Islands Developing State
sq km	Square kilometre
t	tonnes
T&TEC	Trinidad and Tobago Electricity Commission
TGU	Trinidad Generation Unlimited
Trinity	Trinity Power Limited
TTMS	Trinidad and Tobago Meteorological Service
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollars
VCS	Verified Carbon Standard

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Preface

The Fifth Assessment Report of the Intergovernmental Panel on Climate Change reflects the growing certainty about the human influence on climate and its associated risks. Global warming is a reality and, since 1950 several unprecedented changes have taken place, the last three decades being successively warmer at ground level than the previous ones. This is the context within which Trinidad and Tobago is working to contribute to international efforts to tackle climate change, as a Non-Annex I party to the United Nations Framework Convention on Climate Change (UNFCCC).

The National Climate Change Policy 2011 established the principles which mandate the actions related to climate change issues in Trinidad. This document provides the policy basis for the development of the first Strategy for the Reduction of Greenhouse Gas (GHG) Emissions in the Electrical Power Generation, Industry and Transport Sectors of Trinidad and Tobago over the 2013-2040 horizon.

This Strategy is a tool, which is intended to be continuously updated. It is designed to create the necessary conditions and capacities for multidisciplinary implementation of climate change action based on the policies of the Government, while strengthening inter-governmental coordination.

It is designed in the frame of the international negotiations currently led by the UN, which aim to develop a new international climate change agreement that will cover all countries; the Strategy also provides a basis and valuable tool for the GORTT in complying with international obligations in the context of its intended nationally determined contribution (INDC), under the United Nations Framework Convention on Climate Change (UNFCCC) in the context of the international

negotiations towards a new global climate agreement in the 2015 Paris Conference.

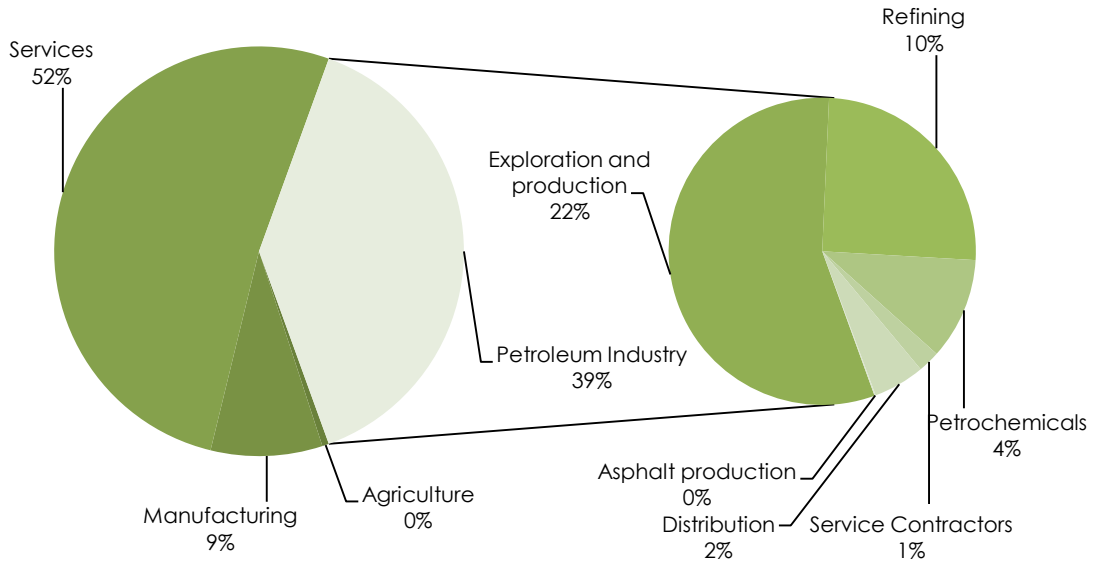
1. Country Overview

The Republic of Trinidad and Tobago is a twin-island state located in the Southern part of the Lesser Antilles in the Caribbean, between the Caribbean Sea and the North Atlantic Ocean, northeast of Venezuela. As of 2014, its estimated population is 1,223,916 people, ranking the country 168th in the world in terms of population. The majority of the population lives in Trinidad, which is the largest island with 4,827 sq km. The land area of both islands adds up to a total of 5,127 sq km [1].

- **Economy of Trinidad and Tobago**

Trinidad and Tobago has one of the highest per capita incomes in Latin America; in fact, it is the most industrialized economy in the English-speaking Caribbean. It is the leading Caribbean producer of oil and gas, and its economy is mainly based upon these resources. Trinidad and Tobago also supplies manufactured goods, mainly food products and beverages, as well as cement, to the Caribbean region. Even though other products are also manufactured, oil and gas is the leading economic sector and accounts for 40% of Gross Domestic Product (GDP) and 80% of exports. In fact, Trinidad and Tobago is the world's largest exporter of ammonia and methanol, and one of the largest exporters of liquefied natural gas (LNG)[2].

Graph 1: Sectoral GDP Distribution (2013).
Source: Prepared by the authors, based on data from the Central Statistical Office.



However, the economic impact of the oil and natural gas sector is not reflected in the employment rate. In fact, only about 5% of the active population is employed in it.

Furthermore, the country has the features of a "dual economy" due to the self-financed investment in the energy sector, which is independent of national savings and fiscal revenues. Nevertheless, the benefits obtained from the large investments in this sector are not clearly reflected in the rest of the economic sectors. As a result, the energy sector is a wealthy sector, with excellent growth prospects, while the rest of the economy of the country lags behind [2].

Furthermore, there is another important factor that significantly influences the country's economy. In the 1970s, the Petroleum subsidy and levy were introduced to protect consumers from the sharp increase in petroleum prices, ensuring that they enjoy the fruits of national patrimony through low and stable prices. Initially, the entire cost of the subsidy was borne by oil-producing companies, but, since the amendment introduced in 1992, oil companies will not have to pay a levy of more than 3% of the company's gross income. This percentage was raised in 2003 to 4%, but in that second amendment another exception was included, with any company not producing more than 3,500 barrels per day being exempt from the levy altogether. As a result, any share of the subsidy in excess of the 4% cap is currently borne by the government.

The financial burden for the government caused by the fuel subsidy is particularly high when oil prices increase. Additionally, fuel subsidies discourage both supply side and demand side efficiency improvements, which lead to high energy consumption and an even bigger burden for the country and create an uncompetitive economic environment for alternative sources of energy such as renewable energy sources [3].

- **Climate Change in Trinidad and Tobago**

Trinidad and Tobago's proximity to the equator is the reason why the country has a tropical climate that is characterised by two seasons throughout the year, a dry season and a rainy season. The year begins with a dry season that contains warm days and cool nights. The dry season lasts from January until May. After the dry season Trinidad and Tobago's climate changes to the rainy season that contains hot and humid days. This rainy season lasts for the rest of the year, therefore from June until December.

Due to its geographical location, Trinidad is on the southern periphery of the North Atlantic hurricane basin. The frequency with which Trinidad is affected directly by storms is lower than that of Tobago. Nevertheless, peripheral weather associated with the passage of tropical storm systems impacts both islands similarly [4]. The temperature and rainfall variability in Trinidad and Tobago mostly originates in the tropics. However, global features also impact the climatic variability of the country. In fact, phenomena such as

El Niño- Southern Oscillation (ENSO) and the North Atlantic Oscillation (NAO) are two of the major drivers of climate variability in Trinidad and Tobago [5].

There are several studies that found evidence of recent changes in the climate in Trinidad and Tobago. It has been shown that, over the last three decades, there has been an upward trend in temperatures. For instance, Mc Sweeney[6, 7], using a Global Climate Model (GCM) found several increases in the mean annual temperature in Trinidad and Tobago, with an increase around 0.6°C since 1960. Furthermore, the Trinidad and Tobago Meteorological Service (TTMS) also found that the annual mean air temperature has warmed over the period 1981-2010 by 0.8 and 0.5 °C relative to 1961-1990 and 1971-1990, for Trinidad and Tobago respectively. That anomalous warming per decade is consistent with those observed by the Intergovernmental Panel on Climate Change (IPCC) (2007) for the Caribbean region [8].

In terms of vulnerability to the effects of climate change, Trinidad and Tobago's effects and possible impacts have been well documented. As a Small Island Developing State (SIDS), the country is vulnerable to temperature increases, changes in precipitation and sea level rise. Other vulnerabilities include increased flooding, increased frequency and intensity of hurricanes, hillside erosion and loss of coastal habitats. In fact, even though Trinidad and Tobago is not in the main Atlantic hurricane belt, one of the new natural hazards scenarios considered for the country is the increased potential to be hit by tropical storms.

Furthermore, according to the latest Representative Concentration Pathways (RCP) scenarios being used in the 5th assessment of the IPCC, the average global sea level rise projection is 0.32-0.62 meters for the period 2081-2100 for the mid-range RCP 4.5 scenario compared to 1986-2005. If the results of the high-range RCP 8.5 scenario are considered, the projection result rises to 0.53-0.97 meters by 2100. Given that, up until now, the sea level rise in Trinidad and Tobago has matched the global average; the country's median sea level rise by 2100 might be 0.52 meters based on RCP4.5 and 0.73 meters based on RCP8.5. Additionally, other projections for the Caribbean by 2100 using RCP 4.5 include a median annual temperature increase of 1.4 °C and precipitation is projected to decrease in the southern Caribbean and increase in the north [9].

Given the climate impacts expected for Trinidad and Tobago and its fossil fuel based economy, taking action to implement climate change mitigation policies in the country is deemed as a necessity to reduce climate change impacts and assume responsibility for the country's GHG emissions. The IPCC's Fifth Assessment Report "Climate Change

2014: Mitigation of Climate Change"[10]can help cast light on mitigation policies and the necessity to mitigate GHG emissions.

According to this report, total anthropogenic GHG emissions have risen more rapidly from 2000 to 2010 than in the previous three decades. Furthermore, a growing share of these emissions is released in the manufacture of products that are traded across international borders. As a result of this, even though per-capita emissions are still markedly higher in the Annex I parties to the United Nations Framework Convention on Climate Change, total annual industrial CO_2 emissions from the Non-Annex I group (largely developing countries) now exceed those of the Annex I group (industrialised developed countries) using territorial and consumption accounting methods. Therefore, without explicit efforts to reduce GHG emissions, the fundamental drivers of emissions growth are expected to persist despite major improvements in energy supply and end use technologies.

According to the mitigation scenarios, there are a range of technological and behavioral measures that would allow the world's societies to follow emissions pathways compatible with atmospheric concentration levels between about 450 ppm CO_2e to more than 750 ppm CO_2e by 2100, which is comparable to CO_2e concentrations between RCP 2.6 and RCP 6.0[1]. Hence, limiting peak atmospheric concentrations over the course of the century is critical for limiting temperature change. According to the report, in order to reach atmospheric concentration levels of 430 to 530 ppm CO_2e by 2100, the majority of mitigation relative to baseline emissions over the course of this century will occur in the non-OECD countries and reaching atmospheric concentrations levels of 430 to 650 ppm CO_2e by 2100 and will require large scale changes to global and national energy systems over the coming decades.

Delaying mitigation through 2030 would increase the challenges of bringing atmospheric concentration levels to 530 ppm CO_2e or lower by the end of the century while, at the same time reducing the options of achieving that objective. Those delays could also substantially increase mitigation costs in the decades that follow and the second-half of the century. On the contrary, mitigation scenarios leading to atmospheric concentration levels between 430 and 530 ppm CO_2e in 2100 are associated with significant co-benefits for air quality, human health and ecosystem outcomes. Furthermore, associated welfare

[1] According to RCP 2.6, the mean and likely ranges of temperature and sea level increase for the 2045-2065 and the 2081-2100 periods would be 1.0 and 1.0 for temperature and 0.24 and 0.40 for sea level rise, respectively. According to RCP 6.0, the mean and likely ranges of temperature and sea level increase for the 2045-2065 and the 2081-2100 periods would be 1.3 and 2.2 for temperature and 0.25 and 0.48 for sea level rise, respectively.

gains are expected to be particularly high where currently legislated and planned air pollution controls are weak [10].

The GHG emissions and vulnerability data will have a significant effect for the well-being of Trinidad and Tobago's citizenry. In fact, those with the least resources are usually the most vulnerable when the effects of climate change appear. From a social perspective, the implementation of this GHG reduction strategy will provide profitable outcomes for Trinidad and Tobago. It will help create new jobs through green growth and diversify the national economy and labor market. This could be used as an opportunity to enhance the integration of the most vulnerable citizens and promote a socially inclusive labor market.

Trinidad and Tobago has outlined a Strategy to reduce GHG emissions in the electrical energy generation, industry and transport sectors, which is detailed in the following sections. The implementation of the Strategy will lead to the establishment of several GHG mitigation actions which will improve the quality of life of the citizenry of Trinidad and Tobago. This improvement will facilitate their access to a safe and reliable public transportation system and help them make a more efficient use of the resources, reducing their expenditure.

2. Strategic framework: Mission and Vision

Up until 1995 several policies and acts which addressed environmental issues had been developed in Trinidad and Tobago. However, it was not until that year when the Environmental Management Act was passed. The introduction of the Environmental Management Act was a very important step towards sustainability in Trinidad and Tobago. For the first time, an act which focused on the environment as a whole was created. This contrasts with the previous situation, where acts addressing individual environmental issues or not developed to address environmental issues but having an important effect on them, composed the environmental legislation of Trinidad and Tobago.

- **CONTEXT**

According to the Environmental Management Act (1995), "*sustainable development should be encouraged through the use of economic and non-economic incentives, and polluters should be held responsible for the costs of their polluting activities*". Furthermore, "*management and conservation of the environment and the impact of environmental conditions on human health constitute a shared responsibility and benefit for everyone in the society requiring co-operation and co-ordination of public and private sector activities*". These principles establish a framework to consider when developing any climate change related policy in Trinidad and Tobago.

Nevertheless, the Environmental Management Act is not the only piece of legislation or policy which establishes clear principles for the management of environmental and climate change issues in Trinidad and Tobago or that should be considered for the development of this Strategy. The table below provides a summary of milestones which shaped the framework for the development of this Strategy.

Table 1: Environment and climate change policy milestones in Trinidad and Tobago.
Source: Prepared by the authors.

Year	Milestone
1995	*Environmental Management Act.* Created the first comprehensive legal framework for the management of environment related issues in Trinidad and Tobago.
1998	*National Environmental Policy.* A requirement of the Environmental Management Act 1995, its goal is the conservation and wise use of the environment of Trinidad and Tobago to provide adequately for meeting the needs of present and future generations and enhancing the quality of life.
2001	*Environmental Management Act 2000.* Act to repeal and re-enact the Environmental Management Act 1995 with a special majority of Parliament since aspects of the original legislation may have been in conflict with the Constitution of Trinidad and Tobago.
2001	*Initial National Communication to the UNFCCC.* Prepared according to the Article 4 of the UNFCCC convention. It includes the first National GHG Inventory and its national programmes to mitigate and adapt to climate change.
2006	*National Environmental Policy. This was an update of the 1998 policy after a process of extensive public consultation. It is a* requirement of the Environmental Management Act 2000, its goal is environmentally sustainable development, meaning the balance of economic growth with environmentally sound practices in order to enhance the quality of life and meet the needs of present and future generations. It includes broad references to climate change adaptation and mitigation.
2011	*National Climate Change Policy.* Its goal is to provide policy guidance for the development of an appropriate administrative and legislative framework, in harmony with other sectoral policies, for the pursuance of a low-carbon development path for Trinidad and Tobago through suitable and relevant strategies and actions to address climate change, including sectoral and cross - sectoral adaptation and mitigation measures.
2012	*Working for Sustainable Development in Trinidad and Tobago.* The document was framed and developed within the context of the Manifesto 2010 of the People's Partnership and the Medium Term Policy Framework (MTPF) 2011-2014. It makes a commitment to prosperity for all within a sustainable development framework.

Year	Milestone
2013	*Second National Communication to the UNFCCC*. It focuses on the compilation and analysis of the National Inventory of greenhouse gases (GHGs), vulnerability and adaptation studies, mitigation options as well as on recommendations with respect to proper data collection and sharing, technology needs, capacity building, research and development constraints and challenges.

As shown in the table, the first national effort focused solely on climate change was developed in 2001, when the Initial National Communication to the UNFCCC of the GORTT was published. Trinidad and Tobago signed and ratified the Kyoto Protocol in 1999. Since it is a Non-Annex I Party to the Convention and belongs to the SIDS group, it had to deliver its initial National Communication within three years of the entry into force of the Convention for the country.

After the development of the Initial National Communication to the UNFCCC, a second national initiative focused on climate change was developed in 2011, the National Climate Change Policy. This document sets the broad policy framework for any climate change action and initiatives in Trinidad and Tobago. It provides policy guidance to define an administrative and legislative framework for the pursuance of a low carbon development path for Trinidad and Tobago. The Policy was built in harmony with other sectoral policies and it includes sectoral and cross-sectoral adaptation and mitigation policies.

Since then, Trinidad and Tobago submitted its Second National Communication to the UNFCCC. This report updated the National GHG Inventory, moving the baseline year from 1990, which was the year used in the Initial National Communication to the year 2000. Furthermore, it also includes the policy developments since the Initial National Communication and the steps taken for the implementation of the National Climate Change Policy.

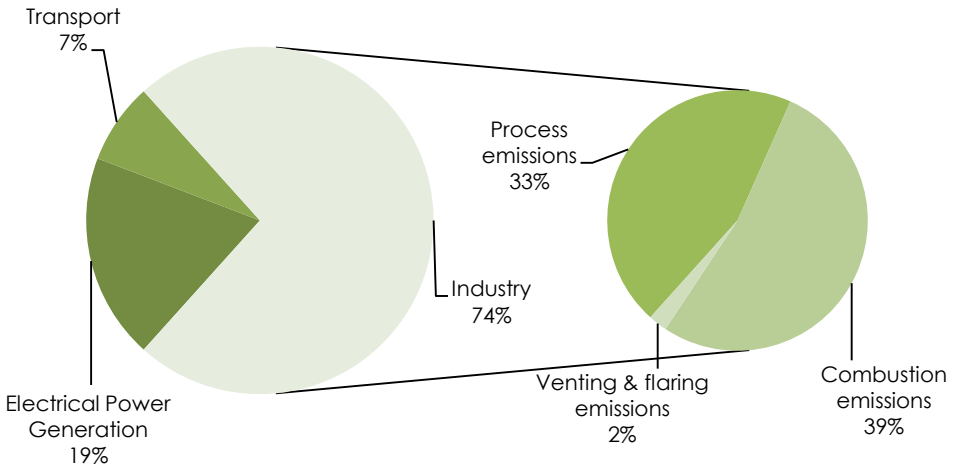
This Strategy for the reduction of GHG emissions in the electrical power generation, industry and transport sectors is clearly aligned with the National Climate Change Policy. In fact, the vision of the National Climate Change Policy established that the country would pursue a low-carbon development path through the development and delivery of strategies and actions for maximising renewable energy resources, clean energy and clean production technology.

According to the GHG inventory of the Second National Communication, the sectors which contribute the most to the GHG emissions of the country were identified as the electricity generation, transport and industry sectors. Therefore, these were the sectors

selected for the development of the GHG Emissions Reduction Strategy. In the graph below, the distribution of the national GHG emissions from energy sources is shown.

Graph 2: GHG emissions by sector (2012).

Source: Projection of the Business as Usual (BaU) and measures scenarios of carbon emissions for the electrical energy generation, industry and transport sectors. Factor CO_2, 2014[11].



As can be seen from the graph, the industry sector contributed the most to the GHG emissions in 2012, followed, with a lower contribution, by the electrical power generation and transport sectors, respectively. Considering that these sectors are the highest contributors to the total GHG emissions account of Trinidad and Tobago according to its GHG Inventory, any policies directed to pursue low-carbon development paths need to consider these sectors.

- **KEY FACTORS**

After having analysed the policy framework for the development of this strategy and before defining its mission and vision, it is necessary to provide deeper insight on the situation which Trinidad and Tobago is facing in terms of climate change. Trinidad and Tobago does not contribute largely to the total worldwide GHG emissions. In fact, as of 2013, Trinidad and Tobago was ranked 62nd off all the countries if they were classified by total national GHG emissions. However, if the analysis considers not only total national emissions but population as well, the country would be ranked second in terms of GHG emissions per capita [12].

A critical factor which drives the need for climate change policies and strategies in Trinidad and Tobago is the vulnerability of the country to the effects of climate change. As mentioned previously, Trinidad and Tobago belongs to the Small Islands Developing States (SIDS) group of countries. Those nations are characterized as being low-lying coastal countries that tend to share similar sustainable development challenges,

including small but growing populations, limited resources, remoteness, susceptibility to natural disasters, vulnerability to external shocks, excessive dependence on international trade, and fragile environments [13].

In fact, according to the National Climate Change Policy of Trinidad and Tobago, adverse effects are expected on the agriculture, human health, human settlements and infrastructure, coastal zones, water resources and tourism sectors. Climate change will also have adverse socio-economic and cultural impacts and therefore be a threat to the society as a whole. However, it will be particularly harmful for the less affluent population sectors, which are the most vulnerable to its effects. Therefore, climate change mitigation actions will also act in favor of reducing their vulnerability and enhancing their life conditions.

Therefore, implementing the provisions of the National Climate Change Policy is critical and necessary to ensure a sustainable development path that will redound to the benefits of society as a whole in the short, medium and long terms. Building climate resilience through the reduction of carbon emissions and reducing climate vulnerability in all sectors will create green jobs and have significant co-benefits from an air quality and associated public health costs perspective, as well as enhance the coping ability and capacity to the adverse impacts of climate change.

2.1. Mission

The GORTT is well aware of the threat climate change poses for the country's development and the population's well-being. Due to the features of the country's economy, reducing GHG emissions is not only a necessary step to tackle climate change, but also desirable in order to diversify the country's economy through the promotion of green growth, reduction of its dependence from fossil fuel based industries and protection of the most vulnerable population.

The GORTT therefore aims to reduce the GHG emissions of the three most emitting sectors of the country through a coordinated effort that will also lead to a reformulation of the productive matrix of the country, promoting sustainable development, fostering new economic sectors linked to green growth and creating new employment options.

2.2. Vision

By 2040 Trinidad and Tobago's economy will not be based on the oil and natural gas resources of the country. The transformation of the economic sectors will have led the country to a development based on green growth, and reducing the economic dependence of the oil and natural gas based sectors. New economic sectors, which will create green jobs and foster innovation and development in Trinidad and Tobago, will have significantly complemented and substituted fossil fuel based sectors.

The growth of these new sectors will have been promoted by the need to reduce GHG emissions and implement sustainable solutions and by the economic benefits obtained from the removal of fossil fuel subsidies. Furthermore, the creation of new economic sectors will favor the inclusion of the economically underprivileged population through new employment options and professional training, and improving social equity.

In the electricity generation sector, renewable energies will be a reality in Trinidad and Tobago energy mix. Furthermore, energy efficiency will have helped reduce the country's electricity consumption and the electricity generated will cause less GHG emissions due to the use of more efficient technologies in generation plants.

In the industry sector, energy resources will be used wisely, by minimizing the production of waste heat and cut energy consumption trough the implementation of energy efficiency actions. The industrial sector of Trinidad and Tobago will have incorporated the latest Best Available Technologies and, as a result, minimized the process-based GHG emissions and the associated environmental impact of their activities.

In 2040, the transport system of Trinidad and Tobago will not only be based on the use of private vehicles; a reliable public transport system will be a safe and economic alternative for the population. This fact combined with effective traffic management plan and the responsible use of the car will lead to less traffic congestion, lower GHG emissions in the sector and reduce environmental impacts. The use of alternative fuels and alternative technologies such as electric vehicles will be a reality for all transport modes and the vehicles used will be more efficient.

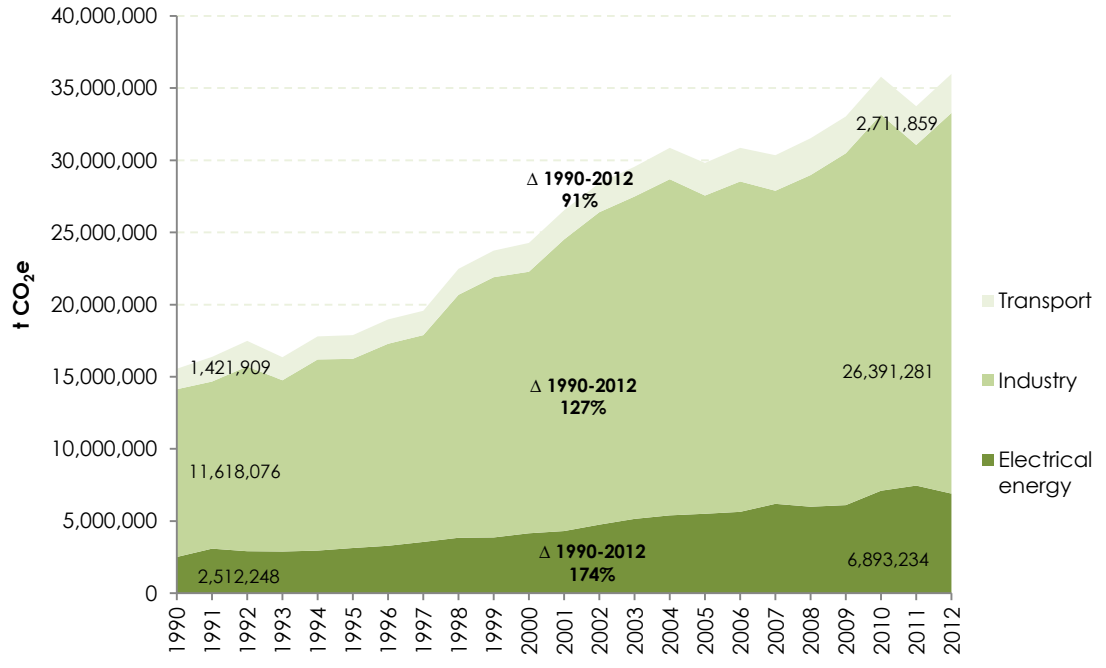
3. Sectoral diagnosis

The lack of reliable data in terms of quantified GHG emissions for all sectors in Trinidad and Tobago is one of the issues addressed within the development of this Strategy. Previous inventories quantifying the emissions from the national energy and industry sectors, had relatively high uncertainty. The reconstruction of the GHG emissions from the electrical power generation, industry and transport sectors is shown. Nevertheless, it should be noted that these results are also affected by the lack of reliable data, which reduces the certainty of the results. Therefore, additional efforts are necessary to guarantee further improvement of these results, focused primarily on the extraction of reliable data in order to construct a complete and reliable national GHG Inventory.

As stated previously, the electrical energy generation, industry and transport sectors contribute the most to the GHG emissions derived from energy sources in Trinidad and Tobago.

Graph 3: GHG emissions from the historical reconstruction.

Source: Projection of the Business as Usual (BaU) and measures scenarios of carbon emissions for the electrical energy generation, industry and transport sectors. Factor CO_2, 2014[11].



According to the historical reconstruction of the GHG emissions developed in the framework of this strategy, the industry sector was the highest emitter of the three sectors in 1990 and this situation has not changed since then. The electricity sector is the second

highest contributor of emissions, while the transport sector is the third highest emitter. In terms of growth, however, the electricity generation sector has the highest growth between 1990 and 2000 and 1990 and 2012, reaching 174% growth at the end of the period. It is followed by the industry sector with 127% growth and the transport sector with 91% growth.

There is a slight decrease in the share of emissions from the industry sector (from 75% to 73%), which therefore means that the transport and electrical energy sector have shares higher in 2012 than in 1990.

In respect of projected emissions, four different future scenarios were developed. The structure created for the scenarios was based on economic and technical-political variables, building a 2x2 matrix which reflects four possible future perspectives. Each dimension of the matrix represents one variable: the economic perspective or the technical-political perspective. In the economic dimension, two scenarios were considered, a conservative economic scenario and an optimistic scenario[2]. From the technical-political perspective, Business as Usual is meant to refer to a situation in which no additional action is taken towards reducing emissions.

The Measures Scenarios implement a series of mitigation measures in order to reduce GHG emissions in these three sectors.

Figure 1: Considered scenarios.

Source: Projection of the Business as Usual (BaU) and measures scenarios of carbon emissions for the electrical energy generation, industry and transport sectors. Factor CO_2, 2014[11].

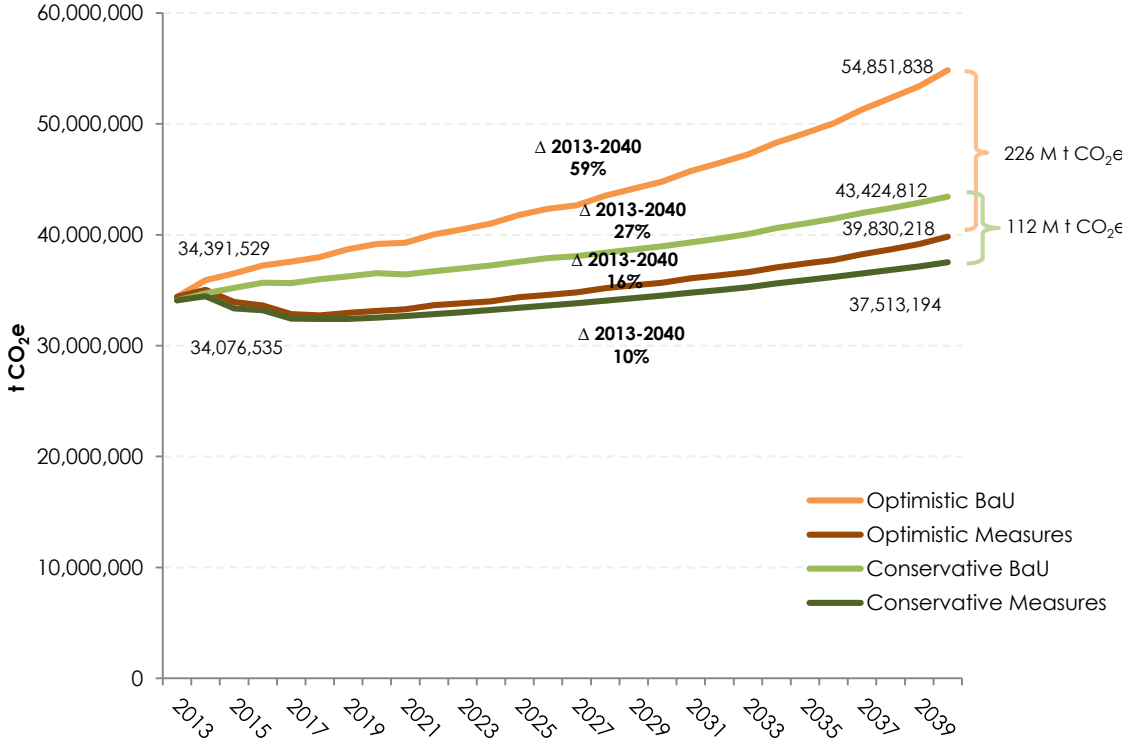
TECHNICAL-POLITICAL SCENARIOS	ECONOMIC SCENARIOS	
	Conservative	Optimistic
Business as Usual	Business as Usual Conservative (BC)	Business as Usual Optimistic (BO)
Measures	Mitigation Measures Conservative (MC)	Mitigation Measures Optimistic (MO)

The results of the emissions projections for all the scenarios are shown in the graph below.

Graph 4: Comparison of the total projected emissions in both scenarios.

[2] The economic growth is higher in the optimistic economic scenario than in the conservative economic scenario. As a result, GHG emissions in the optimistic scenario are higher than in the conservative scenario.

Source: Projection of the Business as Usual (BaU) and measures scenarios of carbon emissions for the electrical energy generation, industry and transport sectors. Factor CO_2, 2014[11].



As can be seen, the Optimistic BaU scenario has the greatest increase of emissions. On the other hand, the Conservative Measures scenario has a smaller growth in emissions. The emissions in the Optimistic BaU scenario grow 59% whereas growth in the Conservative Measures scenario is only 11%. The values of the Conservative BaU scenario and Optimistic Measures scenarios are in the middle, with 27% and 17% growth, respectively.

Nevertheless, the GHG reductions that would be achieved if GHG mitigation actions are implemented will be notable. As shown in the graph, due to the implementation of the measures, between 2013 and 2040 a total of 112 M t CO_2e or the cumulative amount would be saved in the conservative scenarios. In the optimistic scenario, this value would reach 226 M t CO_2e, because in these scenarios the assumption is that higher economic growth would facilitate the implementation of GHG emissions reduction measures.

In the sections below, the particular features of the sectors included in the strategy are presented and discussed.

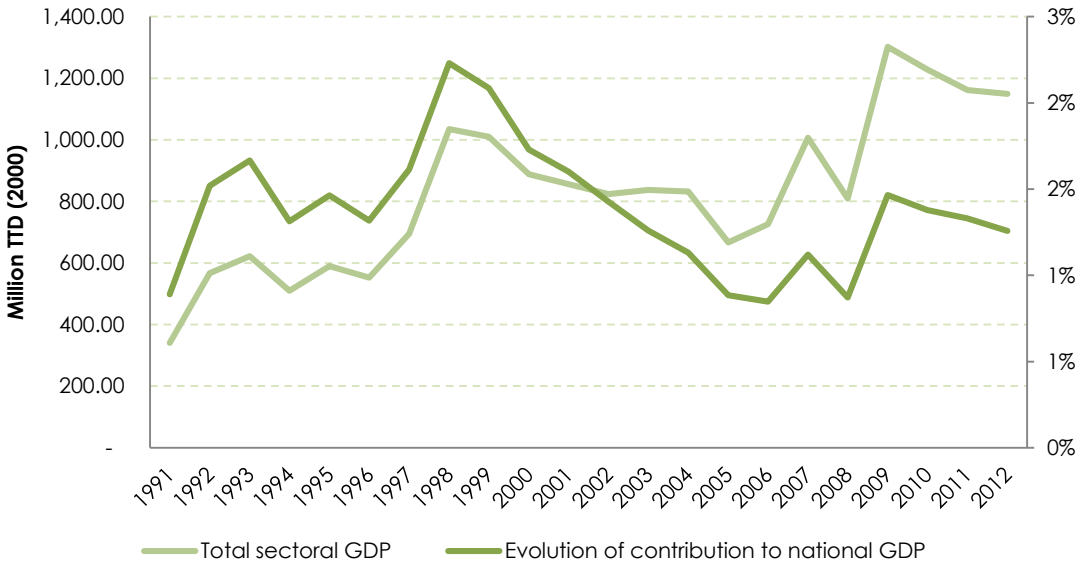
3.1. Electrical Power Generation

Table 2: Overview of the electrical power generation sector.
Source: Prepared by the authors.

Sector	Electrical Power generation
GDP Share[3]	1%
GHG Emissions Share[4]	19%
Key aspects	Efficiency improvements Conservation actions in consuming sectors Implementation of renewable energy sources

Currently, Trinidad and Tobago's electricity generation is almost solely dependent on natural gas, consuming approximately 8% of total natural gas produced in the country[14]. In economic terms, the sector represents approximately 1% of the country's GDP. The graph below shows the evolution of the contribution of the electrical power's generation GDP to the total national GDP.

Graph 5: Contribution of Electrical Power Generation sector to Trinidad and Tobago's GDP and total sectoral GDP (1991-2012).
Source: Prepared by the authors based on data from the Central Statistical Office.



The state owned utility, Trinidad and Tobago Electricity Commission (T&TEC), was created in 1946 from the consolidation of several independent power supply companies. T&TEC,

[3] Sectoral GDP share of the total national GDP of Trinidad and Tobago, 2012
[4] Sectoral GHG emissions share of the total electricity power generation, industry and transport emissions, 2012.

except for a few years in the past, has been managed by the Ministry of Public Utilities (MPU). Since 1946 major advancements were made in the development of the electricity generation, transmission and distribution systems. Initially, diesel fuel was used to generate electricity but in 1953, natural gas was introduced as a cleaner and more economical fuel source for power generation. Trinidad and Tobago was one of the first countries in the world to move away from flaring natural gas from oil production to collecting and utilizing this flared gas for electricity production. Currently, T&TEC is responsible for the design, construction, operation, and maintenance of Trinidad and Tobago's transmission and distribution network, and generates all of the electricity on the island of Tobago. Trinidad is electrically connected to Tobago via two submarine 33 kV cables. According to the Trinidad and Tobago Electricity Commission Act, T&TEC is the only company that can legally retail electricity and hence all producers must wholesale their electricity to T&TEC. T&TEC was once a vertically integrated utility with a monopoly on generation, transmission, distribution of electricity in the country.

In 1994, T&TEC divested its generation assets to the Power Generation Company (PowerGen), an Independent Power Producer (IPP) (T&TEC has a 51% shareholding but management resides with the 49% shareholders). T&TEC buys all electricity generated by PowerGen, as well as all electricity generated by another IPP, Trinity Power Limited (Trinity) [15]. A third IPP Company, Trinidad Generation Unlimited (TGU) has recently completed the installation of a 720 MW combined cycle plant. TGU has a Public-Private Alliance (PPA) with T&TEC that guarantees the income stream for the sale of all the power it generates (720 MW) to T&TEC[16]. The Regulated Industries Commission (RIC) is responsible for regulating T&TEC's electricity tariffs[17].

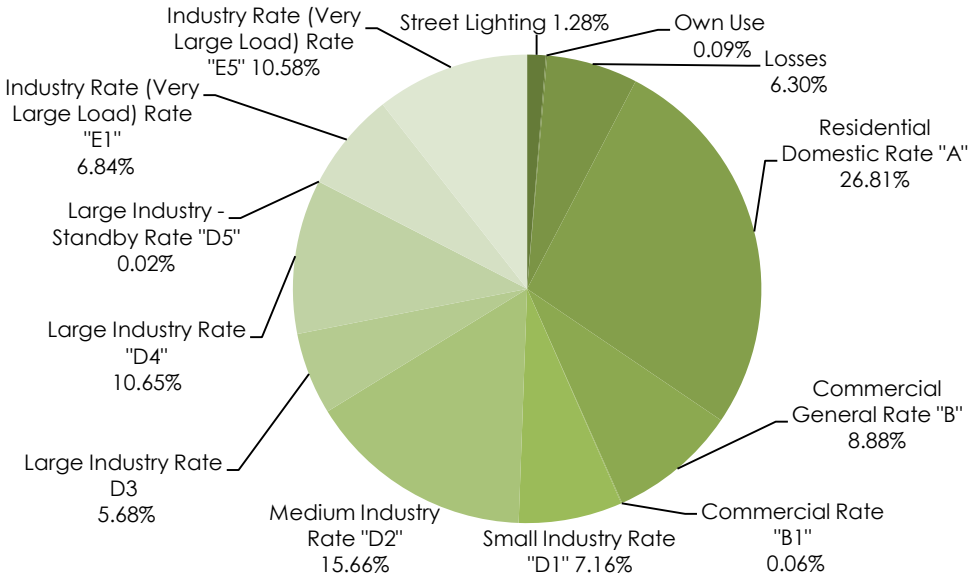
Table 3: Power generation capacity in Trinidad and Tobago.
Source: Prepared by the authors.

Power Station	Ownership	Installed Capacity	Fuel Type
POS 'B'	PowerGen	280 MW	Diesel, Bunker C, Jet A1, Natural Gas
Point Lisas	PowerGen	838 MW	Natural Gas
Penal	PowerGen	236 MW	Natural Gas(combined cycle)
Trinity Power	Trinity Power	225 MW	Natural Gas
TGU	AES Global Inc	720 MW	Natural Gas (combined cycle)
Cove	T&TEC	64 MW	Natural Gas/Diesel
Scarborough	T&TEC	22.1 MW	Diesel

According to the reconstruction of the sector's historical emissions developed in the framework of this Strategy, the GHG emissions of the electrical power generation sector have increased by 174%; in 1990 the value was 2,512,248 t CO_2e and it increased to 6,893,234t CO_2e in 2012. This correlates with a more than doubling electricity generation from approximately 3,400 to 9,000 GWh.

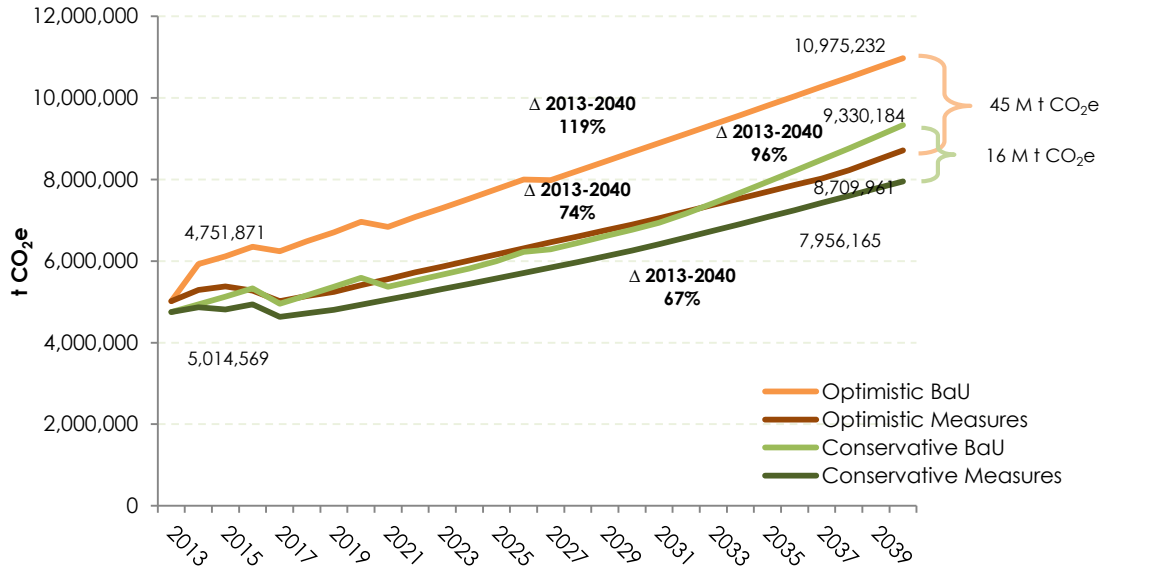
A general overview of the share of the electrical power demand of Trinidad and Tobago can be observed in the graph below. Residential customers consumed 26.8% of all energy produced whereas industrial and commercial customers utilized 56.8% and 8.9% respectively.

Graph 6: Electrical energy usage.
Source: Prepared by the authors based on % Customers based on Regulated Industry Commission approved Rates/T&TEC Billing Categories 2009.



In terms of projected emissions, in this sector, the Optimistic BaU scenario has the highest emissions, and the Conservative Measures scenario has the lower emissions. However, in this case, at the end of the projection period, the Conservative BaU scenario has higher emissions than the Optimistic Measure scenario.

Graph 7: Projected emissions for the electricity generation sector by scenario.
Source: Projection of the Business as Usual (BaU) and measures scenarios of carbon emissions for the electrical energy generation, industry and transport sectors. Factor CO_2, 2014 [11].



In this sector, the results at the end of the projection period are similar to those observed before; however, in this case, the positions of the Conservative BaU scenario and the Optimistic Measures scenario change. After 2035, the emissions of the Conservative BaU scenario are higher than those of the Optimistic Measures scenario, meanwhile before 2035, the Conservative BaU scenario has lower emissions. In terms of the impact of GHG mitigation actions, there is an important difference in the reductions achieved in the conservative scenario and the reduction achieved in the optimistic scenario. The total cumulative reduction for the conservative scenario over the entire period would sum up to 16 M t CO_2e, whereas in the optimistic scenario it would reach 45 M t CO_2e

The source of carbon emissions in the generation of electrical power comes from the combustion of the fossil fuel (natural gas) used to drive the gas turbines in Trinidad and the ICE[5] engines at the Cove Estate in Tobago. The greater the quantity of fuel burnt the greater the carbon emissions are, therefore reduction of emissions goes hand in hand with reducing the quantity of energy required from fossil fuel sources and the heat rate of the engines.

The SWOT analysis developed for this sector helps to better understand the reality of the sector. On the one hand, it has several strengths, such as being a monopoly and having a single transmission and distribution operator which would facilitate the implementation

[5] Internal Combustion Engines

of GHG mitigation actions. However, the sector has several weaknesses, including weak fiscal support mechanisms for energy conservation or alternative cleaner energy sources.

In terms of opportunities and threats, the receptiveness of the Government should be highlighted, even though it is politically unpopular to implement non-subsidized renewable energy policies; however, it is relevant to mention the on-going work performed by the GORTT in terms of providing administrative support to existent, however not operational yet, fiscal support mechanisms. This poses as an important opportunity for the sector since said mechanisms will boost energy conservation projects and alternative cleaner energy sources to be exploited. The strategic analysis table developed for the sector shows similar conclusions, highlighting particularly the necessity to develop energy conservation related actions in order to reduce GHG emissions in the electrical power generation sector.

Figure 2: SWOT Analysis for the Electrical Power Generation sector.
Source: Prepared by the authors.

Strengths	Weaknesses
- Monopoly. - Existing green paper on renewable energy. - Renewable energy integration in utility plan. - Commitment to use higher efficiency plants for new power generation in natural gas installations. - Technically successful pilot residential project for grid tied renewable energy. - A single transmission and distribution network operator.	- Limited utility renewable energy experience. - Separate ministries for power generation and, transmission and distribution. - Weak fiscal support mechanisms for energy conservation or alternative cleaner energy sources. - Lack of public awareness of energy conservation strategies. - Limited renewable energy resources (limited to solar and wind but potential for ocean based energy). - Limited land available for renewable energy. - Limited data available for applicable renewable energy studies. -
Opportunities	**Threats**
- Receptiveness of the Government to conduct an introspective examination. - Demand side management initiatives. - Revision of tariff. - Development of grid infrastructure towards a smart grid. - Engagement of local experts. - Capacity building. - Public awareness programmes. - Local regulation body. - Fibre optic network already overlaid on transmission network. - Feed in Tariff policy and legislative framework for Net metering/net billing. - Existing retirement plans of inefficient plants (e.g. POS Plant) presents an opportunity for the establishment/integration of more efficient plants in the electricity sector.	- Cheaper cost of natural gas exacerbated by the utility fuel subsidy from GORTT. - Limited provisions in RIC and T&TEC Acts for renewable energy implementation. - Socio-economic impacts on citizenry. - Public resistance to fuel subsidy removal. - Public resistance to increased electricity prices. - Disincentive to foreign investors. - Increased manufacturing costs. - Politically unpopular to implement non-subsidized RE policies. Lax societal culture of energy conservation and/or environmental awareness.

Table 4: Strategic analysis of the electrical power generation sector.
Source: Prepared by the authors.

Crucial agents and inter-sectoral relationships	An important share of responsibility is of the Ministry of Public Utilities, which is responsible for T&TEC and the RIC. Furthermore, the Ministry of Planning and Sustainable Development (MPSD) and the Ministry of Energy and Energy Affairs (MEEA) play an important role as well, the first regarding sustainable development and the second in terms of creating energy policies. Furthermore, in terms of implementation of actions, the duties of the Ministry of Finance and the Economy(MFE), the Ministry of Local Government (MLG) and the Ministry of Housing and Urban Development (MHUD) need to be considered.
GAPS **Information**	There are no comprehensive analyses about the potential for renewable energies in Trinidad and Tobago. Work needs to be done to develop solar and wind atlases. Furthermore, the general population needs more information on the impact of their energy consumption, so raising public awareness is necessary.
Institutional capacity	Efforts need to focus on strengthening coordination and developing fiscal support mechanisms for renewable energy.
Mainstreaming of climate change	The required actions need to focus on improving the technology and the efficiency of electrical energy generation. Additionally, conservation actions are needed to reduce energy consumption. Furthermore, renewable energy power generation sources needs to be promoted.
Needed actions	The actions need to focus on improving the technology and the efficiency of the electrical energy generation. Additionally, conservation actions are needed to reduce the energy consumption. Furthermore, renewable energy power generation sources need to be promoted.

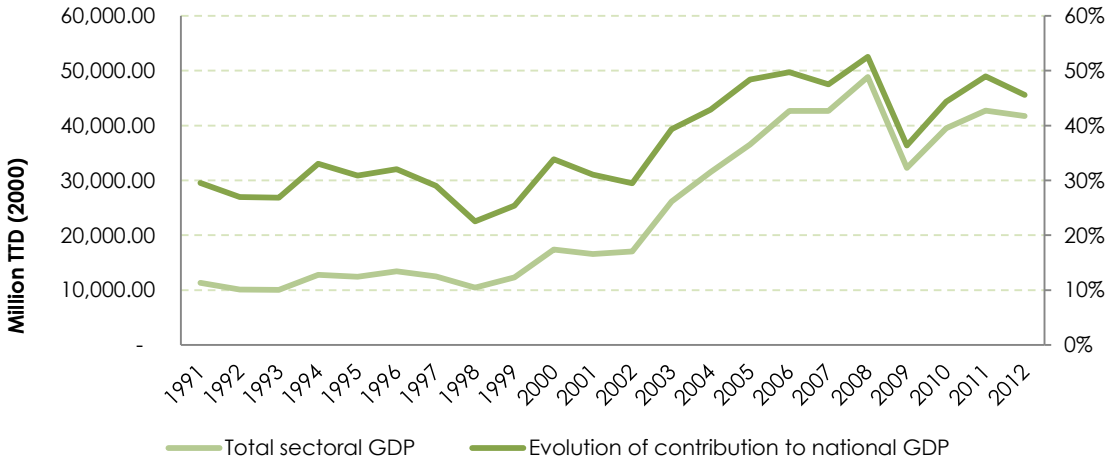
3.2. Industry

Table 5: Overview of the industry sector.
Source: Prepared by the authors.

Sector	Industry
GDP Share[6]	46%
GHG Emissions Share[7]	74%
Key aspects	Reduction of fossil fuel consumption Implementation of Best Available Technologies Improved institutional coordination

Trinidad and Tobago has a well-developed industrial sector. The availability of crude oil and natural gas has spawned a hydrocarbon-based industry that has historically accounted for much of the country´s economic development. Crude oil and natural gas are consumed in large quantities in several industry sub-sectors as fuel and feedstock for export products. Most recent statistics show that the Petroleum Sector accounted for an estimated 40.2% of the national GDP and 38.7% of Government revenues in 2012 [18]. In the graph below, the evolution of the contribution of the industry sector to the country GDP since 1991 can be observed.

Graph 8: Contribution of the Industry sector to Trinidad and Tobago's GDP and total sectoral GDP (1991-2012).
Source: Prepared by the authors based on data from the Central Statistical Office.



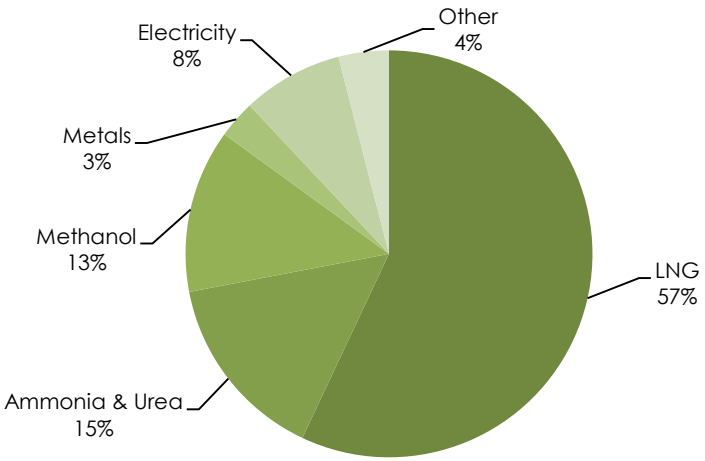
[6] Sectoral GDP share of the total national GDP of Trinidad and Tobago, 2012
[7] Sectoral GHG emissions share of the total electricity power generation, industry and transport emissions, 2012.

For the purpose of this study, Industry refers to heavy industry which includes petroleum exploration and production, pipeline operations, natural gas processing, refining, iron and steel processing, LNG production, cement manufacture, and petrochemical production. Electricity Generation and Distribution is treated separately. Light manufacturing, which refers to economic activities related to food and beverages and printing and packaging, is not included. It is important to understand that this sector has a mix of private and State ownership. Multinational corporations are in the majority, meanwhile the State ownership is via State-owned companies such as The National Gas Company of Trinidad and Tobago Limited (NGC) and the Petroleum Company of Trinidad and Tobago Limited (Petrotrin). The mix of ownership in any one company varies – some are entirely owned by Multinational corporations, some are partially, and some entirely owned by State companies. As such, the assessment in the report treats the Industry sector as a whole and neither private nor public sector is excluded.

Natural gas is the main primary energy source used in industry, both as a fuel and as feedstock for petrochemicals. To avoid any misconception, the industry assessment includes GHG emissions arising from both fuel consumption and from processing where hydrocarbon is used as feedstock or where industrial processes emit GHGs from other raw materials such as in cement manufacture. When the term "energy industry" or "energy sector" is used, it refers to both fuel consumption and processing. This is the generally used terminology as well as for the purposes of GHG emission inventory. A case in point is that the governing state agency for both aspects is the MEEA (Ministry of Energy and Energy Affairs).

Total gas consumption in 2012 was 3,470 million standard cubic feet per day (MMscfd)[19], and its use was distributed as shown in the figure below. LNG (with approximately 144cubic meters of production per annum, 2012)[20] is the largest subsector in this respect. Ammonia (4.9 million tonnes per annum, 2012) is another major gas consumer, followed by methanol (5.9 mtpa, 2012) and electricity generation. Cement production capacity is 1.2 million tonnes per annum. Iron and steel production capacity is around 4.7 mtpa[21].

Graph 9: Portfolio of natural gas usage (2012).
Source: Ministry of Energy and Energy Affairs [18].

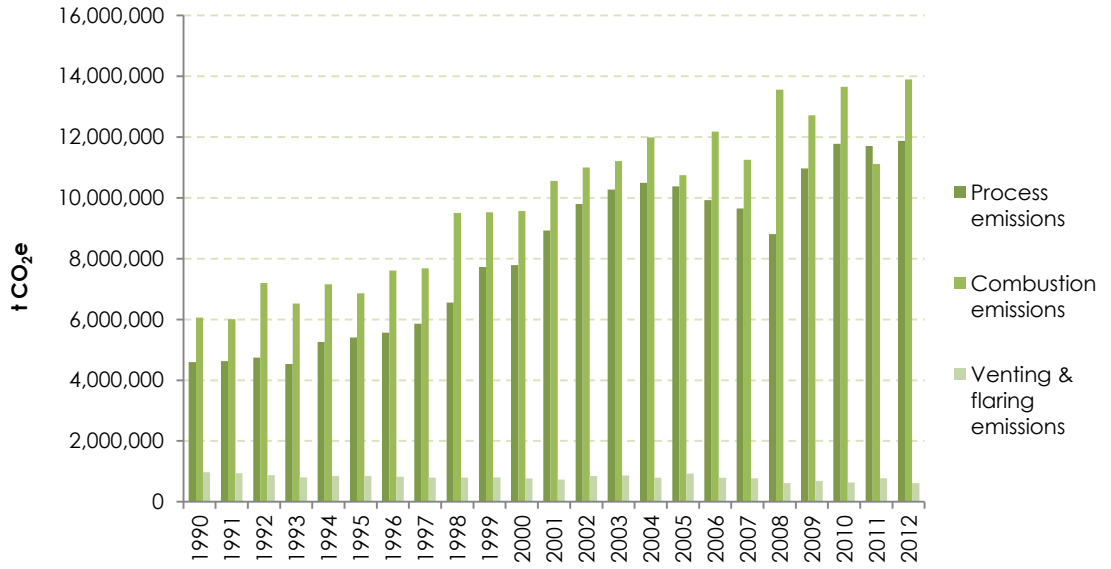


Crude oil production has been steadily declining over recent years, and is estimated to have averaged around 81,700 barrels per day in 2012[22].

By all reports, the industrial sector is collectively the largest contributor to GHG emissions, and this is understandable due to the level of fossil fuel consumption and the nature of the processes and products, as listed above. However, there have been conflicting reported levels of inventory. The Second National Communication [23] suggests that as of 2006 the total country emissions amounted to over 60 million tonnes; the report also suggests that industry accounts for 40% to 60% of GHG emissions.

According to the historical reconstruction of the GHG emissions carried out within the framework of this project, the total emissions of the industry sector as of 2012 added up to more than 14 M t CO_2e. The graph below shows the evolution of the contribution the industrial sector's emissions sources between 1990 and 2012.

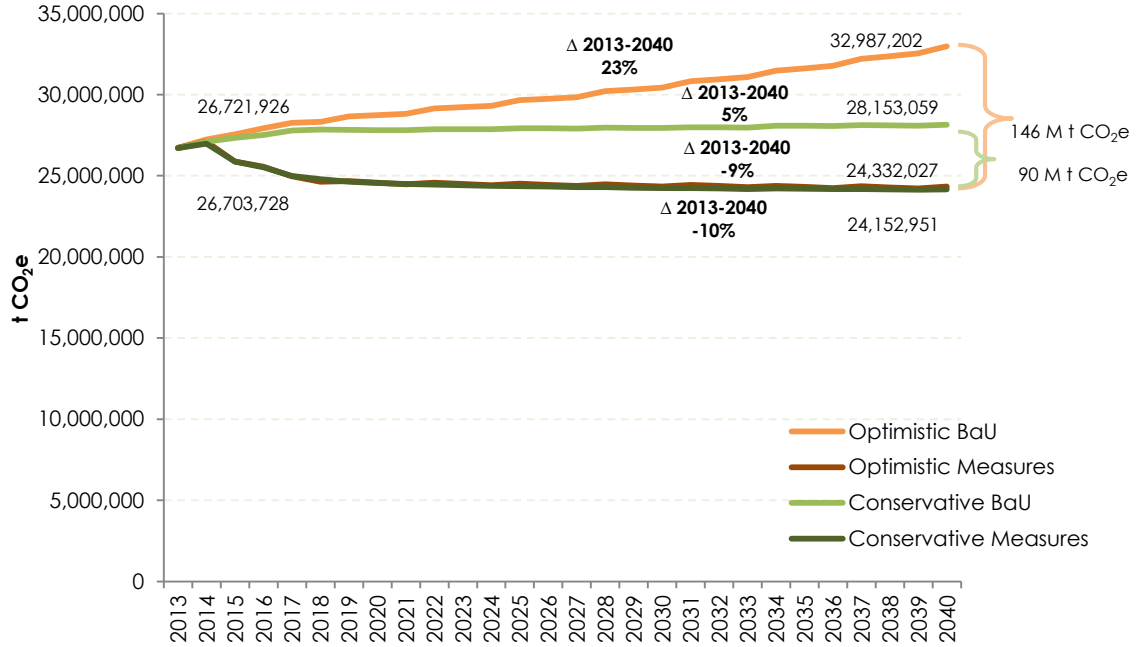
Graph 10: Evolution of GHG emissions of the industry sector by source.
Source: Projection of the Business as Usual (BaU) and measures scenarios of carbon emissions for the electrical energy generation, industry and transport sectors. Factor CO_2, 2014 [11].



As can be observed from the graph, the majority of the GHG emissions of the industrial sector are caused by fossil fuel combustion sources. The average contribution of this source between 1990 and 2012 was 53%. The second contributing source was the process emissions caused by industrial processes with an average contribution during the period of 43%. The rest of the emissions were caused by venting and flaring activities, with an average contribution of 5%.

Not only is the industry sector the largest contribution to the GHG emissions, furthermore, this situation is not expected to change through 2040, according to the results of the projections model. In the BaU scenarios for this sector, the expected GHG emissions growth is low compared to electrical energy generation and transport, reaching just 5% between 2013 and 2040 in the Conservative BaU scenario and 23% in the Optimistic BaU scenario. Therefore, in the Conservative Measures scenarios, instead of having an increase of the emissions between 2013 and 2040, there is a slight decrease in emission caused by the GHG mitigation actions. As a result, the emissions of the Conservative Measures scenario are 10% lower in 2040 than in 2013. In the Optimistic Measures scenario, the emissions are 9% lower in 2040 than in 2013.

Graph 11: Comparison of the projection scenarios for the industry sector.
Source: Projection of the Business as Usual (BaU) and measures scenarios of carbon emissions for the electrical energy generation, industry and transport sectors. Factor CO_2, 2014 [11].



Moreover, when looking at the total cumulative emissions reduction achieved during the whole period, the GHG mitigation actions cause a decrease of 90 M t CO_2e in the conservative scenario and 146 M t CO_2e in the optimistic scenario. As stated previously, this difference is caused by the assumptions related to the effect of the economic growth projections considered for the implementation of the actions.

The SWOT analysis included below helps to better understand the current situation of this sector. Even if there is the availability of cheap fuels and the economic situation is good, due to the lack of coordination and of public awareness, little action is taken to tackle climate change. At the same time, there are opportunities to invest in efficient technologies and the prices of renewable energy sources and fossil fuels facilitate the situation, but there is no willingness to make improvements in the plants and the fuel subsidies so this does not facilitate the implementation of energy efficiency actions.

Similar conclusions are included in the sectoral diagnosis table which follows below the SWOT analysis. Furthermore, another key aspect which needs to be improved is the coordination between the various change agents. Not only that, but also the mindset of the sectoral agents needs to change towards making climate change mitigation actions one of their highest priorities.

Figure 3: SWOT Analysis for the Industry sector.
Source: Prepared by the authors.

Strengths	Weaknesses
- Availability of natural gas as a relatively low-carbon fuel. - Relatively significant financial resources can be made available, and country has a strong credit rating. - Technical expertise is available from Industry and academia.	- Limited or Lack of coordination amongst different Ministries. - Lack of public awareness of climate issues. - Lack of data and cost-benefit analysis on carbon reduction technologies and strategies. - Carbon reduction and climate change are treated with low priority by Political Directorate. - Slow bureaucracy in Public Service. - Lack of personnel with specific knowledge of and experience in "industry".
Opportunities	**Threats**
- Improved technologies with high energy efficiency are available. - Declining cost of renewable energy. - Current high cost of fossil fuels makes renewables and alternative fuels & technologies economically attractive (reasonable payback). - Introduction of carbon emissions and energy efficiency as factors in negotiations and for commitments. - Support from Multilateral Agencies is available.	- Unwillingness to invest in plant upgrades. - Resistance to subsidy removal on fuels. - Slow legislative agenda/ implementation. - Changes in country's political landscape – disruptions in programme/legislative agenda. - Low priority given to carbon reduction technologies, it is presently not a necessity based on current legislation/regulation. - Low energy prices locally.

Table 6: Strategic analysis of the industry sector.
Source: Prepared by the authors.

Crucial agents and inter-sectoral relationships		The MEEA plays a leading role, particularly in its relationship with the public and private sectors. Furthermore, the Ministry of the Environment and Water Resources (MEWR) needs to be considered as well, because it leads the actions in terms of sustainability. The Environmental Management Authority is regulatory entity responsible for the approval of industry projects, assessing the impact and mitigation measures to be implemented and monitoring emissions.
GAPS	**Information**	Detailed and homogeneous GHG inventories of all the industries of the country are needed.
	Institutional capacity	More coordination is needed between the crucial agents, particularly between the MEEA and the MEWR.
Mainstreaming of climate change		It is included in the agendas but there is a lack of consistency between the plans of the different actors. Additionally, it has a low relevance and does not seem to be a priority. For those reasons, the actions in this field are conducted at a slow pace.
Needed actions		Efforts to reduce fossil fuel consumption and increase energy efficiency in the industries are needed. In terms of institutional capacity, better coordination is needed as well as efforts to consider climate change as a relevant issue for the industrial sector of Trinidad and Tobago.

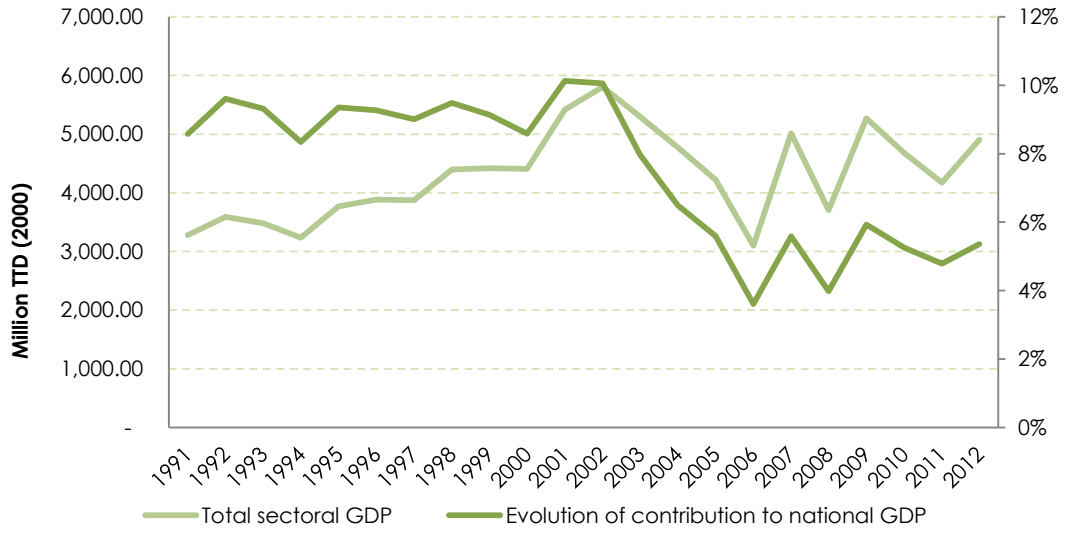
3.3. Transport

Table 7: Overview of the transport sector.
Source: Prepared by the authors.

Sector	Transport
GDP Share[8]	5%
GHG Emissions Share[9]	7%
Key aspects	Data gathering Improvements in public transport service Coordination between different agents

Trinidad and Tobago's transport sector comprises three components: sea, land and air. The features of the transport system are the consequence of the subsidy policies that have been applied in the country, which have led to a situation in which the transport sector is comprised of a large number of private cars because the services offered by the public transport systems do not appear attractive and may not accommodate the needs of the population. In economic terms, the transport sector has a relevant contribution to the country's GPD, which on average, between 1991 and 2012 was of 8%[20]. In the graph below, the evolution of the sectors GDP as well as the evolution of the sectoral GDP's contribution to the national GDP can be observed.

Graph 12: Contribution of the Transport sector to Trinidad and Tobago's GDP and total sectoral GDP (1991-2012).
Source: Prepared by the authors based on data from the Central Statistical Office.



[8] Sectoral GDP share of the total national GDP of Trinidad and Tobago, 2012
[9] Sectoral GHG emissions share of the total electricity power generation, industry and transport emissions, 2012.

For a better understanding of the sectoral features the three components of the transport sector (sea, land and air) need to be analysed.

Sea Sector

The largest port installation for passengers and cargo is at Port of Spain. The Trinidad and Tobago Ferry Service operates two ferries daily between Port of Spain and Scarborough. These ferries are relatively fast and the fares relatively inexpensive, meanwhile a Water Taxi Service currently operates between the cities of San Fernando and Port of Spain. There is also a planned expansion of the Water Taxi Service to include new destinations such as Point Cumana to the west and Chaguanas and Point Fortin to the south of the island in Trinidad. In Tobago, apart from the ferry service, the port of Scarborough is an important terminal for cruises.

The Port of Brighton is important for oil and asphalt loading. Also, there are oil terminals at Chaguaramas, Pointe-a-Pierre and Point Fortin. The port of Point Lisas is a deep-water port and accommodates principally the energy-based industries at the Point Lisas Industrial Estate. Port Point Lisas is located in the Gulf of Paria, 32 km south of Port of Spain and 20 km east of Venezuela. It is referred to as the "Gateways to the America" catering for containerised cargo from around the world. It has six berths and its services include: import/ export of containers, break-bulk cargo, transhipment and provision of stevedoring services. The port also handles large volumes of steel and project cargo, mainly for new plants on the adjacent estate, making it one of the top break-bulk ports in the region.

Additionally, in recent times, a new port was built in Galeota, in the south-eastern tip of Trinidad. It provides support to the offshore oil and natural gas extraction activities and it does also serve as a coastal guard port and a fishing port for the population of the area.

Land Sector

Since the decommissioning of the rail system in Trinidad during the mid-1960's, constant increasing demand for travel has been accommodated by the intensive development of a highway network linking east and west as well as north and south communities both in Trinidad and in Tobago. Even so, there is significant congestion due to high traffic volumes in relation to road capacity, poor secondary roads in need of repair, low connectivity and restricted egress. Without policy intervention the situation will continue to grow worse with transport being a major contributor to greenhouse gas emissions since the growth rate of vehicles is will continue to outstrip the declining population growth

rates projected by the 2010 census. By 2013, the total number of land vehicles in the country was 752,614.

Compounding this is the growth of additional freight movements to and from the main ports at Port-of-Spain and Pt. Lisas. Currently, the only mode of inland freight transportation in Trinidad and Tobago is by truck. Truck routes are very often congested and it is a problem that access between ports and intercity corridors is provided by local streets that also serve commercial and tourist traffic. Trucks require greater manoeuvring space for operations and in urban areas like Port of Spain and even along heavily commercial corridors like some parts of the Eastern Main Road, the lack of a sufficient number of off-street loading facilities contributes significantly to traffic congestion.

The traffic congestion problems are reinforced by the availability of subsidised gasoline and diesel, that most housing and business activities being concentrated along the main highway corridors, availability of cheap foreign used vehicles, the lack of confidence in public transport timetabled services to connect with working hours, no alternatives to car transport in rural areas, the fear of crime discouraging people from walking, cycling or waiting for public transport, the fear of rainfall and flooding combined with poor waiting facilities combine to discourage patronising public transport.

The Public Transport Service Corporation (PTSC) is a Government-owned bus-service responsible for road transport. Public transport is also provided by hired cars, privately owned taxis, maxi-taxis and privately owned cars and minivans illegally operating for hire, which carry passengers along fixed routes for fixed fares across most of the country.

Air Sector

Air facilities in Trinidad are concentrated at the Piarco International Airport situated about 26 km east of Port of Spain. On the western tip of Tobago there is a secondary main airport called the ANR Robinson International Airport. British West Indian Airways was the national airline of Trinidad and Tobago, however it ceased operating in 2006. Caribbean Airlines became the new successor national airline of the Republic of Trinidad and Tobago in 2007. Caribbean Airlines operates domestic, regional and international services. A number of international airlines operate services out of Piarco International Airport mainly to United States, Canada, Central America and England. Additionally, the company Briko Air Services Ltd has facilities in Couva, focused on training and private services.

According to the IPCC methodology for national GHG Inventories, the emissions of the air transport sector should only consider domestic air transport carried out within the

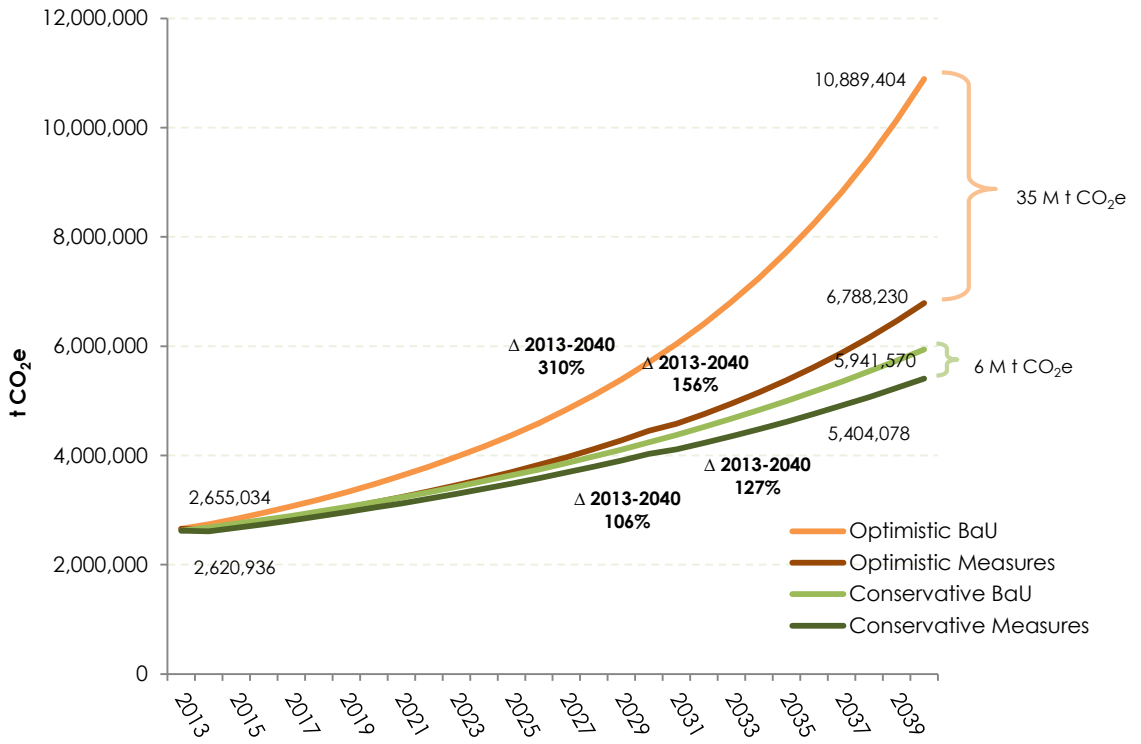
country. In this case, it would mean that only those flights between or within both islands need to be considered. Any other activities, in which additional countries are involved, need to be accounted for separately.

The availability of historical data on GHG emissions of the transport sector in Trinidad and Tobago is limited, and there are several data gaps which make it difficult to obtain a comprehensive and coherent picture of the historical evolution of the transport sector's emissions. Nevertheless, according to the historical reconstruction of the electrical power generation, industry and transport sectors developed in the framework of this Strategy, the transport sector accounted for 7% of the total GHG emissions of the country in 2012. In absolute terms, in 2012 the total emissions of the road transport were 2.7 M t CO_2e.

In terms of emissions projections, the emissions curve for the optimistic scenario shows an exponential shape for the transport sector, resulting in a 310% increase in projected emissions between 2013 and 2040. In the Conservative BaU scenario this increase would be more moderate, at 127%. In fact, the expected emissions of the Optimistic Measures scenario are higher than those of the Optimistic BaU scenario, due to the significant growth of the Optimistic BaU scenario during the last years of the period.

Notwithstanding, the mitigation actions have a significant impact in reducing the emissions in the sector. In the case of the Optimistic scenario the implementation of the mitigation measures in the Optimistic Scenario reduces emissions by a total cumulative amount of 35 M t CO_2e. In the Conservative scenario, this figure would be significantly lower, reaching a total cumulative reduction during the period of 6 M t CO_2e.

Graph 13: Comparison of the projection scenarios for the transport sector.
Source: Projection of the Business as Usual (BaU) and measures scenarios of carbon emissions for the electrical energy generation, industry and transport sectors. Factor CO_2, 2014 [11].



According to the SWOT analysis developed for this sector shown in Figure 4, even though this sector has several strengths, there are significant weaknesses, mainly those related to the data gaps which make it difficult to quantify the energy consumption and GHG emissions of the sector. In terms of opportunities and threats, the main highlight is the threat posed by private vehicles, which dominate the road space.

The conclusions that can be extracted from the SWOT analysis are very similar to those included in the strategic analysis table included below. The main aspect that needs to be addressed in this sector is the abundant use of private vehicles, which needs to be supplemented and minimised by a reliable and safe public transport system.

Figure 4: SWOT Analysis for the Transport sector.
Source: Prepared by the authors.

Strengths	Weaknesses
- Receptiveness of the Government to conduct an introspective examination. - Full operation of the water taxi ferry system. - Replacement of the current fleet of diesel buses with CNG-ready buses. - Maximisation of the use of CNG as a vehicle fuel. - Fiscal incentives for the importation of hybrid vehicles and conversion kits to CNG. - Intention to improve public transport efficiency. - Intention to examine potential and feasibility of biofuels. - Conversion of state-owned vehicles to CNG.	- Large number of organisations involved in transportation. - Strategic Transportation Planning is not being conducted. - Data is urgently needed on travel modes and usage. - Inability to travel conveniently without having to own or operate a car. - Limited monitoring of the transport sector. - Very limited public information. - Limited capacity for analysis of policy options by technocrats. - Low level of responsiveness to transport inadequacies. - Influx of motor vehicles over the past decade and a half on weaknesses and deficiencies.
Opportunities	**Threats**
- No specific agency with the formal mandate to manage the public transportation system. - Current system of subsidies being directed to support transit operators. - Need to institute collaborative planning practices. - Develop appropriate Transportation Demand Management (TDM) programmes. - Development of an efficient mass public transport system. - Develop appropriate fuel pricing.	- Private motor vehicles dominate the road space. - No planning statutory requirements exist.

Table 8: Strategic analysis of the transport sector.
Source: Prepared by the authors.

Crucial agents and inter-sectoral relationships	The Ministry of Transport is the leading agency, but the Ministry of Works and Infrastructure (MWI) plays a very important role as well, because it is responsible for the highway engineering and traffic management. Furthermore, the role of the MEEA needs to be considered as well, because the consumption of fuels is one of its competencies. Additionally, other agents are also involved in the management of the transport sector, for instance the Ministry of Finance and the Economy (MFE) for the Civil Aviation and Caribbean Airlines.
GAPS **Information**	There are data gaps which affect the GHG emissions calculations, including both activity data on the use of the different means of transport and country level emission factors.
GAPS **Institutional capacity**	There is not a specific agency for public transport. Collaborative planning practices between the different agents are needed for the sector.
Mainstreaming of climate change	It is included in the agendas of main of the relevant agents; however, there are not any national policies for the transport sector in Trinidad and Tobago.
Needed actions	The efforts need to focus on improving the public transport system of Trinidad and Tobago in order to promote a reduction in the use of private vehicles. Furthermore, efficiency improvements are needed in the vehicle fleet of the country. Efforts need to be devoted as well to improve the data gathering to provide a comprehensive picture of the reality of the transport sector in Trinidad and Tobago. Additionally, the coordination between the different agents needs to be enhanced.

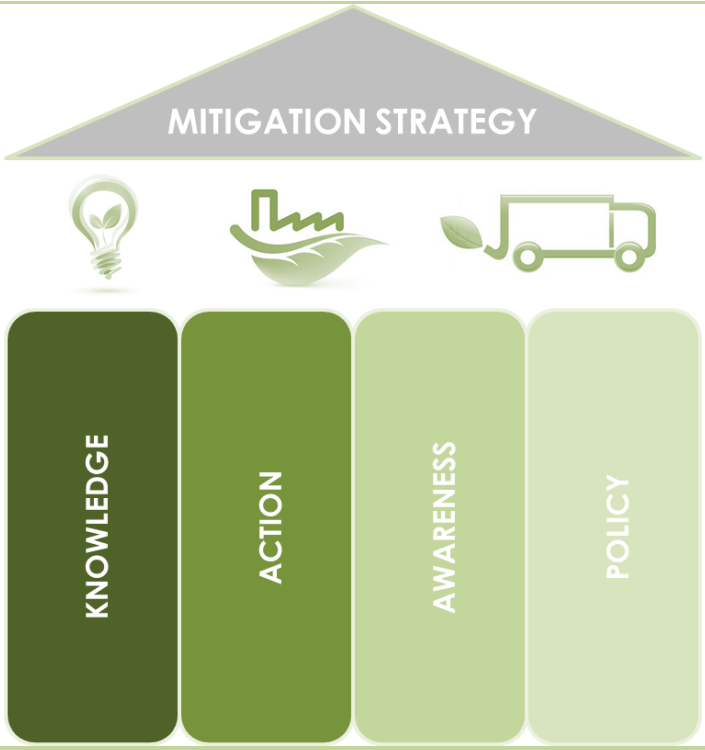
4. Objectives and strategy

This Strategy aims to contribute to the implementation of the National Climate Change Policy through the establishment of a roadmap for the reduction of GHG emissions of Trinidad and Tobago's electricity power generation, industry and transport sectors and thereby create a framework for the development of green growth in Trinidad and Tobago. The implementation of the Strategy will lead to a low carbon economy that fosters the creation of new economic sectors based on sustainability. These GHG mitigation measures will promote green jobs and decouple greenhouse gas emissions from economic growth in Trinidad and Tobago because they are focused on developing alternatives to the current technologies and habits, through the implementation of efficient technologies, the reduction of the energy use or the development of awareness raising campaigns.

4.1. Strategic axes

As stated previously, this Strategy is focused on three sectors due to their relevance in terms of GHG emissions: electrical energy generation, industry and transport. The measures proposed to reduce the GHG emissions in these sectors are organized in this Strategy using a scheme based on Strategic Axes. These axes are multidisciplinary to the sectors creating a comprehensive framework for the measures proposed. The strategic axes defined are: knowledge, action, awareness and policy. The figure below shows the strategic axes defined for this project.

Figure 5: Strategic Axes.
Source: Developed by the authors.



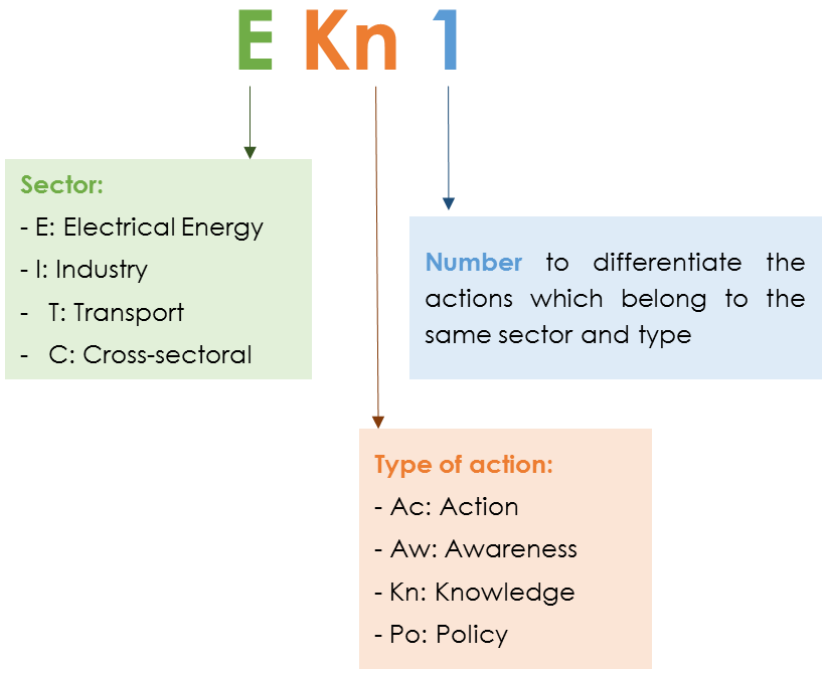
The strategic axes focus on developing actions which address different but relevant aspects in order to achieve a multidisciplinary implementation of the strategy, and working in a coordinated way while minimizing inefficiencies. Each axis is defined as follows:

- Knowledge: these measures aim to enhance knowledge on energy and climate change related issues in Trinidad and Tobago. One of the key factors for the successful design and implementation of GHG mitigation actions is the availability of coherent and reliable information and these measures are designed to provide it.
- Action: the measures included in the action strategic axis are those directly leading to GHG emissions reductions. They include concrete tasks and their design is based on the already existing information.
- Awareness: raising awareness is crucial to promote GHG mitigation measures. The sectors addressed and the general population are going to be responsible for the implementation of several measures. Therefore, without their contribution, the objectives set are not likely to be achieved. A set of well designed awareness raising measures will help involve all agents.

- Policy: the implementation of GHG mitigation measures cannot be guaranteed unless the appropriate policy environment is created. The measures proposed under the policy axis aim to facilitate the creation of that environment, promote a coordinated implementation of the GHG mitigation measures proposed and foster the relevance of climate change mitigation in Trinidad and Tobago's political agenda.

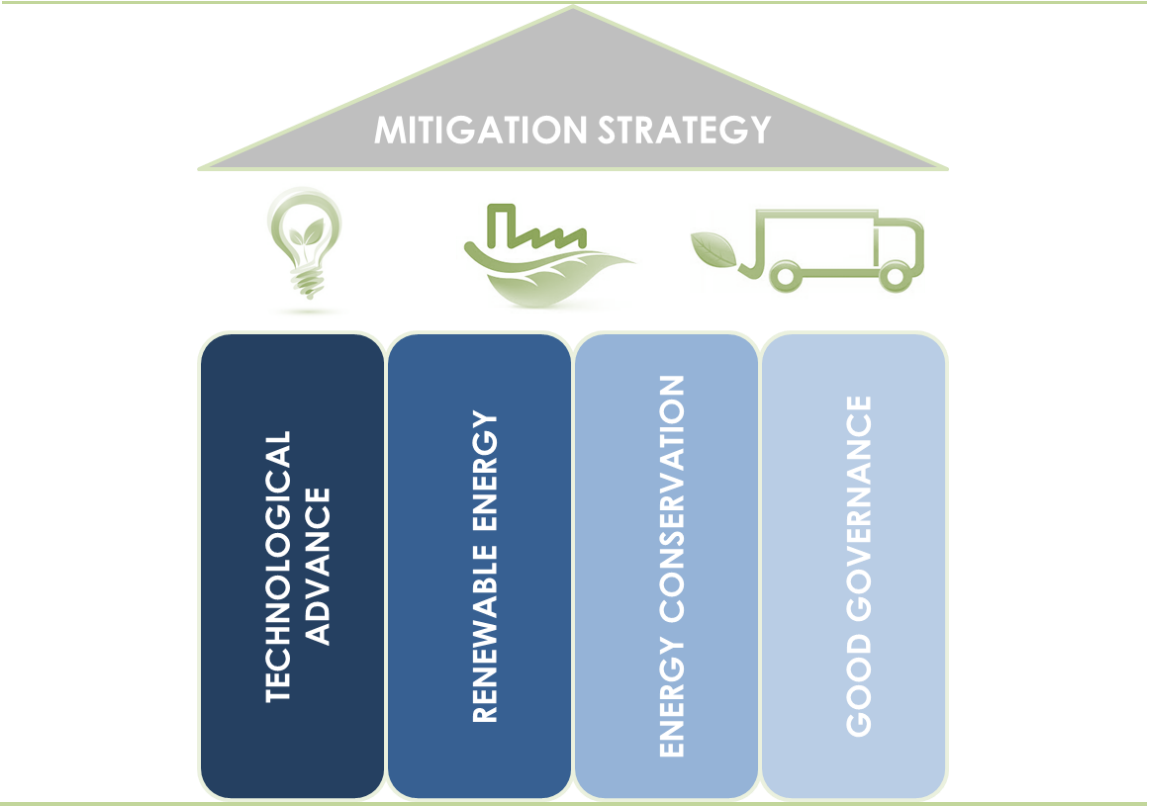
In order to facilitate the understanding of the measures proposed, in the figure below (Figure 6) a summary of the code created to define the measures is included.

Figure 6: Codification of GHG mitigation actions.
Source: Prepared by the authors.



The figure below (Figure 7) illustrates the classification of the GHG mitigation measures proposed based on the strategic axes defined. As shown in the figure, apart from the three sectors mentioned previously, electrical energy generation, industry and transport sectors, a multidisciplinary area for action is included in this Strategy document. Since some of the policy actions do not address solely one sector but have a wider perspective, they are classified under the cross-sectoral appendix.

Figure 7: Strategic Map for the reduction of GHG emissions in Trinidad and Tobago[10].
Source: Developed by the authors.



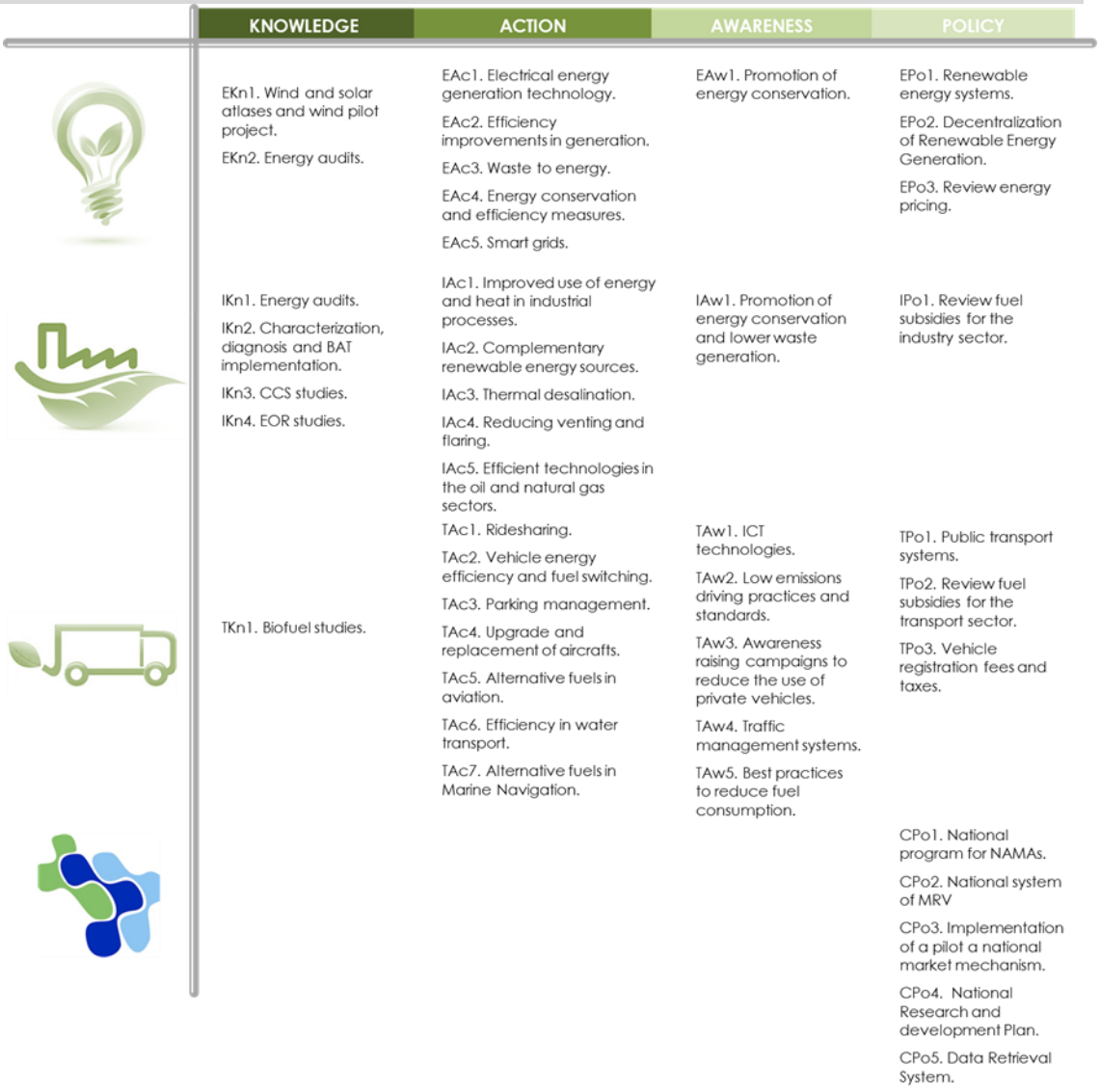
The strategic map defines a total of 43 measures that are divided into four strategic axes. All of them have, as their main objective, the reduction of GHG emissions in the electrical power generation, industry and transport sectors, but the means to achieve that objective vary depending on the action and the strategic axis in which they are included.

4.2. Framework

The GHG mitigation measures proposed in this Strategy are elaborated along detailed Strategy Lines across the Strategy Axes. The Strategy Lines focus on lines for action, understood as common action lines which are cross-sectoral. In the figure below (Figure 8), the Strategy Lines proposed are included.

[10]A classification code was developed to facilitate the understanding of the measures proposed. The first letter of the code indicates the sector the measure belongs to, the second, the strategic axis under which it is classified and the number differentiates measures belonging to the same sector and strategic axis.

Figure 8: Strategy Lines.
Source: Developed by the authors.



- Technological advance: this is based on the fact that there is some margin for improvement in terms of technological advance in the three sectors included in this strategy. The first strategy line aims to promote measures that will help Trinidad and Tobago adopt state-of-the-art technologies which will help reduce GHG emissions in all the sectors. These measures include the implementation of CCGT (Combined-Cycle Gas Turbine)plants for the production of electricity, the implementation of waste-to-energy and thermal desalination, the use of cogeneration in the industry sector or the inclusion of Compressed Natural Gas (CNG) fuelled vehicles in the public transport fleet.

- Renewable energy: currently, all the primary energy consumption of Trinidad and Tobago depends on fossil fuels. Whether that primary energy is used to produce electricity or is consumed for other purposes such as the production of industrial heat or for transportation. Renewable energy sources are almost non-existent in the primary energy mix. In order to improve the situation, a second strategy line focused on promoting renewable energies is proposed. This strategy line aims to implement renewable energies in the electrical energy generation sector, the industry sector, the transport sector and other sectors such as the residential, commercial and institutional sectors of Trinidad and Tobago. Even though these last sectors are not included in this Strategy, they will influence the end results achieved by the implementation of GHG mitigation actions due to their electricity consumption. Therefore, the inclusion of renewable energies to reduce their electricity consumption is part of this action line as well.
- Energy conservation: the effective implementation of new technologies and renewable energy sources will not be complete unless they are complemented by an effort to reduce energy consumption. That is the objective of the third strategy line, which aims to promote measures which will lead to a more efficient use of energy. These actions do not require technological improvements to reduce the energy consumption; they aim to correct habits and ineffective processes which lead to a high energy consumption. This action line is especially important in the case of Trinidad and Tobago due to the low cost of fuels, which prohibit the consumers from considering actions to use them efficiently.
- Good governance: the fourth strategy line includes good governance actions, that is, those actions which aim to promote a favourable policy environment for the development of GHG mitigation actions in Trinidad and Tobago. These actions are cross-sectoral, with their implementation being collateral in the three sectors considered

The definition of the framework does not only include the objectives of the measures proposed, but also the targets set for each sector in terms of GHG mitigation. Given that the main objective of this Strategy is to reduce GHG emissions in the three sectors, its main targets need to be designed accordingly. Therefore, the targets defined are established using the Business as Usual scenarios as the baseline or frame of reference against which the efficacy of actions are measured. In the table below, (Table 9) the sectoral and total emissions growth and accumulated emissions expected for the BaU and measures scenarios are shown, and represents an average of the conservative and optimistic BaU and measures scenarios.

Table 9: GHG emissions growth and total accumulated GHG emissions of BaU and measures scenarios between 2013 and 2040.

Source: Prepared by the authors.

Sector	Scenario	Emissions growth (%)	Total accumulated emissions (t CO_2e)
Electrical energy generation	***BaU***	108%	204,869,872
	Measures	71%	174,463,967
Industry	***BaU***	14%	808,845,505
	Measures	-9%	690,676,468
Transport	***BaU***	218%	131,348,950
	Measures	131%	110,710,320
Total	***BaU***	43%	1,145,091,327
	Measures	13%	975,850,755

According to the GHG emissions projections, a 17% reduction would be achieved between 2013 and 2040 for the electrical energy generation and industry sectors, while, for the transport sector, the reduction is expected to be 18%. Based on those values, the targets proposed would be a 15% reduction of the GHG emissions for the electrical energy generation and industry sectors and a 16% reduction for the transport sector. That would consequently lead to a 15% reduction of the overall emissions of the three sectors.

In absolute terms, these objectives would mean a reduction of more than 30 M t CO_2e for the electrical energy generation sector, almost 120 M t CO_2e for the industry sector and more than 20 M t CO_2e over the projected time period. These figures can be observed in the table below (Table 10):

Table 10: Proposed GHG emissions reduction targets.
Source: Prepared by the authors.

Sector	Targets for 2040 (% of reduction of accumulated GHG emissions of the BaU scenarios)	Targets for 2040 (total cumulative t CO_2e reduced between 2013 and 2040)
Electrical energy generation	15%	30,432,905
Industry	15%	118,169,037
Transport	16%	20,638,629
Total	15%	169,240,571

4.3. GHG mitigation actions

After the definition of the strategic axes and the strategy lines, hereinafter a detailed analysis of the measures proposed will be carried out. This section will include a more detailed approach assessing every action's main features, including title and a brief description, entities responsible for the implementation and implementation timeline. However, the complete measure sheets developed for this Strategy are not included in this section but in Annex II, where apart from the information included in this section, the tasks necessary for the implementation of this action and a detailed implementation schedule are included.

Notwithstanding, given that the proposed implementation of the GHG mitigation measures has several common aspects, before detailing their features, an introduction to the policies proposed is included below. As proposed by the OECD (Organisation for Economic Co-operation and Development)[25], (and used as guidelines in developing action lines in this Strategy), in order to promote green growth in any country, the following objectives will need to be met:

1. integrate the natural resource base into the same dynamics and decisions that drive growth
2. Develop ways of creating economic payoffs which more fully reflect the value of the natural resources of the economy
3. Focus on mutually reinforcing aspects of economic and environmental policy.

To achieve these objectives, two types of actions need to be implemented. On the one hand, payoffs need to be changed. On the other hand, policy addressing inertia, the risks of technology lock-in and the roles of innovation, infrastructure and institutions in enabling change, needs to be created. The figure (Figure 9) below details the most relevant aspects for the development of both areas:

Figure 9: Actions which drive payoff changing and policy improvements.
Source: Prepared by the authors based on OECD, 2011: Towards Green Growth.

Actions which drive payoff changing	Policy improvements
• **Pricing pollution and natural resource use through mechanisms such as taxes or tradable permits.** They are very cost-efficient policy instruments, incentivize efficiency gains and innovation and generate revenue. • **Removing perverse subsidies.** They encourage pollution or over-extraction of resources, are very costly for the public budget. • **Ensuring that regulatory standards focus on outcomes.** Not only is price-based policy important, regulations that address pollution or energy efficiency can be relevant complements.	• **Innovation.** Governments are key agents in fostering green innovation. They can lend support by funding research, supplying finance and using demand-side instruments such as standards, regulations or public prodrurement. It is important to ensure diffussion and international transfer of green technologies and practices. • **Infrastructure improvement programmes.** Well-designed programs can help drive development, reduce pollution, avoid unsustainable land use change and enable the deployement of next generation technologies • **Institutional and governance capacity.** With the objective of implementing wide-ranging policy reform, which is an essential condition for greening growth. Green growth objectives need to be integrated into broader economic policymaking, development planning and poverty reduction strategies.

As previously indicated, the policy improvements and streamlining is one of the key areas in which efforts are needed in order to promote green growth at the national level. There are several policy instruments which can be used and implemented for these purposes. In the measures proposed for this Strategy, several of those instruments, including cap-and-trade permit systems, where feasible, taxes on pollution or voluntary approaches, are proposed. In this regard, it is important to note that the Energy Chamber of Trinidad and Tobago as taken the initiative to determine the feasibility of a carbon trading system. The table below includes a summary of these instruments and common applications of them:

Table 11: Environmental policy instruments.
Source: OECD, 2011: Towards Green Growth.

Policy instrument	Examples/Common applications
Cap-and-trade permit systems	- GHG emission reductions (EU ETS) - Air pollution (SO_2, NO_x, VOC) - Fishing quotas and nutrient and water trading

Policy instrument	Examples/Common applications
Baseline-and-credit permit systems	- Clean Development Mechanism - Lead content of gasoline - Biodiversity offsets/banking (*e.g.* REDD)
Taxes or changes on pollution or resource use	- Water effluents - Water abstraction or consumption
Taxes or charges on a proxy (input or output)	- Fuels and coal - Motor vehicles - Fertilisers - Waste fees and levies
Subsidies	- Forest management and conservation - Purchase of environmental-friendly energy equipment
Deposit-refund systems	- Beverage and chemical containers - Lead acid batteries
Performance standards	- Limits on CO_2 emissions of a passenger vehicle - Energy efficiency standards for various manufactured goods
Technology standards	- Minimum percentage of a low-carbon source in the overall fuel mix of a passenger vehicle - Specific housing building codes for energy saving purposes
Active technology support policies	- Feed-in tariffs for electricity generated by renewable sources - Renewable energy portfolio standard (green certificate) - Targeted public procurement
Voluntary approaches	- Loan guarantees and tax credits - Negotiated agreements to encourage energy efficiency in energy-intensive industries - Publicly available inventories of various pollutants - Labelling schemes - Local municipal land use planning

After having detailed the key aspects to consider when fostering national green growth, in the tables below (Tables 12 to 14), a summary of the measures proposed classified by Strategic Axes can be found. In Annex II, more detailed sheets of every measure are included. In these sheets, apart from the information shown below, the complete lists of tasks for the implementation of the measures proposed and the detailed timeline for the implementation, are included.

Nevertheless, it should be noted that additional work will be required in the definition of some aspects of the GHG mitigation actions outlined in this Strategy. This Strategy therefore includes a preliminary analysis of the GHG measures selected to mitigate GHG emissions in the electricity power generation, industry and transport sectors of Trinidad and Tobago, but before any of them are implemented, a detailed analysis of their features, the implementation schedule and their budget needs to be carried out. Furthermore, the final analysis of the measure will be used to detect the possible financing sources for this strategy. Tables 12 to 14 include the main features of all the actions included in the strategy, and codified accordingly.

Table 12: Summary of measures composing the knowledge program.
Source: Prepared by the authors.

Code	Measure	Program	Line	Objective	Schedule	Responsible entities
Ekn1	Wind and solar atlases and wind pilot project	Knowledge	Renewable energy	Determine the solar and wind energy potential in Trinidad and Tobago as well as the most appropriate locations for the implementation of these technologies and develop a pilot installation of wind power.	Short term	*Ministry of Energy and Energy Affairs*, T&TEC, UWI
EKn2	Energy audits	Knowledge	New technologies	Reduction of the energy consumption in the housing, commercial and institutional sectors of Trinidad and Tobago performing energy audits and implementing energy efficiency measures.	Mid term	*Ministry of Energy and Energy Affairs,* ESCOs
IKn1	Energy audits	Knowledge	New technologies	Reduction of the energy consumption in the industrial sector through the development of energy audits in industries for the implementation of energy efficiency measures	Short term	*Ministry of Energy and Energy Affairs,* ESCOs
IKn2	Characterization, diagnosis and BAT implementation	Knowledge	New technologies	Improve the knowledge on the features of the industry of Trinidad and Tobago and evaluate the possibilities for implementation of BAT	Short term	*Ministry of Energy and Energy Affairs,* EMA, industrial firms
IKn3	CCS Studies	Knowledge	New technologies	Analyze the potential of Trinidad and Tobago for the implementation of CCS technologies to capture CO_2 emissions	Long term	*Ministry of Energy and Energy Affairs,* EMA, Ministry of the Environment and Water Resources
IKn4	EOR studies	Knowledge	New technologies	Assess the viability of the use of EOR technology for the capture of CO_2 emissions	Medium to Long term	*Ministry of Energy and Energy Affairs,* EMA, Ministry of the Environment and Water Resources
TKn1	Biofuel studies	Knowledge	Renewable energy	Assess the viability of using biofuels in the transport system of Trinidad and Tobago	Medium to Long term	*Ministry of Energy and Energy Affairs,* Ministry of Food Production, Ministry of the Environment and Water Resources

Table 13: Summary of measures composing the action program.
Source: Prepared by the authors.

Code	Measure	Program	Line	Objective	Schedule	Responsible entities
EAc1	Electrical energy generation technology	Action	New technologies	Convert thermal power plants into CCGT plants	Medium term	*T&TEC, PowerGen* , RIC, EMA, Ministry of Energy and Energy Affairs
EAc2	Efficiency improvements in generation	Action	New technologies	Improve system configuration of currently functioning power plants to ensure they work at designed efficiency	Medium term	*T&TEC, PowerGen, Trinity Power,* Ministry of Energy and Energy Affairs
EAc3	Waste to energy	Action	New technologies	Develop a pilot waste-to energy plant in Trinidad and Tobago, which will provide a solution for waste management and produce electricity	Medium term	Ministry of the Environment and Water Resources, Ministry of Energy and Energy Affairs, Local Government Authorities, EMA, Ministry of Local Government, Tobago House of Assembly
EAc4	Energy conservation and efficiency measures	Action	Energy conservation	Develop energy conservation and efficiency measures in residential, commercial and institutional sectors in Trinidad and Tobago through discontinuing use of incandescent lighting and promoting light emitting diode and compact fluorescent lighting	Short to Medium term	Ministry of Energy and Energy Affairs, ESCOs
EAc5	Smart Grids	Awareness raising	Energy conservation	Reduce the electricity losses and enhance the stability of the electricity grid of Trinidad and Tobago converting it into a Smart Grid system	Long term	T&TEC, RIC
IAc1	Improved use of energy and heat in industrial processes	Action	New technologies	Promote the development of energy efficiency actions and the reduction of the produced waste heat in the industrial sector of Trinidad and Tobago (except oil and gas sectors, see action IAc5 for these sectors)	Long term	Ministry of Energy and Energy Affairs

Code	Measure	Program	Line	Objective	Schedule	Responsible entities
IAc2	Complementary renewable energy sources	Action	Renewable energy	Install renewable energy technologies in industrial sites of Trinidad and Tobago to provide supply for low energy consuming processes and replace public lighting with solar powered lighting	Short to Long term	Ministry of Energy and Energy Affairs/T&TEC
IAc3	Thermal desalination	Action	New technologies	Improve the energy efficiency in Trinidad and Tobago creating a desalination plant which would use waste heat from industrial sites to produce desalinated water for industrial purposes	Long term	Ministry of Energy and Energy Affairs, Ministry of the Environment and Water Resources
IAc4	Reducing venting and flaring	Action	New technologies	Diminish the consumption of fuels in the oil and natural gas sectors reducing venting and flaring emissions in the oil and natural gas, and industrial sectors of Trinidad and Tobago	Medium term	Ministry of Energy and Energy Affairs, Ministry of the Environment and Water Resources
IAc5	Efficient technologies in the oil and natural gas sector	Action	New technologies	Implement more efficient technologies in the oil and natural gas sector in order to reduce fuel consumption in the productive process	Medium term	Ministry of Energy and Energy Affairs
TAc1	Ridesharing	Action	Energy conservation	Reduction of the use of private cars developing a plan for the promotion of ridesharing practices among the population of Trinidad and Tobago	Medium term	Ministry of Transport, Ministry of Planning and Sustainable Development
TAc2	Vehicle energy efficiency and fuel switching	Action	New technologies	Reduction of the consumption of fossil fuels in the transport sector converting the PTSC and maxi taxi fleet into CNG fuelled engines	Short to Medium term	Ministry of Transport
TAc3	Parking management	Action	Energy conservation	Develop a plan to manage parking practices and establish a framework on parking activities in order to discourage the use of private vehicles in cities	Medium term	Ministry of Transport, Ministry of Planning and Sustainable Development
TAc4	Upgrade and replacement of aircrafts	Action	New technologies	Improve the fuel efficiency of the aircraft fleet of Trinidad and Tobago upgrading it and replacing the aircrafts with newer, more efficient aircrafts	Medium term	Ministry of Finance and the Economy and Caribbean Airlines

Code	Measure	Program	Line	Objective	Schedule	Responsible entities
TAc5	Alternative fuels in aviation	Action	New technologies	Reduce the GHG emissions of the air transport in Trinidad and Tobago introducing the use of biofuels.	Long term	Ministry of Transport, Ministry of Energy and Energy Affairs, air companies.
TAc6	Efficiency in water transport	Action	New technologies	Promote energy efficiency practices in the waterborne transport in Trinidad and Tobago in order to reduce the fuel consumption of the sector	Long term	Ministry of Transport, Ministry of Energy and Energy Affairs
TAc7	Alternative fuels in Marine Navigation	Action	New technologies	Introduce the use of LNG or biofuels in the waterborne transport sector of Trinidad and Tobago	Medium to Long term	Ministry of Transport, Ministry of Energy and Energy Affairs

Table 14: Summary of measures composing the awareness raising program.
Source: Prepared by the authors.

Code	Measure	Program	Line	Objective	Schedule	Responsible entities
EAw1	Promotion of energy conservation	Awareness raising	Energy conservation	Promote energy conservation actions in housing, commercial and institutional sectors of Trinidad and Tobago	Short term	*Ministry of Energy and Energy Affairs*
IAw1	Promotion of energy conservation and lower waste generation	Awareness raising	Energy conservation	Promotion of best practices to reduce the consumption of resources and waste generation in the industrial sector of Trinidad and Tobago	Medium term	*Ministry of Energy and Energy Affairs,* Ministry of the Environment and Water Resources, EMA
TAw1	ICT technologies	Awareness raising	Energy conservation	Promote of ICT technologies to avoid the need to travel	Medium term	*Ministry of Transport,* Local Governments
TAw2	Low emissions driving practices and standards	Awareness raising	Energy conservation	Disseminate low emissions driving practices and standards to reduce GHG emissions of the road transport.	Short term	*Ministry of Transport*

Code	Measure	Program	Line	Objective	Schedule	Responsible entities
TAw3	Awareness raising campaigns to reduce the use of private vehicles	Awareness raising	Energy conservation	Development of awareness raising campaigns to reduce the use of private vehicles and promote other transportation modes	Short term	*Ministry of Energy and Energy Affairs*
TAw4	Air Traffic management systems	Awareness raising	Energy conservation	Implementation of air traffic management system to reduce fuel consumption in air transport operations.	Medium term	Ministry of Transport
TAw5	Best practices to reduce fuel consumption in waterborne navigation	Awareness raising	Energy conservation	Dissemination of best practices to reduce fuel consumption and GHG emissions in waterborne navigation	Medium term	*Ministry of Transport,* Ministry of Energy and Energy Affairs

Table 15: Summary of measures composing the awareness raising program.
Source: Prepared by the authors.

Code	Measure	Program	Line	Objective	Schedule	Responsible entities
EPo1	Renewable energy systems	Policy	Renewable energy	Development of policies to promote renewable energy systems in housing, commercial and institutional sectors of Trinidad and Tobago to facilitate the implementation of these technologies	Short term	*Ministry of Energy and Energy Affairs,* T&TEC, UWI
EPo2	Decentralization of renewable energy generation	Policy	Renewable energy	Install renewable energy systems in commercial, institutional and residential sectors of Trinidad and Tobago to reduce the fossil fuel consumption in the electricity generation sector.	Short term	*Ministry of Energy and Energy Affairs,* T&TEC
EPo3	Review energy pricing	Policy	Energy conservation	Review current electricity pricing system to promote lower electricity consumption habits	Short term	*T&TEC, RIC,* Ministry of Energy and Energy Affairs, Ministry of Finance and the Economy
IPo1	Review fuel subsidies for the industry sector	Policy	Energy conservation	Review fuel subsidies applied to the industries of Trinidad and Tobago.	Short term	*Ministry of Energy and Energy Affairs*, Ministry of Finance and the Economy

Code	Measure	Program	Line	Objective	Schedule	Responsible entities
TPo1	Public transport systems	Policy	Energy conservation	Analyze and propose actions to improve the public transport system of Trinidad and Tobago to promote its use instead of the use of private vehicles	Short term	*Ministry of Transport*
TPo2	Review fuel subsidies for the transport sector	Policy	Energy conservation	Review fuel subsidies applied to the fuel used for public and private transportation in Trinidad and Tobago	Short term	*Ministry of Transport*, Ministry of Finance and the Economy
TPo3	Vehicle registration fees and taxes	Policy	New technologies	Establish vehicle registration fees and taxes in order to control the car fleet of the country and promote efficient vehicles with lower fossil fuel consumption	Medium term	*Ministry of the Environment and Water Resources, EMA,* Ministry of Energy and Energy Affairs
CPo1	National program for NAMAs	Policy	Good governance	Create a national program for the development of NAMA in Trinidad and Tobago	Short term	*Ministry of the Environment and Water Resources, EMA,* Ministry of Energy and Energy Affairs
CPo2	National MRV system	Policy	Good governance	Develop a national MRV system to help implement and quantify GHG mitigation actions such as the NAMA or the national market mechanism	Medium term	*Ministry of the Environment and Water Resources, EMA,* Ministry of Energy and Energy Affairs
CPo3	Implementation of a pilot national market mechanism	Policy	Good governance	Create a pilot national emissions trading mechanisms to reduce GHG emissions in the industrial sector	Medium term	*Ministry of the Environment and Water Resources*, Ministry of Energy and Energy Affairs, EMA

Code	Measure	Program	Line	Objective	Schedule	Responsible entities
CPo4	National research and development plan	Policy	Good governance	Create a national research and development programme to promote the development of these sectors in Trinidad and Tobago	Short to Medium term	*Ministry of Science and Technology,* Ministry of Finance and the Economy, University of the West Indies, University of Trinidad and Tobago
CPo5	Data Retrieval System	Policy	New technologies	Improve the quality of the data retrieved in order to quantify GHG emissions from the electrical power generation, industry and transport sectors of Trinidad and Tobago through the creation of a Data Retrieval System containing information on environmental parameters with the information provided by private companies and public entities.	Short term	*EMA*, CSO, Ministry of the Environment and Water Resources, industrial firms

5. Evaluation and monitoring

This section provides a description of how to evaluate and monitor the implementation of the Strategy. It includes a detailed description of the institutional coordination as well as the sets of indicators proposed for monitoring actions. One of the measures proposed in this Strategy, a national system of Monitoring, Reporting and Verification (MRV), is closely linked to the evaluation and monitoring of the implementation of the Strategy.

Given the importance of MRV systems in the implementation of GHG strategies, before detailing the institutional coordination framework and the monitoring details, a brief introduction to MRV systems and their main advantages is provided below.

MRV systems consist of three different parts [26]:

- Monitoring: tracking of GHG emissions and reductions caused by the programs and actions applied.
- Reporting: focused on informing about the main outcomes of the monitoring stage. The information is classified, processed and condensed in order to provide an updated and precise view of the situation.
- Verification: revision of the fulfillment of the policy or action.

Furthermore, there are three different areas in which the national MRV system is applied:

- Emissions MRV: focused on estimating national or sectoral GHG emissions (*e.g.* GHG emissions inventories, National Communications and Biennial Update Reports).
- Actions MRV: referred to the measurement of the impact of policies and GHG mitigation actions (*e.g.* Nationally Appropriate Mitigation Actions (NAMAs).
- Support MRV: it includes financial flows, technology transfer, capacity building and its impacts *(e.g.* support providers/receivers).

A well designed MRV system is an effective scheme to demonstrate the impact of a project or mitigation action. It provides a way for public and private entities to justify the financial and political support they require to reduce GHG emissions. Furthermore, the principles associated with MRV system under the UNFCCC framework are transparency, consistency, comparability, completeness and accuracy. Additionally, a MRV system can help determine whether the objectives set are being met, since it is a tool that evaluates the situation and the changes that are being carried out in a continuous

manner, establishing the effectiveness of the measures implemented. In the table below (Table 16), a summary of the roadmap to develop a national MRV system is included:

Table 16: Proposed Roadmap for the development of a national MRV system.
Source: Prepared by the authors.

Time period	Action	Coordinator
Immediate actions (2015)	▪ All the ministries which are part of the CCMC should identify an individual with ability to make decisions who will be the link between the Ministry and the CCMC. ▪ Evaluate the knowledge level of the selected individuals on climate change and GHG emissions reduction and, if necessary, develop a capacity building plan to be developed in the short term. This action should be linked to the roadmap detailed in Table 17. ▪ Decide the role of every agent. In the measures proposed, the coordinating and supporting entities are defined, these roles should be approved and then the responsibilities clearly defined, because the Ministries in charge of the implementation of the measures should deliver the information about their progress to the CCMC. ▪ The MFE will consider climate change planning in the national budgets. ▪ In the private and academia sectors, key agents who will provide support in the monitoring tasks will be identified as well. They will provide information or take part in the implementation of the GHG mitigation actions. It will be necessary to define the roles and the process to deliver the information to the CCMC.	Coordinator of the Executive Committee of the CCMC, supported by the rest of the structure of the CCMC.
Short term (2016-2017)	▪ Develop the operative system for the MRV. An IT system, implemented at the Government level where every entity could introduce its monitoring data could be created. Then, the CCMC would be able to review the data included. Furthermore, yearly the CCMC would carry out an analysis of the results obtained, determining the deviation between the results and the objectives set and, if necessary, redefine the GHG mitigation actions. ▪ Capacity building on the functioning of the MRV IT system.	Coordinator of the Executive Committee of the CCMC.
Long term (from 2017 on)	▪ Once the MRV system is in place, periodical meetings (at least once every six months) will take place in order to evaluate the progress and approve any modifications to the Strategy. ▪ Periodical meetings will be organized as well with the external agents from the private and academia sectors.	Coordinator of the Executive Committee of the CCMC, supported by the rest of the structure of the CCMC.

5.1. Capacity building

In order to implement, monitor and evaluate a coordinated Strategy for the electrical power generation, industry and transport sectors it is necessary to ensure that the required capacities are developed. The implementation of the Strategy requires a multidisciplinary approach because it addresses several different aspects. Furthermore, not only the three sectors included in the Strategy document are affected by its implementation, other sectors which even if are not the focus of the Strategy, due to their nexuses and inter-relationships the electrical power generation, industry and transport sectors, need to be considered as well.

Up until the development of this Strategy, the GORTT has made several efforts in order to strengthen its capacity for climate change related initiatives. On the one hand, the Cabinet has established a Climate Change Ministerial Committee (CCMC), which is composed of Ministers responsible for key areas relevant to climate and a coordinated work group focused on providing policy guidance to the implementation of the National Climate Change Policy. Furthermore, the Climate Change Focal Point Network (CCFPN) is a mechanism that allows all members to receive the latest climate change related information, which guarantees that they have prompt access to it and are informed about every relevant climate change related topic, as well as provide the conduit for inputs related to policy and decision making.

Climate change related issues in Trinidad and Tobago are mainly coordinated by the Multilateral Environmental Agreements Unit (MEAU), of the Ministry of Environment and Water Resources (MEWR). Within the unit, there is a working team of several professionals with a strong climate change background. They have been coordinating many of the climate change related projects and activities that have taken place in Trinidad and Tobago, from which they obtained invaluable experience.

Nevertheless, there is a need for further strengthening of the institutional capacity in order to reinforce the leadership of the GORTT and, particularly, of the MEAU and the MEWR. In the table below (Table 17), a number of initiatives designed to work in that direction are included.

Table 17: Capacity building.
Source: Prepared by the authors.

Required capacity	Comments
Integration of climate change in Trinidad and Tobago's policies	▪ This is a multidisciplinary policy approach which includes strategic action lines, which need to be integrated in the agendas of the Ministries in order to guarantee its integration in the timeline set. A review of the existing sectoral policy and legislative framework has already been conducted along with recommendations, which now need to be implemented. ▪ Furthermore, it is important to reinforce the relationship with the local government institutions of the country, in order to ensure the implementation of climate change policies at the local level.
Institutional coordination	▪ In order to guarantee the mainstreaming of the Strategy, institutional coordination is needed within the GORTT. ▪ The CCMC needs to lead the efforts. In order to do so, reinforcement in the following aspects is needed: o Specific staff who can work on the implementation of GHG mitigation actions, composing a Technical Committee which will provide support to the Executive Committee. o Actions to disseminate the already existing climate change knowledge and its links with other existing sectoral policies (for instance in transport, spatial planning, building, health, biodiversity, water management, etc.). ▪ The MEAU, the EMA and the secretariat will be key instruments to enhance coordination. ▪ Furthermore, sub-committeess will be created to reinforce the implementation of the GHG mitigation measures. These groups could be coordinated by MEAU and would work separately working on the most technical aspects of each action. The sectoral groups would be composed by staff from the Ministries/entities involved in every sector, including private companies, sectoral organizations such as the Energy Chamber and NGOs. The results of the work developed by these sectoral groups would then be presented to the CCMCs Executive and Technical Committees.
Technical knowledge	▪ The knowledge on climate change related topics is expanded and improved continuously. Several reports are published yearly with relevant information, being the main sources: international research projects, the IPCC, national projects promoted by the IDB, the UNDP or the MEWR and other national research carried out by universities and research institutions. ▪ Therefore, it is important to consider the creation of a continuous capacity building process which would facilitate being aware of any existing novelties in the field.
Management of capacity building	▪ Climate change knowledge needs to be reinforced within the GORTT. In order to do so, the MEAU, with the support from the MEWR, can lead this activity. ▪ The MEAU will maintain a close relationship with all the research groups of Trinidad and Tobago, in order to influence on the definition of the research topics so that the information needs which allow politic decisions are covered. ▪ Furthermore, the MEAU needs to be able to disseminate any relevant information to the rest of the Ministries and entities involved, so as to influence in their decision-making process when those decisions are related to the reduction of GHG emissions.
Information on funding sources	▪ Given the national and international interest to promote actions to tackle climate change, there are opportunities to consider in terms of financing. As seen with the technical information, it is important to reinforce the updating of the knowledge in terms of climate finance, getting to know the organisations which manage the funds and the best ways to have

Required capacity	Comments
	access to them. It is crucial to keep open a communication channel with multilateral donor institutions such as the IDB or the UNDP.
Social and community leadership	▪ It is necessary to ensure public and private participation in order to guarantee the implementation of the Strategy. It is important to disseminate and explain the Strategy's agenda in order to guarantee that professional associations, other types of associations, NGOs and other actors which compose the society of Trinidad and Tobago take part. ▪ Convening power to reach actors from the social society for the programs of the Strategy is needed, making use of virtual tools or through the creation of permanent dialogue groups with the citizens.

5.2. Monitoring and evaluation system

In order to monitor the implementation of the GHG mitigation measures proposed in this Strategy and assess whether the targets set are going to be met or not, it is necessary to define a framework defining the indicators that will help monitor the advance of the implementation and its results. To do so, the sets of indicators proposed are included in this section.

Nevertheless, before detailing the sets of indicators proposed for the monitoring, some important remarks to consider need to be addressed. An appropriate design of the monitoring actions is crucial to obtain the necessary data to assess the implementation of the Strategy. Additionally, it helps to keep on working on the development of planning actions, because these actions will benefit from the feedback provided by the monitoring system. As with such long term policies and strategies, it would be necessary to review the planning and implementation during its lifetime to facilitate changing circumstances. Given that it will last from 2014 to 2040, it is recommended that an in-depth review of the Strategy is conducted approximately every five years. This would be a good way to include emerging technologies and remove measures which, for any reason, may not be coherent with the reality of Trinidad and Tobago at the moment of the review.

Not only is the definition of the indicators important, having a reasonable number of indicators is also a condition to guarantee an effective monitoring. Often, when developing climate change planning strategies a large set of indicators is defined, this leads to difficulties when updating them according to the established regularity. For that reason, in this document a limited number of monitoring indicators is proposed. These indicators group together the main data which needs to be periodically monitored in order to assess the implementation of the Strategy.

To conclude, another determining factor is the definition of the organization in charge of the monitoring scheme. This organization will have to send requests to gather the data necessary to calculate the indicators according to the periodicity defined. Furthermore, this organization will have to analyze the results obtained and propose actions to complement or correct the deviations detected.

Given the overall environmental coordination and enforcement mandate of the Environmental Management Authority under the Environmental Management Act 2000, a sound proposal could be for the CCMC, particularly their Executive Committee, to lead the analysis, monitoring of the results and enforcement of the strategy. This will receive feedback from the Technical Committee, the Secretariat, the MEAU, the sub-committees (through the MEAU) and the Environmental Management Authority (EMA). Nevertheless, the institutional coordination proposed for the implementation of this Strategy is detailed below.

One set of indicators are proposed that will focus on measuring the material advance of the Strategy, and will help monitor the progress achieved in the implementation of the measures. Another set of indicators are defined to measure the result or effect of the measures on the three sector's GHG emissions and energy consumption is included.

The table below (Table 18) includes the advance indicators, that is, as defined previously, those indicators which would help assess the progress of the implementation of the GHG mitigation measures. Given the lack of data to estimate the current state of the development of some of the actions, it was not possible to quantify several of the indicators, particularly, in terms of their progress by 2012.

Table 18: Advance indicators.
Source: Prepared by the authors.

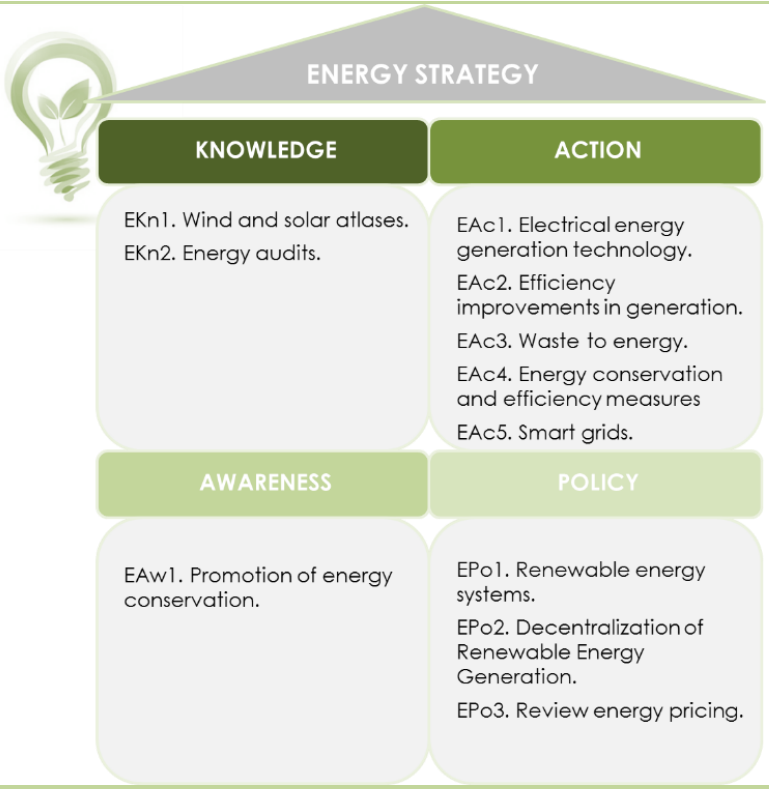
Sector	Indicator	Unit	Frequency	Value in 2012	Target for 2020	Target for 2030	Target for 2040
Electricity generation	CCGT power installed/CCGT power planned	%	Yearly	0%	24%	65%	100%
	Renewable energy power installed/Renewable energy power planned	%	Yearly	0%	24%	65%	100%
	Number of energy efficiency actions developed/Number of energy efficiency actions planned	%	Yearly	N/D	24%	65%	100%
Industry	Renewable energy power	%	Yearly	0%	24%	65%	100%

Sector	Indicator	Unit	Frequency	Value in 2012	Target for 2020	Target for 2030	Target for 2040
	installed/Renewable energy power planned						
	Number of energy efficiency actions developed/Number of energy efficiency actions planned	%	Yearly	N/D	24%	65%	100%
	Number of BAT implemented/Number of BAT planned	%	Yearly	N/D	24%	65%	100%
Transport	Energy consumption of road public transport/total road energy consumption	%	Yearly	8%	12%	20%	30%
	Number of registered road vehicles/Total number of road vehicles	%	Yearly	N/D	24%	65%	100%
	Number of upgraded planes/ Planned number of upgraded planes	%	Yearly	N/D	24%	65%	100%
	Number of upgraded vessels/Planned number of upgraded vessels	%	Yearly	N/D	24%	65%	100%

As previously indicated, apart from advance indicators, effectiveness indicators, which measure the results achieved are included in the indicators set as well. Given the differences between the three sectors analyzed and the fact that they are directly linked to the measures proposed for every sector and are designed to quantify efficiently the results of these measures, three sets of indicators, one for each sector, are proposed.

In the figure below (Figure 10), the GHG mitigation measures proposed for the electrical energy generation sector are included. These measures focus on promoting renewable energy sources and energy efficiency, prioritizing efficient generation technologies such as CCGT and developing actions to reduce generation losses.

Figure 10: GHG mitigation measures for the electrical energy generation sector.
Source: Developed by the authors.



The table below (Table 19) includes the effectiveness indicators proposed for the electrical energy generation sector. According to the GHG mitigation measures proposed for this sector, these indicators measure the implementation of renewable energy sources, CCTG and the efficiency of the electricity generation in Trinidad and Tobago.

Table 19: Effectiveness indicators for the electrical energy generation sector.
Source: Prepared by the authors.

Indicator	Unit	Frequency	Value in 2012	Target for 2020	Target for 2030	Target for 2040
Renewable energy production/total electricity production	%	Yearly	0%	4%	5%	6%
CCGT production/total electricity production	%	Yearly	14%	89%	90%	91%
Thermal plants production/total electricity production	%	Yearly	86%	0%	0%	0%
Produced electricity/total consumed fuel	%	Yearly	26%	42%	43%	44%

For the industry sector (Figure 11), the measures proposed focus mainly on reducing energy consumption, increasing energy efficiency actions and clean technologies, such as cogeneration. Furthermore, an effort to reduce venting and flaring emissions is also proposed.

Figure 11: GHG mitigation measures for the industry sector.
Source: Developed by the authors.

The table below (Table 20) includes the effectiveness indicators defined for the industry sector. Green growth consists, to a large extent, on decoupling energy consumption, and hence greenhouse gas emissions, and economic growth. Furthermore, the economy of Trinidad and Tobago is largely based on its industrial activities. To consider both factors, three of the indicators proposed quantify the results considering the national GDP versus the energy consumption or process and venting and flaring emissions. In that way, it is possible to determine whether the link between energy consumption, emissions and the GDP evolves over time with the implementation of GHG mitigation actions or it does not.

Table 20: Effectiveness indicators for the industry sector.
Source: Prepared by the authors.

Indicator	Unit	Frequency	Value in 2012	Target for 2020	Target for 2030	Target for 2040
Cogeneration production/total electricity production	%	Yearly	0%	3%	4%	4%
Fossil fuel consumption/National GDP	TJ/10^6 USD (2005)	Yearly	13	10	7	5
Process emissions/National GDP	t $CO_2e/10^6$ USD (2005)	Yearly	763	584	442	319
Flaring & venting emissions/National GDP	t $CO_2e/10^6$ USD (2005)	Yearly	33	4	4	4

Figure 12 and Table 21 outline the GHG mitigation actions proposed for the transport sector. These actions aim to foster the use of public transportation systems, and reduce the fuel consumption on the road transport sector. At the present time, the road transport sector, particularly the use of private vehicles, is responsible for the majority of the GHG emissions of the transport sector of Trinidad and Tobago. In order to modify that trend, most of the actions focus on promoting the reduction of the use of private vehicles. The actions proposed includes incorporation of less emitting fuels in the energy matrix of the transport system, so that, even if the use of the vehicles is not reduced, it would have a significant impact on GHG emissions.

Figure 12: GHG mitigation measures for the transport sector.
Source: Developed by the authors.

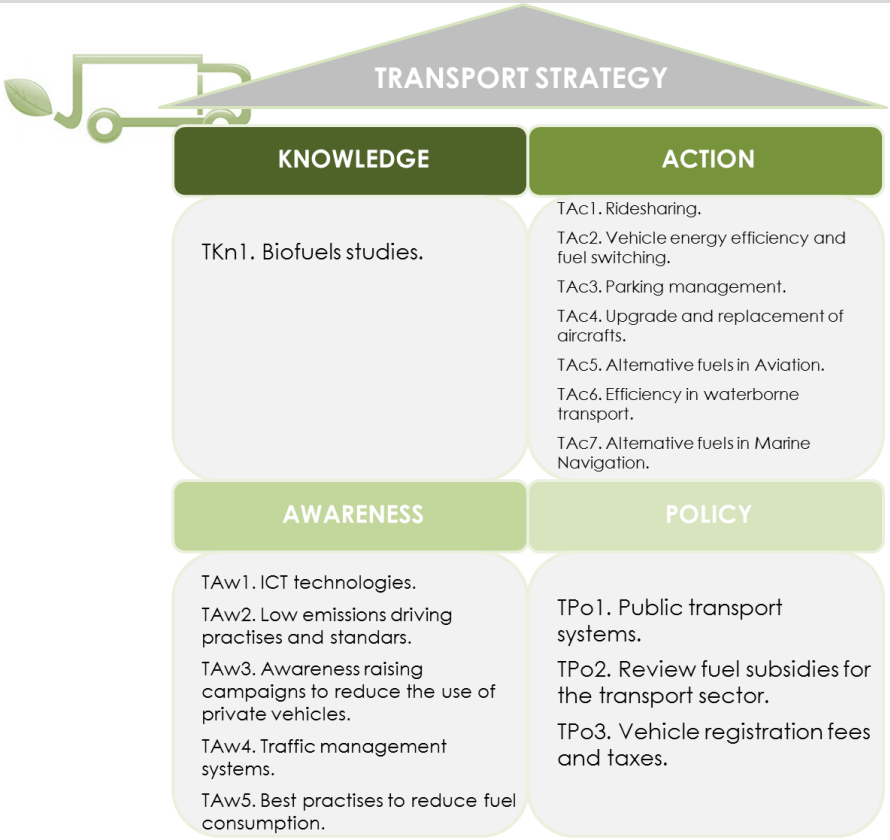


Table 21 includes the effectiveness indicators proposed for the transport sector. They focus on quantifying the fuel consumption and the use of less emitting fuels. As explained previously for the industry sector, the use of fuels is closely linked to the economic growth. Given that the objective of this Strategy is to promote green growth, not to depress the economic demand, the indicators are designed to measure if the link between the energy consumption and the economy varies along the Strategy's timeframe.

Table 21: Effectiveness indicators for the transport sector.
Source: Prepared by the authors.

Indicator	Unit	Frequency	Value in 2012	Target for 2020	Target for 2030	Target for 2040
Fuel consumption road transport / GDP	TJ/10^6 USD (2005)	Yearly	1.65	1.50	1.49	1.48
CNG consumption (road transport)/ Total road fuel consumption	*%*	Yearly	0%	4%	6%	7%
Fuel consumption air transport / GDP	TJ/10^6 USD (2005)	Yearly	0.24	0.24	0.27	0.35
Biofuel consumption (air transport)/ Total air fuel consumption	%	Yearly	0%	5%	9%	18%

Fuel consumption waterborne transport / GDP	TJ/10^6 USD (2005)	Yearly	0.07	0.07	0.07	0.07
LNG or biofuel consumption (waterborne transport)/ Total waterborne fuel consumption	%	Yearly	0%	5%	14%	42%

5.3. Institutional Coordination

Currently, the MEAU of the MEWR leads most of the climate change related projects driven by the GORTT. Moreover, the CCMC was created in order to facilitate the multidisciplinary implementation of climate change related policies and actions in the different fields covered by each Ministry, particularly the National Cliamte Change Policy. The committee is composed by members from the following Ministries:

1. Ministry of Environment and Water Resources (MEWR).
2. Ministry of Public Utilities (MPU).
3. Ministry of Energy and Energy Affairs (MEEA).
4. Ministry of Transport (MT).
5. Ministry of Works and Infrastructure (MWI).
6. Ministry of Local Government (MLG).
7. Ministry of Health (MH).
8. Ministry of Housing and Urban Development (MHUD).
9. Ministry of Planning and Sustainable Development (MPSD).
10. Ministry of Food Production (MFP).
11. Ministry of Tourism (MTo).
12. Ministry of Tobago Development (MTD).

The CCFPN coordinated by the MEAU/MEWR serves to facilitate information dissemination to stakeholders as well as receiving feedback.

Given its multidisciplinary composition and relevance, for the purposes of the implementation of this Strategy, the CCMC is proposed as the umbrella coordinating body. This committee, in addition to its terms of reference may need to also address, among others, two key aspects:

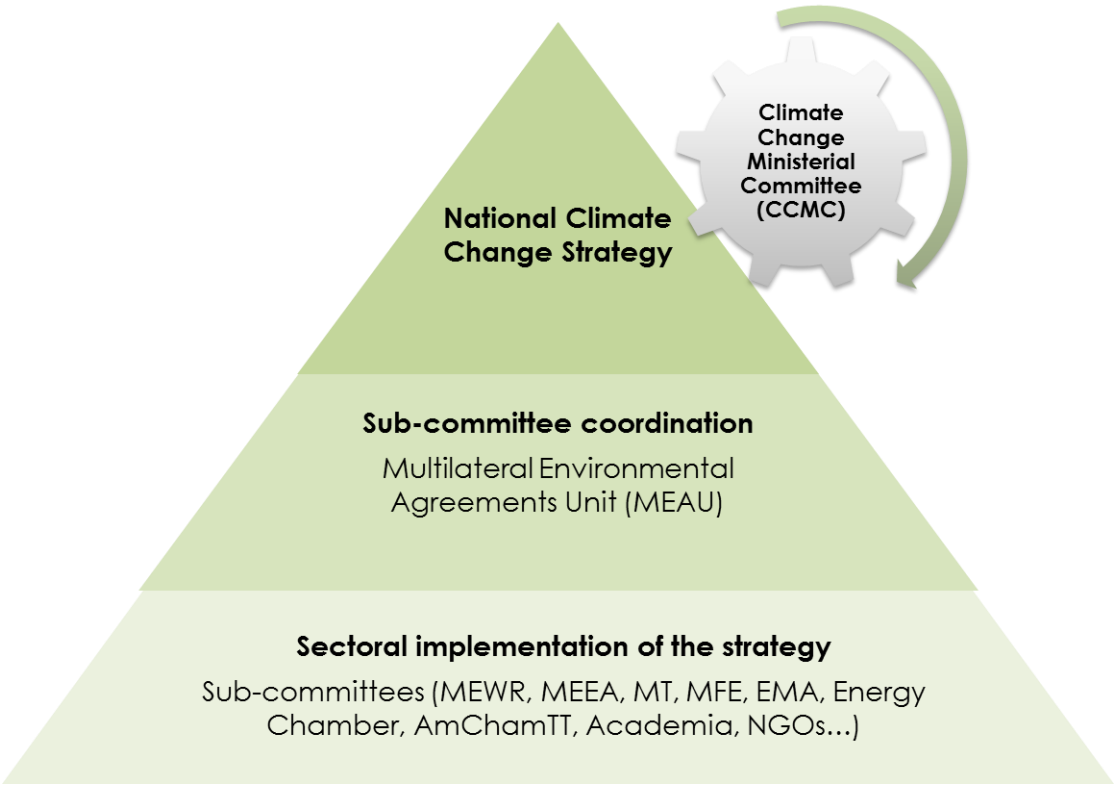
- The general technical coordination, which will guarantee that projects, measures and actions are constructed in accordance with the national climate change policy, harmonizing in this way the management of the information derived from each project. This will allow improving the integration of the climate change

related information in the country and creating a feedback loop to provide information on the results of already developed initiatives for the new ones to be implemented.

- The coordination of the financing of the measures, making use of resources provided by the GORTT and with the budget obtained from other national and international entities. As detailed in further sections, there are several entities which manage public and private national and international funds in order to promote climate change action. Nevertheless, in order to maximize the results, it is necessary to establish a single communication and coordination channel between these entities and the State.

The scheme for the general coordination of the implementation is illustrated in the figure below (Figure 13).

Figure 13: Proposed Mechanism for the coordination of the Strategy.
Source: Developed by the authors.



Furthermore, it is recommended that there be a close connection with entity or person coordinating the yearly budget of the GORTT within the MFE so that the GHG mitigation actions identified in this Strategy are taken into consideration in the national budgeting process, and for public sector investment programmes. This is critically important if climate change actions in general, and those related to the implementation of this Strategy in particular, are to be mainstreamed in national development planning and implementation as provided for in the National Climate Change Policy. Depending on the scope of the measures, representatives from other Ministries will also be involved in their implementation.

The figure below (Figure 14) shows the coordination lines that need to be established for the implementation of the Strategy according to the scheme designed:

Figure 14: Proposed Coordination mechanisms[11,12].
Source: Developed by the authors.

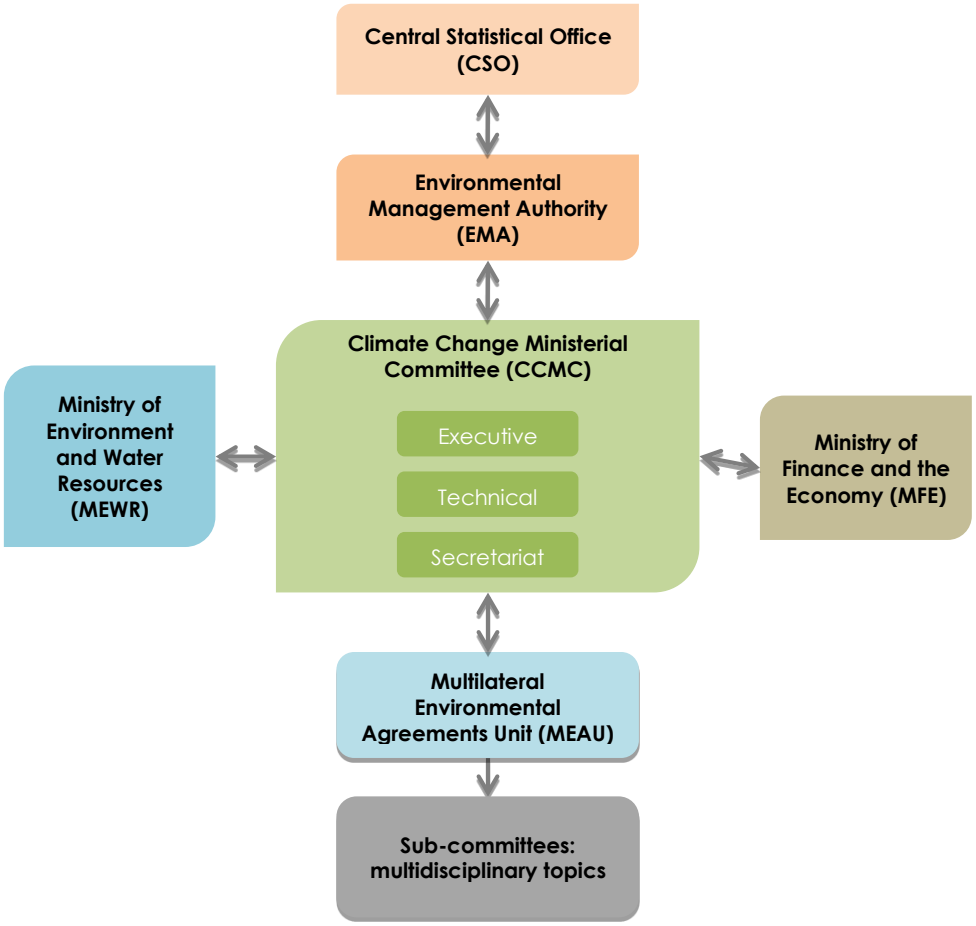


Figure 14 should not be interpreted as a top-down, hierarchical model, but rather as a 'spoke and hub' arrangement, with the CCMC being the centre and overarching coordinating entity (hub) coordinating the implementing entities (spokes). In this arrangement, several complementary mechanisms are proposed. The CCMC will be composed by an Executive Committee, a Technical Committee and a Secretariat. The Executive Committee will be in charge of high-level political decisions, supported by the Technical Committee, which will also be in charge of technical decisions. The Secretariat will manage the administrative aspects of the CCMC, coordinating the meetings and executing other tasks such as the delivery of information to its components.

These bodies will facilitate the high-level decision-making process required for the implementation of the Strategy. Additionally, it will be supported by:

[11] The figure displays information exchange linkages between ministries and agencies; it does not depict a hierarchical arrangement.

[12] Up to the time of finalising this Strategy, the CCMC had not yet held session. There is however an agreement that the MEWR and the MEAU will convene the first CCMC meeting with senior ministry comprising the CCMC in order to develop policy directives to the strategy implementation. The technical committees or sub-committees arising therefrom would meet, deliberate, and report back to their ministers for information or any other guidance as necessary on a quarterly or six months basis [27].

- The MEAU, which will be in charge of coordinating the sub-committees created for the implementation of the GHG mitigation options. These committees will be composed by different agents including ministries, industry associations, private companies, NGOs and academics. This unit will also be in charge of capacity building and dissemination actions related to climate change and will keep the CCMC updated on the latest international climate change agreements and innovations.
- The EMA, which will analyze the information retrieved by the Central Statistical Office (CSO) and/or Ministry of Energy and Energy Affairs and provide it to the CCMC, through the MEAU. The information compilation process will assure a safe use of the data, guaranteeing that none of it is displayed to the public without prior permission and that no sensitive information is made public.

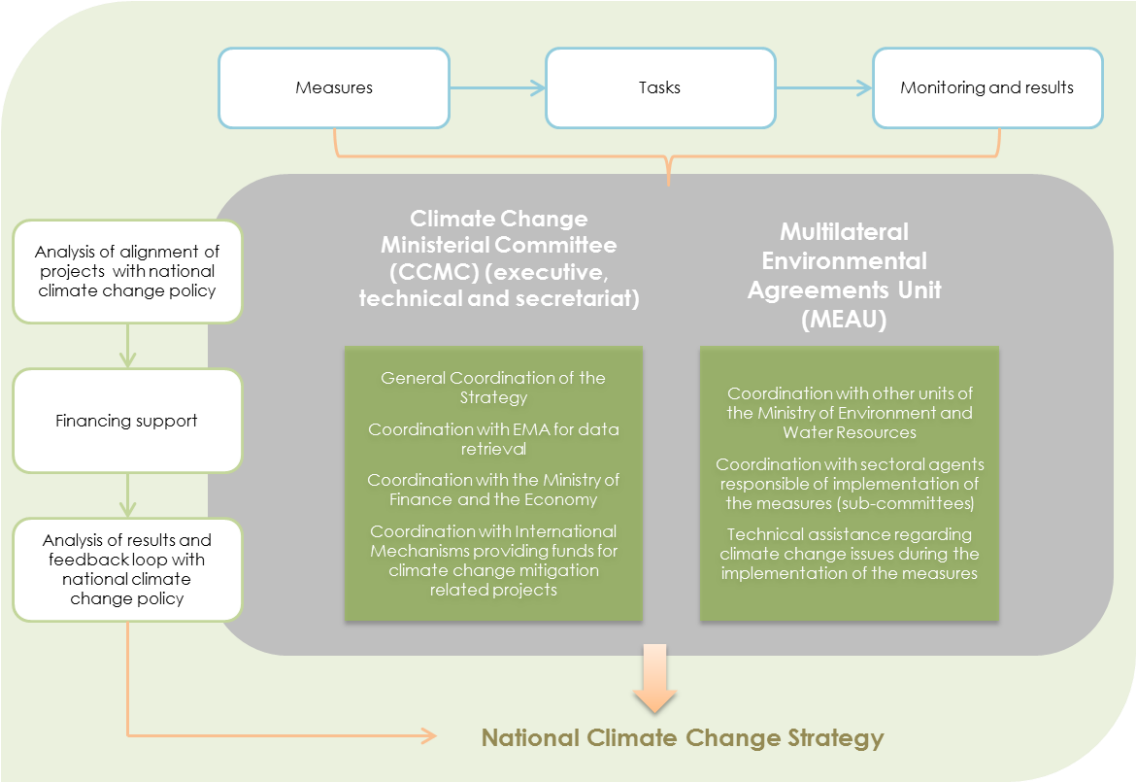
Additionally, the CCMC will coordinate with the Ministry of Environment and Water Resources, which is the leading Ministry for climate change activities in Trinidad and Tobago. Furthermore, it will also coordinate the finance related aspects of the Strategy closely with the MFE. Since the MFE has the competencies regarding the national budgets, its cooperation is crucial for the implementation of the Strategy. Additionally, international financing where available will also be coordinated in order to achieve consistency between the financed projects and the country's needs.

Moreover, for the coordination of the implementation of the Strategy, continuous contact will be kept with the following:

- Technical and political agencies of coordinating bodies. With them, a capacity building and policy articulation effort will be put in place.
- Local entities for the measures in which their participation is necessary. Common spaces will be created to guarantee that all the segments of the society are involved in the implementation and awareness raising actions.

Therefore, the general coordination actions managed by the CCMC will focus on guaranteeing that the projects and initiatives that are developed in terms of climate change mitigation in Trinidad and Tobago are aligned with this Strategy. The figure below (Figure 15) summarizes the proposed actions to be developed by the CCMC and the support provided by the MEAU:

Figure 15: Functions of the CCMC and support of the MEAU.
Source: Developed by the authors.



6. Financing

6.1. Context

The implementation of GHG mitigation measures will depend on the availability of adequate financing. In addition to efforts to mainstream measures in the public sector investment programme and national budgetary provisions, additional financing sources may be needed to supplement the complete implementation of the measures over the identified timeframe.

Based on the models used for the cost-benefit analyses for the implementation of the Strategy, the initial estimation for the cost of the implementation of the GHG mitigation measures is approximately two billion USD. In that figure, not all the measures proposed are included due to the difficulties to quantify some of them. However, the figure includes both costs and benefits of the measures, that is, even if the benefits are considered, the implementation of these actions would cost, between 2013 and 2040 almost two billion USD.

It should be noted that the timeline of the strategy is 27 years (2013-2040), which means that on average of less than 75 million USD would be spent yearly. Nevertheless, more detailed information on the cost-benefit and multicriteria analyses carried out can be found in Annex I of this document.

In this section a brief summary of national and international financing sources which are available and may be used for the implementation of the GHG mitigation options proposed is included. These financing sources will be helpful when the measures are being planned, but their implementation will not depend solely on them. Every entity in charge of any measures will have to quantify and designate the yearly budget necessary for the implementation of the measures they are responsible for. This is essentially mainstreaming mitigation in national development and the implementation measures should not be viewed as discrete project based activities requiring a particular quota of finance for implementation. The formulation of budgets for the various identified action lines be included as an activity for the sub-committees of the CCMC when the implementation plan is being developed. To facilitate this budgeting exercise, an analysis of the funding sources available would be necessary.

6.2. Potentially available funding sources

The programs and funding sources that are potentially available for implementing the Strategy can be classified into three financing categories:

- Climate finance: in this category, the funding that would be obtained from international financing sources is included. They are managed, mainly, by multilateral organisms and focus on financing technical reports, capacity building or pilot projects.
- Carbon markets: in this category, funding sources which focus on action measures can be found. It includes mechanisms such as NAMA, Program of Activities (PoA) or Verified Carbon Standard (VCS). This type of funding covers solely projects which derive from direct GHG emissions reductions.
- National finance: in this third category, funds provided by the GORTT for the implementation of GHG mitigation actions would be included.

A summary of these sources shown in the table below (Table 22), including their origin and the type of financing source.

Table 22: Potential financing sources for the implementation of GHG mitigation actions.
Source: Prepared by the authors.

Financing Scheme	Origin of funding scheme	Type of financing source
The Green Fund	National	National Finance
Public Sector Investment Programme (PSIP)	National	National Finance
Nationally Appropriate Mitigation Actions (NAMA)	International	Carbon Markets
Clean Development Mechanism (CDM)	International	Carbon Markets
Global Environmental Facility	International	Climate Finance
Global Environmental Facility Small Grants Programme	International	Climate Finance
International Finance Corporation (IFC)	International	Climate Finance
Sustainable Energy and Climate Change Initiative (SECCI)	International	Climate Finance
Green Climate Fund (GCF)	International	Climate Finance
Germany's International Climate Initiative (IKI)	International	Climate Finance
Low Emissions Capacity Building Programme (LECB)	International	Climate Finance

- **The Green Fund**

The Green Fund is an instrument created by the Government of Trinidad and Tobago which aims to promote environmentally sustainable development in the country. The fund is capitalized by a 0.1% Green Fund Levy, which is applied to gross sales or receipts of companies carrying on business in Trinidad and Tobago. The Green Fund was designed to be a source of funding for organizations and community groups in Trinidad and Tobago. Consideration could be given to using the Green Fund for facilitating public-private partnerships for mitigation actions identified in the Strategy as appropriate.

- **Public Sector Investment Programme (PSIP)**

The Ministry of Planning and Sustainable Development describes the Public Sector Investment Programme as "a budgeting and strategic planning tool employed by the Government, to translate its plans into tangible projects and programs. These programs support the nation's social and economic transformation agenda which thereby improve the quality of the life of citizens of Trinidad and Tobago. As the capital expenditure component of the National Budget, the PSIP is focused on projects and programs that would achieve sustainable development".

- **Nationally Appropriate Mitigation Action (NAMA)**

NAMAs are voluntary actions that aim to reduce greenhouse gas emissions linked closely to national policy objectives. NAMAs can be defined as projects, policies or programs towards a strategy of low carbon development which aim to address a technology or sector. NAMAs may either be a part of, or separate from, Low Emission Development Strategies (LEDS). LEDS are strategic plans at the national level that should include a defined set of GHG emission reduction measures, a quantification of reductions, and the financial requirements to implement the actions.

Clean Development Mechanism(CDM)

The Clean Development Mechanism is a mechanism within the Kyoto Protocol in which countries with an emission reduction commitment (Annex I Parties) can implement an emission reduction project in developing countries in order to earn saleable certified emissions reduction credits (CER) than can be counted towards meeting their targets. Each CER is equal to one tone of CO_2 equivalent that is reduced through the project's actions, compared to the business as usual scenario. The Clean Development Mechanism has funded projects in a wide range of areas including hydro power, wind power, biomass, biogas, waster gas/heat utilization, and fuel switching. In Trinidad and

Tobago, there is one CDM project under the Program of Activities (PoA) framework, registered by PETROTRIN.

- **Global Environmental Facility(GEF)**

The Global Environmental Facility provides grants for projects related to biodiversity, climate change (both mitigation and adaptation), international waters, land degradation, the ozone layer, and persistent organic pollutants. It manages five funds, the Global Environment Facility Trust Fund; Least Developed Countries Trust Fund (LDCF); and the Special Climate Change Trust Fund (SCCF); the Nagoya Protocol Implementation Fund (NPIF) and the Adaptation Fund.

- **Global Environmental Facility Small Grants Programme(SGP)**

Community-based organizations (CBOs) and NGOs have the opportunity to apply for GEF grants through the Small Grants Programme, which primarily works in five GEF focal areas: conservation and sustainable use of biodiversity, mitigation and adaptation to climate change, protection of international waters, reduction of chemicals such as persistent organic pollutants (POP), and prevention of land degradation, including sustainable forest management.

- **International Finance Corporation (IFC)**

The IFC belongs to the World Bank Group. IFC is legally and financially independent, yet coordinates its activities with the other institutions of the World Bank Group. Its objective is to create opportunities for people to escape poverty by promoting inclusive and sustainable growth. To achieve its purpose, IFC offers solutions through firm-level interventions (Investment Services, Advisory Services, and the IFC Asset Management Company); promoting global collective action; strengthening governance and standard-setting; and business-enabling-environment work.

- **Sustainable Energy and Climate Change Initiative (SECCI)**

The SECCIof the Inter-American Development Bank (SECCI) finances the activities undertaken by the Sustainable Energy and Climate change Initiative. This Initiative is aimed at mainstreaming renewable energy, energy efficiency, biofuels, carbon financing, and the inclusion of climate change adaptation into policies and programs across sectors in Latin America and the Caribbean. The IDB, through its SECCI

programme has provided funding for a study to mainstream climate change in national development in Trinidad and Tobago. This project is completed and an implementation plan is being developed.

- **Green Climate Fund(GCF)**

The GCF was established at the 16th session of the Conference of the Parties (COP-16) to the UNFCCC as an entity of the financial mechanism of the UNFCCC. The fund was established in order to help the UNFCCC achieved its climate finance goals and effectively manage the funds pledged by different countries. The GCF will support projects, programs, policies and other activities in developing country Parties. Details on how the fund will receive, manage and disburse funds are still being discussed by the Green Climate Fund Board.

- **Germany's International Climate Initiative (IKI)**

The IKI finances climate projects in developing and transition economies in order to promote low carbon economies, climate change adaptation actions, the preservation or sustainable use of carbon reservoirs/Reducing Emissions from Deforestation and Forest Degradation (REDD) and the protection of biological diversity. The fund is managed and funded by the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety of Germany. At least 120 million Euros is available annually. Projects are mainly selected through calls for proposals, are based on the needs of partner countries, and supplement existing multilateral and bilateral cooperation with the German Government.

- **Low Emissions Capacity Building Programme (LECB)**

The LECB Programme was launched in January 2011 as part of a joint collaboration between the European Union (EU) and the United Nations Development Programme (UNDP). Since then, it has grown to include 25 participating countries and several contributing organizations. The program is designed to provide coordinated, expert, capacity-building support to assist participating countries in selecting the most relevant project activities to focus on. In this regard, it should be noted that the MEAU/MEWR is currently executing a Low Emissions Capacity Building (LECB) project with the UNDP which identifies NAMAs as outcomes of the project, which will be used to contribute to

the implementation of the Strategy. Trinidad and Tobago is the only SIDs participating in this programme.

6.3. Analysis of funding sources

Table 23 provides a summary of the types of potential funding detailed in the previous section for the GHG mitigation actions proposed.

Table 23: Potential financing sources for the implementation of the proposed GHG mitigation actions.

Source: Prepared by the authors.

Code	Measure	Climate Finance	Carbon markets	National finance
EKn1	Wind and solar atlases and wind pilot plant	X	X	X
EKn2	Energy audits	X		X
IKn1	Energy audits	X		X
IKn2	Characterization, diagnosis and BAT implementation	X	X	X
IKn3	CCS studies	X		X
IKn4	EOR studies	X		X
TKn1	Biofuel studies	X		X
EAc1	Electrical Energy generation technology	X	X	X
EAc2	Efficiency improvements in generation	X	X	X
EAc3	Waste to energy	X	X	X
EAc4	Energy conservation and efficiency measures	X	X	X
EAc5	Smart grids	X	X	X
IAc1	Improved use of energy and heat in industrial processes	X	X	X
IAc2	Complementary renewable energy sources	X	X	X
IAc3	Thermal desalination	X	X	X
IAc4	Reducing venting and flaring	X	X	X
IAc5	Efficient technologies in the oil and natural gas sectors	X	X	X
TAc1	Ridesharing			X
TAc2	Vehicle energy efficiency and fuel switching	X	X	X

Code	Measure	Climate Finance	Carbon markets	National finance
TAc3	Parking management			X
TAc4	Upgrade and replacement of aircrafts	X	X	X
TAc5	Alternative fuels in aviation	X	X	X
TAc6	Efficiency in water transport	X	X	X
TAc7	Alternative fuels in marine navigation	X	X	X
EAw1	Promotion of energy conservation	X		X
IAw1	Promotion of energy conservation and lower waste generation	X		X
TAw1	ICT technologies			X
TAw2	Low emissions driving practices and standards			X
TAw3	Awareness raising campaigns to reduce the use of private vehicles			X
TAw4	Air traffic management systems	X		X
TAw5	Best practices to reduce fuel consumption			X
EPo1	Renewable energy systems	X	X	X
EPo2	Decentralization of renewable energy generation	X		X
EPo3	Review energy pricing	X		X
IPo1	Review fuel subsidies for the industry sector			X
TPo1	Public transport systems	X	X	X
TPo2	Review fuel subsidies for the transport sector			X
TPo3	Vehicle registration fees and taxes			X
CPo1	National program for NAMAs	X		X
CPo2	National system of MRV	X		X
CPo3	Implementation of a pilot national market mechanism	X		X
CPo4	National research and development plan	X		X
CPo5	Data retrieval system	X		X

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Annex I: Cost-efficiency and Multicriteria Analysis of the GHG mitigation measures

This Annex includes the detailed results of the Cost-Efficiency and Multicriteria Analyses which were carried out as a part of the GHG mitigation measures analysis. The table below includes the detailed results of the cost-efficiency analysis of the GHG mitigation measures.

Table 24: Detailed results of the cost-efficiency analysis[13].

Source: Cost-benefit analysis, sensitivity analysis and financing opportunities of intervention policy options. Factor CO_2, 2014 [9].

	Action code	Title	Total cost	Total benefit	Net present value	Cost Efficiency	Benefit-Cost Ratio	tCO_2e Avoided
Energy Generation	E.GT.1	Electrical energy generation technology	386,784,064	174,760,444	-212,023,620	15.74	0.45	13,471,044
	E.GE.1	Efficiency improvements in the electrical energy generation	34,944,000	74,461,093	39,517,093	-21.62	2.13	1,827,435
	E.C.3.1	Energy conservation and efficiency measures in consuming sectors - CFLs	25,821,235	265,341,868	239,520,633	-35.09	10.28	6,825,742
	E.C.3.2	Energy conservation and efficiency measures in consuming sectors - LEDs	10,699,744	274,970,256	264,270,512	-36.30	25.70	7,280,792
	E.RE.1	Development of wind and solar atlases and implementation of a pilot wind energy project	255,192,963	150,647,528	-104,545,435	30.43	0.59	3,435,151
	E.RE.3	Use of renewable energy sources in housing, commercial and tourism sectors	172,338,364	71,525,234	-100,813,131	54.22	0.415	1,859,404
	E.RE.4	Waste to energy	391,518,338	202,270,293	-189,248,045	10.19	0.517	18,565,315
Industry	I.CS.1	Mandatory energy audits and implementation of energy efficiency technology for industries	NC[14]	NC	NC	7.31	NC	40,294,494
	I.CS.2	Characterization and diagnosis of the industry of Trinidad and Tobago and implementation of the Best Available Technologies	NC	NC	NC	0.19	NC	53,982,665
	I.CS.3	Improvement in the use of heat in process plants	156,684,725	69,177,969	-87,506,756	50.52	0.44	1,732,016
	I.CS.5	Viability of using thermal desalination in industrial sites	238,462,996	25,982,678	-212,480,318	2,349.80	0.11	90,425
	I.O.1	Reducing venting and flaring	2,690,810,596	4,494,679,638	1,803,869,041	-60.16	1.67	29,982,429

[13] All the monetary values are expressed in USD
[14] Not calculated, due to lack of information

	Action code	Title	Total cost	Total benefit	Net present value	Cost Efficiency	Benefit-Cost Ratio	tCO_2e Avoided
	I.O.3	Upgrade to more efficient technologies	2,590,301	215,295	-2,375,006	1.36	0.08	1,745,407
Transport	T.R.1	Reduction/phased withdrawal of fossil fuel subsidy	5,653,708,088	5,741,849,848	88,141,760	-152.76	1.02	582,920
	T.R.2	Motor vehicle registration fees and taxes	263,687,622	204,665,645	-59,021,977	101.63	0.78	580,743
	T.R.5.1	Promotion of vehicle energy efficiency and fuel switching - Buses	25,511,110	86,694,299	61,183,189	-791.41	3.40	77,309
	T.R.5.2	Promotion of vehicle energy efficiency and fuel switching - Maxi Taxis	51,232,183	622,959,213	571,727,031	-966.31	12.16	591,660
	T.A.3	Use of alternative fuels in Aviation	403,804,995	0	-403,804,995	193.08	N/A	2,091,431
	T.W.1	Operational changes to reduce fuel consumption	0	346,493,675	346,493,675	-151.90	N/A	2,281,050
	T.W.3	Use of alternative fuels in Marine Navigation	46,856,584	0	-46,856,584	60.01	0.00	780,777

Table 25 includes the cost-efficiency results of the measures:

Table 25: Cost-efficiency results.

Source: Cost-benefit analysis, sensitivity analysis and financing opportunities of intervention policy options. Factor CO_2, 2014 [9].

Code	Title	Cost Efficiency	tCO_2e Avoided
T.R.5.2	Promotion of vehicle energy efficiency and fuel switching - Maxi Taxis	-966.31	591,660
T.R.5.1	Promotion of vehicle energy efficiency and fuel switching – Buses	-791.41	77,309
T.R.1	Reduction/phased withdrawal of fossil fuel subsidy	-152.76	582,920
T.W.1	Operational changes to reduce fuel consumption	-151.90	2,281,050
I.O.1	Reducing venting and flaring	-60.16	29,982,429
E.C.3.2	Energy conservation and efficiency measures in consuming sectors - LEDs	-36.30	7,280,792
E.C.3.1	Energy conservation and efficiency measures in consuming sectors - CFLs	-35.09	6,825,742
E.GE.1	Efficiency improvements in the electrical energy generation	-21.62	1,827,435
I.CS.2	Characterization and diagnosis of the industry of Trinidad and Tobago and implementation of the Best Available Technologies	0.19	53,982,665
I.O.3	Upgrade to more efficient technologies	1.36	1,745,407
I.CS.1	Mandatory energy audits and implementation of energy efficiency technology for industries	7.31	40,294,494
E.RE.4	Waste to energy	10.19	18,565,315
E.GT.1	Electrical energy generation technology	15.74	13,471,044

Code	Title	Cost Efficiency	tCO_2e Avoided
E.RE.1	*Development of wind and solar atlases and implementation of a pilot wind energy project*	30.43	3,435,151
I.CS.3	*Improvement in the use of heat in process plants*	50.52	1,732,016
E.RE.3	*Use of renewable energy sources in housing, commercial and tourism sectors*	54.22	1,859,404
T.W.3	*Use of alternative fuels in Marine Navigation*	60.01	780,777
T.R.2	*Motor vehicle registration fees and taxes*	101.63	580,743
T.A.3	*Use of alternative fuels in Aviation*	193.08	2,091,431
I.CS.5	*Viability of using thermal desalination in industrial sites*	2349.80	90,425

These results are displayed in Marginal Abatement Cost Curves in the graphs below. These curves show, on the Y-axis, the cost efficiency (USD/tCO_2e) of the measure and, on the X-axis, the estimated amount of tonnes of CO_2 equivalent that can be reduced through the implementation of this action. Therefore, the area of each bar on the chart represents the total cost (or benefit, if the cost is negative) of the measure. The measures are in order from most efficient to least efficient. Measures with wider bars show that the measure has a large potential to reduce emissions, whereas measures that are tall show high efficiency (if they are negative) or inefficiency (if they are positive). As an example, the first measure, T.R.5.2, is very cost efficient in that, there is a high benefit per tonne of CO_2 equivalent reduced ($966.31/$tCO_2e$ in benefits); however, the total amount of reductions available through its implementation is relatively low, namely 591,660 tCO_2e (the bar is relatively thin, meaning low result on the x-axis). Whereas, the fifth measure, I.O.1, is less efficient, at $60.16/$tCO_2e$ in benefits (therefore, less benefits per ton of CO_2 equivalent reduced), however, it has the potential to reduce significantly more tCO_2e through its implementation, namely 29,982,429 tCO_2e (the bar is relatively wide, meaning a large result on the x-axis).

Graph 14: Marginal Abatement Cost Curve.

Source: Prepared by the authors based on data from the Central Statistical Office.

Table 26 below contains the detailed results of the Multicriteria analysis developed for the GHG mitigation actions.

Table 26: Multicriteria results.
Source: Prepared by the authors.

Code	Action	Importance	Urgency	No-regret	Generation of jobs	Generation of economic activity	Weighed result	Ranking
IKn1	**Energy audits**	5	5	5	3	2	68	1
TPo1	**Public transport systems**	5	5	5	2	2	66	2
IKn2	**Characterization diagnosis and BAT implementation**	5	5	5	2	1	65	3
IPo1	**Review fuel subsidy for the industry sector**	5	5	5	1	3	65	4
CPo5	**Data registry tools**	5	5	4	1	1	60	5
CPo2	**National system of MRV**	5	5	2	2	2	57	6
TPo2	**Review fuel subsidies for the transport sector**	5	4	4	1	3	58	7
EPo3	**Review energy pricing**	4	5	5	1	2	59	8
EAc2	**Efficiency improvements in generation**	4	5	5	1	1	58	9
EPo2	**Decentralization of renewable energy generation**	4	5	4	3	3	61	10
EKn1	**Wind and solar atlases and wind pilot project**	4	5	4	3	2	60	11
EAw1	**Promotion of energy conservation**	4	5	4	3	1	59	12
CPo1	**National programme for NAMAs**	4	5	1	2	1	48	13
EAc3	**Waste to energy**	4	4	5	2	1	56	14
EKn2	**Energy audits**	4	4	4	4	3	59	15

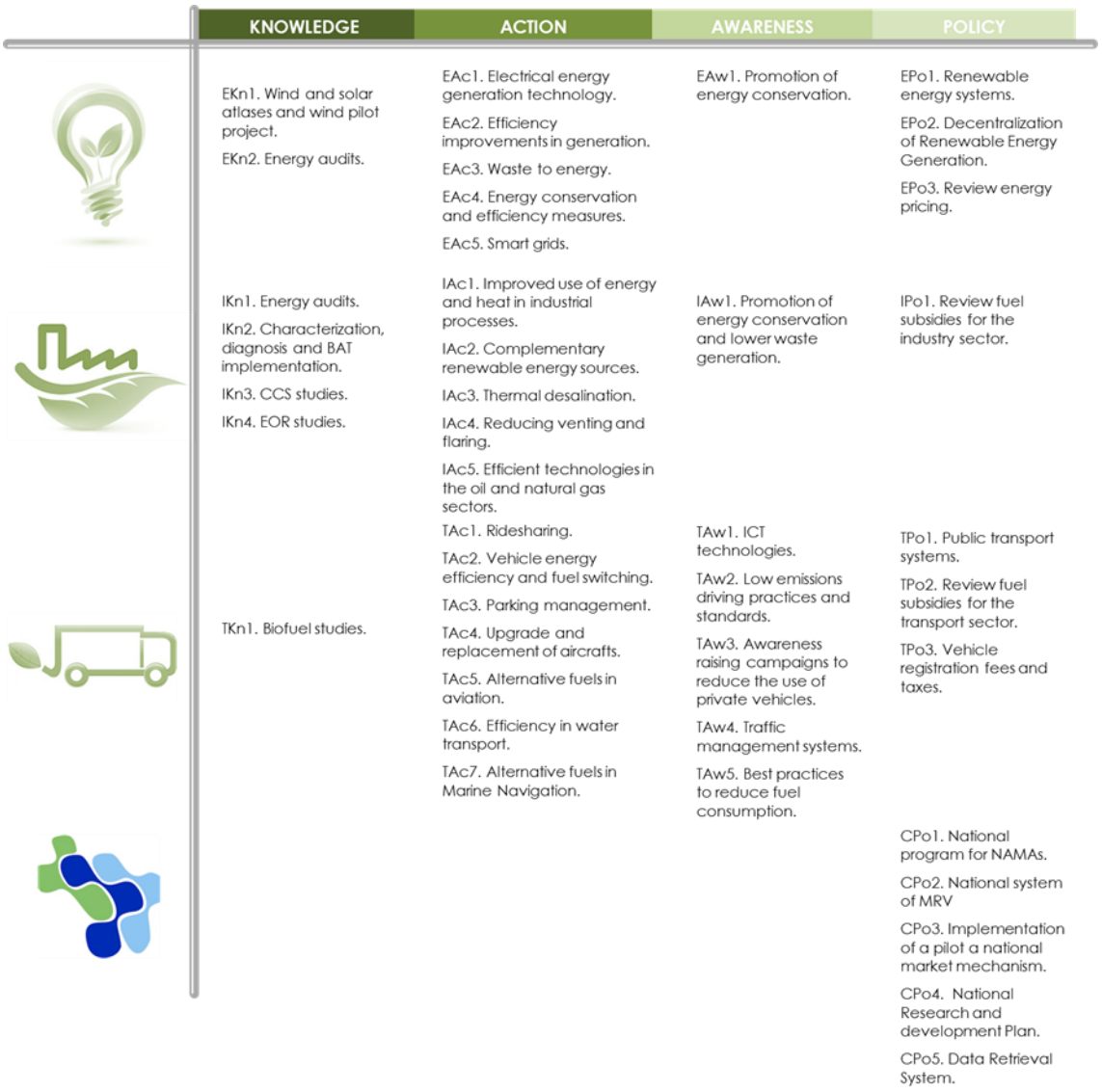
Code	Action	Importance	Urgency	No-regret	Generation of jobs	Generation of economic activity	Weighed result	Ranking
CPo4	**National research and development plan**	4	4	4	2	3	55	16
EPo1	**Renewable energy systems**	4	4	4	2	3	55	17
IAc5	**Efficient technologies in oil and natural gas sector**	4	4	4	2	2	54	18
IAc1	**Improved use of energy and heat in industrial processes**	4	4	4	2	2	54	19
TAw1	**ICT Technologies**	4	4	3	2	2	51	20
TAw3	**Awareness raising campaigns to reduce the use of private vehicles**	4	4	3	2	1	50	21
EAc1	**Electrical energy generation technology**	4	4	3	2	1	50	22
CPo3	**Implementation of a pilot national market mechanism**	4	4	1	2	2	45	23
IKn4	**EOR studies**	4	3	1	1	1	38	24
TAc3	**Parking management**	3	4	4	3	3	52	24
EAc4	**Energy conservation and efficiency measures**	3	4	4	2	2	49	26
IAw1	**Promotion of energy conservation and lower waste generation**	3	4	4	2	1	48	27
TPo3	**Vehicle registration fees and taxes**	3	4	4	1	3	48	28
TAc4	**Upgrade and replacement of aircrafts**	3	4	4	1	1	46	29
TAc6	**Efficiency in water transport**	3	4	4	1	1	46	30
TAw2	**Low emissions driving practices and standards**	3	4	3	2	1	45	31

Code	Action	Importance	Urgency	No-regret	Generation of jobs	Generation of economic activity	Weighed result	Ranking
IAc4	**Reducing venting and flaring**	3	4	3	1	2	44	32
TAc1	**Ride sharing**	3	3	4	3	3	48	33
EAc5	**Smart grids**	3	3	4	3	2	47	34
Tac2	**Vehicle energy efficiency and fuel switching**	3	3	3	2	2	42	35
TAw5	**Best practices to reduce fuel consumption in waterborne navigation**	3	3	3	1	1	39	36
TKn1	**Biofuel studies**	3	3	2	1	1	36	37
IKn3	**CCS studies**	3	3	1	1	1	33	38
TAw4	**Air traffic management systems**	2	3	4	1	1	37	39
IAc2	**Complementary renewable energy sources**	2	3	3	2	2	37	40
IAc3	**Thermal desalination**	2	3	3	1	1	34	41
TAc5	**Alternative fuels in aviation**	2	2	1	1	1	24	42
Tac7	**Alternative fuels in marine navigation**	2	2	1	1	1	24	43

Due to their contribution in terms of GHG emissions reductions and their importance, actions focused on reducing GHG emissions in the industry sector need to be prioritized, particularly those aiming to implement energy efficiency and best available technologies. The efforts need to focus as well on data retrieving and on assessing the improvements needed in the public transport service system. On the other hand, technologies which have not been developed to their full extent in other countries have a lower priority, considering their costs and benefits as well as other aspects included in the multicriteria analysis.

Annex II: Measure analysis

In this Annex, the complete analysis sheets developed for the purposes of this Strategy are included. For every action proposed, a sheet in which the main features of the measure in terms of purpose, implementation and responsible entities, is included. The figure below summarizes all the measures proposed. After the figure, the detailed data sheets developed for each measure are included.



Measure

Wind and solar atlases and wind pilot project

Code

Ekn1

Program

Knowledge

Action line

Renewable energy

Objective

Find out the solar and wind energy potential in Trinidad and Tobago as well as the most appropriate locations for the implementation of these technologies and develop a pilot installation of wind power.

Tasks and progress (upon completion of tasks)	**%**
1. Development of program of activities for the elaboration of wind and solar atlases and pilot renewable energy project: definition of objectives, schedule, budget and technologies to implement. This task will include an analysis of possible financing options for the development of the program from national and international sources. See section 6 for more information on financing sources.	*10%*
2. Development of atlases and selection of sites for implementation of pilot projects. The selection of the sites will be based on the results from the atlases in terms of location and energy generation potential and additional selection criteria such as the environmental features of the possible areas and land availability.	*50%*
3. Installation of turbines.	*90%*
4. Data compilation from pilot projects, analysing the results in terms of electricity generation and other side effects such as environmental impact, economic impact or creation of jobs.	*100%*

Schedule

Short term
Task 1: to be completed by the end of 2015
Task 2: to be completed by mid 2017
Task 3: to be completed by the end of 2018
Task 4: to be carried out from the end of 2018 on

Responsible entities/Other Participating Bodies

Ministry of Energy and Energy Affairs, T&TEC, UWI

Measure

Energy audits

Code

Ekn2

Program

Knowledge

Action line

New technologies

Objective

Reduction of the energy consumption in the housing, commercial and institutional sectors of Trinidad and Tobago performing energy audits and implementing energy efficiency measures.

Tasks and progress (upon completion of tasks)	**%**
1. Definition of Program of Activities to characterize the energy consumption, undertake energy audits and develop awareness raising campaigns and capacity building sessions in commercial, institutional and housing sectors in Trinidad and Tobago. This task will include the definition of the objectives, the expected results and the budget of the action. This task will also include the definition of the best scheme for implementation of energy audits and energy efficiency measures and the analysis of the need to create/modify legislation. Awareness raising campaigns and capacity building workshops will also be developed. Additionally, in this task, national and international funding sources will be analysed as well (see section 6 for information on funding sources).	*5%*
2. Development of energy system characterization studies, in order to map the energy consumption in the housing, commercial and institutional sectors of Trinidad and Tobago. This task will also include the definition of the best scheme for implementation of energy audits and energy efficiency measures and the analysis of the need to create/modify legislation. This task will also include the development of awareness raising campaigns and capacity building workshops.	*20%*
3. Definition of scheme for the implementation and funding of energy audits and energy efficiency measures. The development of audits could be established as a legal requirement for commercial and institutional sectors and for households to be sold or rented. An ESCO scheme could be defined, in which the ESCOs would be in charge of auditing and, if desired by the owners, implementing energy efficiency measures. This could be done by creating a common platform for entities and citizens to be in contact with ESCOs. With the implementation of energy efficiency actions, the energy consumption of the households or entities would be reduced and the ESCOs would recoup their investments (see action EAc4).	*35%*
4. Creation or modification of legislation, if applicable.	*50%*
5. Development of capacity building sessions for ESCOs on the results of the energy characterization, and the development of energy audits in the selected sectors.	*55%*
6. Organization of awareness raising campaigns for the target sectors, focusing on explaining the new legal requirements, the ESCO scheme created and the benefits of the development of energy audits.	*65%*
7. Selection of pilot entities and households for the development of energy audits. The selection will be based on the results of the characterization, prioritizing households/buildings with the highest energy consumption rates, while, at the same time, building a representative sample for a better result.	*70%*
8. Development of pilot energy audits, analysis of achieved results and development of corrective actions, if necessary.	*80%*
	100%

9. Beginning of period of application of legislation with compulsory energy audits. It will include a yearly analysis of achieved results, revision of energy and economic costs of implementation of the scheme.

* This action would be continued by the implementation of EAc4.

Schedule

Medium term
Task 1: completed by the end of 2016
Task 2: to be completed by mid 2018
Tasks 3 and 4: to becompleted by the end of 2019
Tasks 5 and 6: to becompleted by mid 2020
Tasks 7 and 8: to becompleted by the end of 2021
Task 9: to be carried out from the end of 2021 on

Responsible entities/Other Participating Bodies

Ministry of Energy and Energy Affairs, ESCOs

Measure

Energy audits

Code

IKn1

Program

Knowledge

Action line

New technologies

Objective

Reduction of the energy consumption in the industrial sector through the development of energy audits in industries for the implementation of energy efficiency measures

Tasks and progress (upon completion of tasks)	**%**
1. Definition of Program of Activities to characterize the energy consumption, undertake energy audits and develop awareness raising campaigns and capacity building sessions in the industrial sector in Trinidad and Tobago. This task will include the definition of the objectives, the expected results and the budget of the action. Additionally, in this task, national and international funding sources will be analysed as well (see section 6 for information on funding sources).	*5%*
2. Development of energy system characterization studies, including the general use of fuels and, particularly the use of heat in companies, in order to map the energy consumption in the industrial sector of Trinidad and Tobago. This task will also include the definition of the best scheme for implementation of energy audits and the analysis of the need to create/modify legislation. It will also include developing awareness raising campaigns and capacity building workshops.	*25%*
3. Definition of scheme for the implementation and funding of energy audits. The development of audits could be established as a legal requirement for industries, as proposed for the housing, commercial and institutional sectors. However, for the implementation of the actions (see IAc1 and IAc5) a Voluntary Scheme could be created with the industries, in which tax deductions are granted to companies implementing efficiency measures.	*35%*
4. Creation or modification of legislation, if applicable.	*45%*
5. Development of capacity building sessions for on the results of the energy characterization and the development of energy audits in the industrial sector.	*50%*
6. Organization of awareness raising campaigns for the target sector, focusing on explaining the new legal requirements, the Voluntary Scheme created and the benefits of the development of energy audits and implementation of energy efficiency measures.	*55%*
7. Selection of pilot industries for the development of energy audits. The selection will be based on the results of the characterization, prioritizing companies with the highest energy consumption rates, while, at the same time, building a representative sample for a better result.	*60%*
8. Development of pilot energy audits and analysis of achieved results.	*70%*
9. Based on the results of the development of the energy audits, if necessary, corrective actions will be applied.	*80%*
10. Beginning of period of application of legislation with compulsory energy audits. This task will include a yearly analysis of achieved results, revision of energy audits and quantification of economic costs of implementation of the scheme.	*100%*

* This action would be continued by the implementation of IAc1 and IAc5.

Schedule

Short term

Task 1: to becompleted by mid 2015
Task 2: to becompleted by the end of 2015
Tasks 3 and 4: to becompleted the end of 2016
Tasks 5 and 6: to becompleted by mid 2017
Tasks 7, 8 and 9: to becompleted by the end of 2018
Task 10: to be carried out from the end of 2018 on

Responsible entities/Other Participating Bodies

Ministry of Energy and Energy Affairs, ESCOs.

Measure

Characterization, diagnosis and BAT implementation

Code

IKn2

Program

Knowledge

Action line

New technologies

Objective

Improve the knowledge on the features of the industry of Trinidad and Tobago and evaluate the possibilities for implementation of BAT

Tasks and progress (upon completion of tasks)	**%**
1. Definition of program of activities for the development the sectoral characterization of the industry of Trinidad and Tobago and the creation of sectoral BAT guides, including the target sectors, the schedule and the type of scheme to implement. This task will also include an analysis of possible financing sources for the program from national and international sources (more on this in section 6).	5%
2. Development of industrial characterization and sectoral BAT guides. The objective of the characterization is to detect which technologies are currently being used in Trinidad and Tobago. Based on that information, the most suitable BAT according to the features of the national industry will be detailed in the guides.	20%
3. Development of sectoral capacity building program for local engineering companies, on how to characterize different industrial companies and detect the BAT which could be implemented on them.	25%
4. Definition of scheme of incentives for companies' characterization and BAT implementation program. To promote the participation of companies, for those companies which take part in the programme and can prove the implementation of any BAT in their production sites in Trinidad, a reduction in the taxes paid to the government will be guaranteed, the reduction will be based on the impact of the BAT implemented in terms of GHG reductions.	40%
5. Pilot companies willing to take part in the BAT scheme will be selected from sectors with a high contribution to the GHG emissions. In these companies, a characterization of the technologies used will be performed by local engineering companies to define the options for implementation of BAT. The characterization will include the definition of the technological baseline and the feasibility of implementation of BAT, both from the economic and technical perspective. The results of the characterization will be used to select the BAT(s) to implement. During the application of the pilot scheme, companies will be provided close guidance by the Ministry of Energy and Energy Affairs.	50%
6. Implementation of BAT in pilot companies and analysis of results to determine the GHG emissions reduction achieved and assess the improvements need for the implementation of the scheme at the national level. Application of tax reduction for companies taking part in pilot cases.	60%
7. Development of voluntary scheme for all companies in Trinidad and Tobago. Any company willing to take part will be able to join the scheme. Technical guidance will be provided by the Ministry of Energy and Energy Affairs. The results of the implementation of BAT by the companies will be validated, analysing the results obtained in terms of GHG emissions and calculating the tax deductions for the companies. This task will include a yearly analysis of the scheme, analysing the number of BAT implemented, its impact in GHG emissions reductions, the economic cost of the scheme and determining the actions for its improvement.	100%

Schedule

Short term
Task 1: to becompleted by mid 2015
Task 2: to becompleted by mid 2016
Task 3: to becompleted by the end of 2016
Task 4: to becompleted by the end of 2016
Tasks 5 and 6: to becompleted by the end of 2017
Task 7: to be carried out from the end of 2017 on

Responsible entities/Other Participating Bodies

Ministry of Energy and Energy Affairs, EMA, industrial firms.

Measure

CCS Studies

Code

IKn3

Program

Knowledge

Action line

New technologies

Objective

Analyze the potential of Trinidad and Tobago for the implementation of CCS technologies to capture CO_2 emissions

Tasks and progress (upon completion of tasks)	**%**
1. Definition of program of activities for the development of CCS studies, including CCS map for Trinidad and Tobago with possible locations for CCS sites in which the features of every site will be analysed. The report will also include an assessment of the estimated costs for the sites and an assessment on the viability of the technology in the country. This task will also comprise the analysing possible financing sources for the program from national and international sources (more on this in section 6).	30%
2. Development of CCS report and analysis of the results from the analysis. If the results of the report are favourable, a roadmap for the implementation of CCS technologies in Trinidad and Tobago could be developed. The CCS report will include an assessment of the viability to generate carbon credits for the international carbon markets from the CCS projects developed in Trinidad. Due to the high costs involved in the implementation of CCS technologies, their viability will largely depend on the development of the carbon markets and, therefore, the assessment of the costs and benefits of the implementation of the technology needs to consider them as well.	100%

Schedule

Long term
Task 1: to be completed by the end of 2020
Task 2: to be completed by the end of 2022

Responsible entities/Other Participating Bodies

Ministry of Energy and Energy Affairs, EMA, Ministry of the Environment and Water Resources.

Measure

EOR studies

Code

IKn4

Program

Knowledge

Action line

New technologies

Objective

Assess the viability of the use of EOR technology for the capture of CO_2 emissions

Tasks and progress (upon completion of tasks)	**%**
1. Definition of program of activities for the development of EOR studies, including EOR map for Trinidad and Tobago with possible locations for EOR sites in which the features of every site will be analysed, including both the suitability of the sites in oil extraction and geological terms and considering as well the existence of a piping system. The report will also include an assessment of the estimated costs for the sites and an assessment on the viability of the technology in the country. This task will also comprise the analysing possible financing sources for the program from national and international sources (more on this in section 6).	30%
2. Development of EOR report and analysis of the results from the analysis. If the results of the report are favourable, a roadmap for the implementation of EOR technologies in Trinidad and Tobago could be developed. The EOR report will include an assessment of the viability to generate carbon credits for the international carbon markets from the EOR projects developed in Trinidad. Due to the high costs involved in the implementation of EOR technologies, their viability will largely depend on the development of the carbon markets and, therefore, the assessment of the costs and benefits of the implementation of the technology needs to consider them as well.	100%

Schedule

Long term
Task 1: to be completed by the end of 2020
Task 2: to be completed by the end of 2022

Responsible entities/Other Participating Bodies

Ministry of Energy and Energy Affairs, EMA, Ministry of the Environment and Water Resources.

Measure

Biofuel studies

Code

TKn1

Program

Knowledge

Action line

Renewable energy

Objective

Assess the viability of using biofuels in the transport system of Trinidad and Tobago

Tasks and progress (upon completion of tasks)	**%**
1. Definition of program of activities for the development of biofuel studies, including both the feasibility of producing biofuels in Trinidad and Tobago: land availability, crop type, impact on agricultural sector, economic feasibility; and the viability and benefits of its use as fuel: technical viability of its use in the engines of vehicles, type of biofuel that should be produced or percentage of biofuel to be used substituting fossil fuels. This task will also comprise the analysing possible financing sources for the program from national and international sources (more on this in section 6).	30%
2. Development of biofuel studies programme. If the results obtained are positive, a pilot implementation action could be developed. The development of the action would depend on the results obtained from the biofuel studies. If the growing of crops for biofuel uses in Trinidad and Tobago is evaluated positively, the action could include the plantation of crops for the production of biofuels, their production and use. Otherwise, it could be limited to the use of imported biofuels.	100%

Schedule

Long term
Task 1: to be completed by the end of 2020
Task 2: to be completed by the end of 2022

Responsible entities/Other Participating Bodies

Ministry of Energy and Energy Affairs, Ministry of Food Production, Ministry of the Environment and Water Resources.

Measure

Electrical energy generation technology

Code

EAc1

Program

Action

Action line

New technologies

Objective

Convert thermal power plants into CCGT plants

Tasks and progress (upon completion of tasks)	**%**
1. Definition of Programme of Activities for the feasibility analysis, which will include the characterization of technologies being used for electricity production and the economic analysis of the upgrade to CCGT technology, as well as a research on financing sources for the project (see section 6 for more information on financing sources).	10%
2. Development of programme of activities and analysis of the results of the feasibility study.	25%
3. Selection of plants to be upgraded to CCGT and calculation of budget.	35%
4. Installation of CCGT turbines.	80%
5. Trial period and procurement of permit for grid connection.	90%
6. Connection of turbines to national electric grid and compilation of information on energy consumption, electricity production, efficiency, working hours and economic costs.	100%

Schedule

Medium term
Tasks 1-3: to be completed by the end of 2017
Task 4: to becompleted by mid 2019
Tasks 5-6: to be completed by mid 2020

Responsible entities/Other Participating Bodies

T&TEC, PowerGen ,RIC, EMA, Ministry of Energy and Energy Affairs

Measure

Efficiency improvements in generation

Code

EAc2

Program

Action

Action line

New technologies

Objective

Improve system configuration of currently functioning power plants to ensure they work at design efficiency

Tasks and progress (upon completion of tasks)	**%**
1. Definition of Program of Activities to undertake energy audits and implement energy efficiency actions in the electricity generation sector in Trinidad and Tobago. This task will include the definition of the objectives, the expected results and the budget of the action. Additionally, in this task, national and international funding sources will be analysed as well (see section 6 for information on funding sources).	5%
2. Development of energy system characterization studies, in order to map the energy consumption in the electrical energy generation sector of Trinidad and Tobago. The results presented will include as well a first approach of the types of energy efficiency actions that could be implemented based on the energy mapping carried out. This task will also include the definition of the best scheme for implementation of energy audits and energy efficiency measures and the analysis of the need to create/modify legislation.	20%
3. Definition of scheme for the implementation and funding of energy audits and energy efficiency measures. The development of audits could be established as a legal requirement for electricity generation companies. An ESCO scheme could be defined, in which the ESCOs would be in charge of auditing and, if desired by the organizations, implementing energy efficiency measures. This could be done by creating a common platform for organizations to be in contact with ESCOs. With the implementation of energy efficiency actions, the energy consumption of the energy generation companies would be reduced and the ESCOs would recoup their investments.	30%
4. Creation or modification of legislation, if applicable.	35%
5. Development of capacity building sessions for ESCOs on the results of the energy characterization, the development of energy audits in the electrical generation sector and the implementation of energy efficiency measures.	40%
6. Organization of awareness raising campaigns for the target sector, focusing on explaining the new legal requirements, the ESCO scheme created and the benefits of the development of energy audits and implementation of energy efficiency measures.	45%
7. Selection of pilot plants for the development of energy audits and implementation of energy efficiency actions. The selection will be based on the results of the characterization, prioritizing sites with the highest energy consumption rates.	50%
8. Development of pilot energy audits and analysis of achieved results.	55%
9. Selection of energy efficiency actions to implement in the electrical energy generation sites according to the results of the energy audits.	60%
10. Implementation of pilot energy efficiency measures and analysis of results of implementation.	70%
11. Based on the results of the development of the energy audits and the implementation of energy efficiency measures, if necessary, corrective actions will be applied.	75%
	100%

12. Beginning of period of application of legislation with compulsory energy audits. This task will include a yearly analysis of achieved results, revision of energy audits and quantification of energy consumption reductions achieved and economic costs of implementation of the scheme.

Schedule

Medium term
Task 1: to be completed by mid 2016
Task 2: to be completed by mid 2017
Task 3: to be completed by the end of 2017
Task 4: to be completed by mid 2018
Task 5 and 6: to be completed by mid 2019
Tasks 7, 8, 9 and 10: to becompleted by the end of 2020
Task 11: to becompleted by mid 2021
Task 12: to be carried out from mid 2021 on

Responsible entities/Other Participating Bodies

T&TEC, PowerGen, Trinity Power, Ministry of Energy and Energy Affairs

Measure

Waste to energy

Code

EAc3

Program

Action

Action line

New technologies

Objective

Build a waste-to energy plant in Trinidad and Tobago, which will provide a solution for waste management and produce electricity

Tasks and progress (upon completion of tasks)	**%**
1. Definition of program of activities to select the best available technology for waste-to-energy implementation in Trinidad and Tobago, including: development of research on waste sources, quantities and composition of waste in Trinidad and Tobago. In this task, funding sources will also be analysed. See section 6 for more information on financing sources.	10%
2. Development of program.	20%
3. Analysis of results obtained and selection of best technology for the waste-to-energy site.	35%
4. Elaboration of waste-to-energy project, selecting design features for site, budget and timeline for the construction.	45%
5. Construction of the plant, initial tests and securing of legal permits.	95%
6. Beginning of normal functioning period, during this time, data on the activities carried out in the plant will be compiled, including amounts of waste incinerated, GHG emissions, energy consumption, polluting emissions, generated waste, polluting discharges and costs of functioning.	100%

Schedule

Medium term
Task 1: to be completed by mid 2016
Tasks 2 and 3: to be completed the end of 2017
Task 4: to be completed by the end of 2018
Task 5: to be completed by the end of 2020
Task 6: to be carried out from the end of 2020 on

Responsible entities/Other Participating Bodies

Ministry of the Environment and Water Resources, Local Government Authorities, EMA, Ministry of Local Government, Tobago House of Assembly

Measure

Energy conservation and efficiency measures

Code

EAc4

Program

Action

Action line

Energy conservation

Objective

Develop energy conservation and efficiency measures in residential, commercial and institutional sectors in Trinidad and Tobago

Tasks and progress (upon completion of tasks)	**%**
*This action would continue the work carried out in action EKn2.	
1. Definition of program of activities for the implementation of energy efficiency measures, including, particularly, the promotion of CFL and LED bulbs. This action will be based on the results obtained in action EKn2, in which energy audits will be carried out in residential, commercial and institutional sectors of Trinidad and Tobago. It will include the definition of the actions to implement, including the use of CFL and LED lighting and other additional energy efficiency measures to be defined. Furthermore,the development of awareness raising campaigns for the general population on the characteristics and benefits of CFL and LED bulbs and promotion of other energy efficiency actions will also be a part of this task. Additionally, it will define the capacity building workshops for companies of the construction sector on CFL and LED lighting and other energy efficiency actions. It will be completed with the analysis of the need to modify legislation in order to ban incandescent bulbs and promote other types of energy efficiency measures. Furthermore, in this task, funding from national and international sources will be identified (see section 6 for more information on funding options).	10%
2. Development of the analysis to define the best scheme to enhance the implementation of CFL and LED bulbs and other energy efficiency measures. As proposed in EKn2, an ESCO scheme could be a way to develop this action.	30%
3. Establishment of ESCO scheme platform, in which ESCOs and clients will interact.	45%
4. Development of awareness raising campaigns (see EAw2) for the general population and the commercial and institutional sectors on the existing ESCO scheme and the advantages of implementing energy efficiency measures.	55%
5. Creation/modification of legislation for outphasing of incandescent bulbs, prohibiting their commercialization.	75%
6. Removal of custom duties to CFL and LED bulbs and any other energy efficiency technologies detected, if applicable.	95%
7. Yearly, the results of the ESCO scheme in terms of energy savings achieved, number of activities performed, GHG emissions reduced and economic costs and benefits will be analysed.	100%

Schedule

Medium term
Task 1: to be completed by mid 2018
Task 2: to be completed by the end of 2020
Task 3: to be completed by mid 2021
Task 4: to be completed by the end of 2021

Task 5: to be completed by the end of 2022
Task 6: to be completed by mid 20023
Task 7: to be carried out from mid 2023 on

Responsible entities/Other Participating Bodies

Ministry of Energy and Energy Affairs, ESCOs

Measure

Smart Grids

Code

EAc5

Program

Awareness raising

Action line

Energy conservation

Objective

Reduce the electricity losses and enhance the stability of the electricity grid of Trinidad and Tobago converting it into a Smart Grid system

Tasks and progress (upon completion of tasks)	**%**
1. Development of program of activities to assess the viability of implementing Smart Grids in Trinidad and Tobago. The objective will be to analyse the electricity grid of Trinidad and Tobago in order to characterize it and detect possible Smart Grid developments within it. In this task, national and international financing sources will be reviewed as well (see section 6 for more information on this).	10%
2. Development of program of activities. The results expected from it are a characterization of the electricity grid of the country and a selection of actions which could be implemented in order t convert it into a Smart Grid. The analysis will include the areas for the implementation of the actions as well as the quantification of the economic costs and benefits of their implementation and other co-benefits they may have.	35%
3. Development of plan for implementation of Smart Grids at the national level, based on the outcomes from the analysis carried out in the previous task.	55%
4. Creation of a public-private partnership for the development of the Smart Grids. Since the process for the development of Smart Grids may affect electricity generators, distributors and final users, all the agents need to be involved in the development of the initiative.	70%
5. Selection of grid areas for implementation of pilot Smart Grids based on features of the grid, particularly, focusing on those areas with high population and electricity demand, where breakdowns would affect to a large number of users.	
6. Development of pilot Smart Grids projects and data compilation from pilot projects. If necessary, corrective actions will be applied.	90%
7. Development of Smart Grid at the national level. In this task, a periodical review of the implementation of the action will be carried out as well, in order to evaluate the results achieved and carry out corrective actions if necessary.	100%

Schedule

Long term
Task 1: to be completed by the end of 2020
Task 2: to be completed by the end of 2021
Task 3: to be completed by mid 2023
Task 4: to be completed by the end of 2023
Task 5: to be completed by mid 2024
Task 6: to be completed by the end of 2026
Task 7: to be carried out from the end of 2026 on

Responsible entities/Other Participating Bodies *T&TEC,* RIC

Measure

Improved use of energy and heat in industrial processes

Code

IAc1

Program

Action

Action line

New technologies

Objective

Promote the development of energy efficiency actions and the reduction of the produced waste heat in the industrial sector of Trinidad and Tobago (except oil and gas sectors, see action IAc5 for these sectors)

Tasks and progress (upon completion of tasks)	**%**
* This action would continue the activities carried out in IKn1.	
1. Definition of program of activities for the implementation of energy efficiency measures. The actions should pay particular attention to the use of heat in companies, trying to minimize heat waste. This action will be based on the results obtained in action IKn1, in which energy audits will be carried out in the industrial sector of Trinidad and Tobago. Furthermore, the development of awareness raising campaigns for the promotion of energy efficiency actions and best practices to minimize heat waste of companies will also be a part of this task. Additionally, in this task, funding from national and international sources will be identified (see section 6 for more information on funding options).	10%
2. Definition and development best scheme to enhance the implementation of energy efficiency measures. As proposed in IKn1, aVoluntary Scheme could be a way to develop this action. The companies joining the scheme which could demonstrate the application of energy efficiency measures and their successful results would obtain a deduction in their yearly tax payments. The deduction could be calculated based on the energy efficiency improvements achieved.	55%
3. Development of awareness raising campaigns for industries on the existing Voluntary Scheme and the advantages of implementing energy efficiency measures.	75%
4. Yearly, the results of the Voluntary Scheme in terms of energy savings achieved, number of activities performed, GHG emissions reduced and economic costs and benefits will be analysed.	100%

Schedule

Long term
Tasks 1: to be completed by mid 2019
Task 2: to be completed by the end of 2020
Task 3: to be completed by mid 2021
Task 4: to be carried out from the end of 2021 on

Responsible entities/Other Participating Bodies

Ministry of Energy and Energy Affairs

Measure

Complementary renewable energy sources

Code

IAc2

Program

Action

Action line

Renewable energy

Objective

Install renewable energy technologies in industrial sites of Trinidad and Tobago to provide supply for low energy consuming processes

Tasks and progress (upon completion of tasks)	**%**
1. Definition of program of activities in order to analyse different renewable energy sources which could provide complementary energy to industrial companies for low energy requiring processes. The program of activities will also define the best scheme for the implementation of the action and an analysis of possible financing sources for the program from national and international sources (more on financing sources in section 6).	10%
2. Development of the analysis, the results will include the best types of technologies to implement, the power which could be installed and the costs and benefits of the implementation. Additionally, the best scheme to promote the implementation of complementary renewable energy sources will also be defined. In this case, a voluntary scheme in which a feed-in-tariff is offered to companies implementing renewable energy sources would be a suitable option.	25%
3. Analysis of results, selection of technologies to be promoted and definition of scheme to be used to promote the renewable energy sources in companies.	35%
4. Establishment of the scheme and selection of companies to take part in pilot implementation actions.	50%
5. Development of pilot implementation actions, including analysis of results, both in energy terms (energy savings, GHG emissions avoided...) and in functioning terms, considering the design of the scheme, its accessibility and the feedback provided by the pilot companies regarding its usability.	65%
6. If necessary, corrective actions in the scheme derived from the analysis of the results of the pilot actions.	70%
7. Development of awareness raising campaign to promote complementary renewable sources campaign among the industries of Trinidad and Tobago.	75%
8. Beginning of voluntary scheme for all industries. It will include a yearly evaluation of the results of the scheme, modifying it according to latest renewable energy trends, the needs of the industry of Trinidad and Tobago and the conclusions of the analysis of the implementation results. Audits will be carried in companies participating to assure that the tax deductions given are duly justified and that renewable energy sources comply with the requirements of the scheme.	100%

Schedule

Long term
Task1: to be completed by the end of 2023
Task 2: to be completed by mid 2025
Tasks 3 and 4: to be completed by the end of 2026
Tasks 5 and 6: to be completed by the end of 2027
Task 7: to be completed by mid 2028

Task 8: to be carried out from mid 2028 on

Responsible entities/Other Participating Bodies

Ministry of Energy and Energy Affairs

Measure

Thermal desalination

Code

IAc3

Program

Action

Action line

New technologies

Objective

Improve the energy efficiency in Trinidad and Tobago creating a desalination plant which would use waste heat from industrial sites to produce desalinated water for industrial purposes

Tasks and progress (upon completion of tasks)	**%**
* This action would continue the activities carried out in IKn1 and IAc1.	
1. Definition of program of activities to analyse the availability of waste heat in the industries of Trinidad and Tobago and assess the viability of using that waste heat as a source of energy for water desalination. This analysis will include the quantification of the waste heat available and its conditions, the economic feasibility of the plant and the environmental impact of its implementation. In this task, national and international funding sources available will be determined as well (see section 6 for more information on funding sources).	10%
2. Development of program of activities, as a result, the viability of this technology will be determined. If it is not viable due to technical, economic or environmental limitations, the following tasks will not be developed.	40%
3. Development of project for the construction of the thermal desalination plant, it will include both the cost of building the plant and developing the piping network to deliver waste heat from industries to it. In this task, the budget of the project will be calculated and the environmental impact of the construction of the plant and its functioning will be assessed.	50%
4. Application for building and functioning permits.	60%
5. Building the plant and developing the pipe network.	90%
6. Connection of piping system to industrial companies and commissioning of plant. This task will also include the compilation of information on the functioning of the plant regarding the quantity of heat recycled, the economics of it and its environmental impact.	100%

Schedule

Long term
Task 1: to be completed by the end of 2026
Task 2: to be completed by the end of 2028
Task 3: to be completed by mid 2030
Task 4: to be completed by the end of 2030
Task 5: to be completed by the end of 2033
Task 6: to be carried out from the end of 2033 on

Responsible entities/Other Participating Bodies

Ministry of Energy and Energy Affairs, Ministry of the Environment and Water Resources

Measure

Reducing venting and flaring

Code

IAc4

Program

Action

Action line

New technologies

Objective

Diminish the consumption of fuels in the oil and natural gas sectors reducing venting and flaring emissions in the oil and natural gas sectors of Trinidad and Tobago

Tasks and progress (upon completion of tasks)	**%**
1. Definition of program of activities to assess the current venting and flaring practices in the oil and gas sector of Trinidad and Tobago. The analysis will include the quantification of the amounts of gas vented and flared, the GHG emissions derived from these activities, the determination of the reduced venting and flaring levels that could be achieved and the definition of the best scheme for the reduction of venting and flaring activities. In this task, national and international funding sources will be analysed as well.	10%
2. Development of program of activities. The main results from it will be the targets for venting and flaring reduction and the best scheme to achieve these targets. Furthermore, it will also provide measures to reduce venting and flaring. In this case, environmental taxes could be used combined with budgeting of venting and flaring activities among companies. That is, based on the detected venting and flaring volumes, a reduction target will be set and every company will receive an allocated volume to vent and flare. Any company not meeting the target set will have to pay a tax to compensate it.	35%
3. Creation/modification of legislation to define the venting and flaring targets and environmental taxes.	70%
4. Development of capacity building sessions for oil and natural gas companies to provide information on practices and technologies to reduce venting and flaring practices without putting security at risk.	80%
5. Beginning of implementation of environmental taxes. The results will be analysed yearly to determine if the objectives achieved are coherent with the targets set and there is balance between the taxes paid the companies and the reductions achieved. If necessary, corrective actions will be applied to reduce/increment taxes or redefine the venting and flaring budgets.	100%

Schedule

Medium term
Task 1: to be completed by the end of 2018
Task 2: to be completed by the end of 2019
Task 3: to be completed by mid 2021
Task 4: to be completed by the end of 2022
Task 5: to be completed from the end of 2022 on

Responsible entities/Other Participating Bodies

Ministry of Energy and Energy Affairs, Ministry of the Environment and Water Resources

Measure

Efficient technologies in the oil and natural gas sector

Code

IAc5

Program

Action

Action line

New technologies

Objective

Implement more efficient technologies in the oil and natural gas sector in order to reduce fuel consumption in the productive process

Tasks and progress (upon completion of tasks)	**%**
This action would continue the activities carried out in IKn1.	
1. Definition of program of activities for the implementation of energy efficiency measures in the oil and natural gas sectors. This action will be based on the results obtained in action IKn1, in which energy audits will be carried out in the industrial sector of Trinidad and Tobago. Furthermore, the development of awareness raising campaigns for the promotion of energy efficiency actions will also be a part of this task. Additionally, in this task, funding from national and international sources will be identified (see section 6 for more information on funding options).	10%
2. Development of the analysis to define the best scheme to enhance the implementation of energy efficiency measures. As proposed in IKn1, a Voluntary Scheme could be a way to develop this action. The companies taking part in the scheme which could demonstrate the development and results of the implementation of energy efficiency actions would be granted a tax deduction. The value of the deduction would be based on the energy savings demonstrated.	55%
3. Development of awareness raising campaigns for oil and natural gas industries on the existing Voluntary Scheme and the advantages of implementing energy efficiency measures.	75%
4. Yearly, the results of the Voluntary Scheme in terms of energy savings achieved, number of activities performed, GHG emissions reduced and economic costs and benefits will be analysed.	100%

Schedule

Medium term
Tasks 1: to be completed by mid 2019
Task 2: to be completed by the end of 2020
Task 3: to be completed by mid 2021
Task 4: to be carried out from the end of 2021 on

Responsible entities/Other Participating Bodies

Ministry of Energy and Energy Affairs

Measure

Ridesharing

Code

TAc1

Program

Action

Action line

Energy conservation

Objective

Reduction of the use of private cars developing a plan for the promotion of ridesharing practices among the population of Trinidad and Tobago

Tasks and progress (upon completion of tasks)	**%**
1. Development of program of activities for the assessment of transport modes in Trinidad and Tobago and the definition of a platform to promote ridesharing. It will analyse the current transport trends in Trinidad, including types of means of transport used, distance travelled and main travelling routes. Furthermore it will also assess the motivations/fears of ridesharing and analyse the economic impact of the current scheme and the proposed modal changes. In this stage, an analysis of national and international funding sources will be carried out as well (more information on this in section 6).	10%
2. Development of program of activities, the results will include a characterization of the transport modes and routes in the country, the existing views on ridesharing and the quantification of the results that could be achieved with the implementation of this system. Additionally, it will focus particularly on the design and functioning features of the ridesharing platform in a way that guarantees safety and transparency.	25%
3. Development of ridesharing web platform. It will be the tool in which car owners, who would be the drivers and passengers get in touch, allowing car sharing at a proposed prize and defining travelling routes. Furthermore, the platform will include feedback from the users, both drivers and passengers, about the journeys shared, providing marks based on safety, comfort and so on.	40%
4. Development of awareness raising campaigns on the car sharing platform, providing information about how does it work and the benefits, both environmental and economic, of ridesharing.	50%
5. Pilot implementation of ridesharing platform. Early adopters, both drivers and passengers will be selected and offered to participate. A close monitoring of the first experiences will be carried out. In order to reward their participation, small prices such as free meals, cinema tickets and similar rewards will be given.	60%
6. Analysis of the result of the pilot implementation of the platform. One of the most important actions to analyse will be the willingness of passengers to use it based on perceived security. Additionally, other factors such as economic savings, GHG emissions avoided or effects on traffic will also be assessed.	70%
7. Application of corrective actions based on the results of the pilot implementation, if necessary.	80%
8. Beginning of normal functioning of the platform. A continuous evaluation of its functioning will be carried out, implementing improvements in the platform continuously and assessing its development.	100%

Schedule

Medium term
Task 1: to be completed by the end of 2018
Task 2: to be completed by the end of 2020
Task 3: to be completed by the end of 2021

Task 4: to be completed by mid 2022
Tasks 5, 6 and 7: to be completed by mid 2023
Task 8: to be carried out from mid 2023 on

Responsible entities/Other Participating Bodies

Ministry of Transport, Ministry of Planning and Sustainable Development

Measure

Vehicle energy efficiency and fuel switching

Code

TAc2

Program

Action

Action line

New technologies

Objective

Reduction of the consumption of fossil fuels in the transport sector converting the PTSC and maxi taxi fleet into CNG fuelled engines

Tasks and progress (upon completion of tasks)	**%**
1. Definition of program of activities to assess the viability of promoting the use of CNG instead of gasoline and diesel in the fleet of PTSC and the maxi-taxi fleet. The work will include a characterization of the vehicles being used currently and an analysis of the feasibility of implementing CNG engines in terms of technological and economic feasibility and environmental impact. Not only will the vehicles be assessed, but the need for CNG stations as well. Furthermore, it will also analyse the options to create a funding scheme for this action in order to facilitate the conversion from gasoline and diesel to CNG. This task will also include an analysis of national and international funding sources (more information on this in section 6).	10%
2. Development of programme of activities. The results will include a characterization of the existing fleet, an assessment of the viability of implementing CNG engines considering both the services provided by PTSC and maxi-taxi companies and the CNG stations that would need to be created and the definition of the funding scheme. The funding scheme could be a combination of a voluntary agreement with maxi-taxis and PTSC granting them tax deductions for the implementation of CNG buses, while, at the same time, creating a credit scheme allowing them to have easy access to financing sources for the renovation of the fleet. In the case of CNG stations, legislation could be created to require petrol station companies to include CNG in a minimum percentage of stations to guarantee access to it, particularly for maxi-taxis. This would be done in a progressive manner, installing the first CNG stations in densely populated areas and spreading them as the use of CNG becomes more generalised among maxi-taxis.	35%
3. Analysis of results from the programme of activities and definition of targets and funding scheme. Depending on the objectives defined in terms of implementation of CNG engines, the tax deductions applied will be defined. In this task, any necessary legal modifications will be undertaken as well.	50%
4. Progressive implementation of CNG stations, according to the legal requirements set by the government.	70%
5. Development of awareness raising campaigns, particularly for maxi-taxi owners, on the benefits of CNG and the tax deductions and credits created.	80%
6. Beginning of funding scheme, including the credits for the upgrade to CNG and the provision of tax deductions to the adopters. This task will also include a periodical revision of the scheme, analysing the implementation rates achieved, the costs and benefits, the GHG emissions reduced and the general results of the use of CNG in the public transport sector.	100%

Schedule

Long term

Tasks 1: to be completed by the end of 2019
Task 2: to be completed by mid 2021
Task 3: to be completed by the end of 2022
Task 4: to be carried out from the end of 2022 on
Task 5: to be completed by the end of 2023
Task 6: to be carried out from the end of 2023 on

Responsible entities/Other Participating Bodies

Ministry of Transport

Measure

Parking management

Code

TAc3

Program

Action

Action line

Energy conservation

Objective

Develop a plan to manage parking practices and establish a framework on parking activities in order to discourage the use of private vehicles in cities

Tasks and progress (upon completion of tasks)	**%**
1. Definition of program of activities, in order to determine the best solution in terms of parking management in Trinidad and Tobago. The analysis should include the results of the traffic assessment carried out in TAc3, in order to understand the traffic trends in Trinidad and Tobago. Based on that information, different parking solutions will be developed and prioritized, including their effectiveness, previous international success cases, their costs and benefits and other factors.	10%
2. Development of program of activities. As a result of it, different parking management options will be detected and analysed. One of the most commonly used solutions for parking management is parking pay stations. These systems may have different features but, in general, they share the fact that, in order to park a car in the designed areas, a minute/hourly rate needs to be paid. Furthermore, they can include other features, such as restricted areas for residents or limited parking times in order to enhance parking rotation.	35%
3. Analysis of the results obtained and selection of parking management action(s) to implement.	50%
4. If parking pay stations are the option selected, the designated parking areas will need to be detected and signalled. Additionally, paying machines will need to be installed.	70%
5. Selection of company in charge of managing the parking system. The company will be in charge of providing staff. Their duties will be controlling that the system is used and the parking tariffs are paid. To do so, they will control that every car parked in a signalled area has a parking ticket. Fines will be imposed to drivers without or with not-valid parking tickets.	85%
6. Beginning of functioning of parking management system. Periodically, the results obtained will be analysed, the selected areas will be revised, as well as the tariffs applied.	100%

Schedule

Medium term
Tasks 1: to be completed by the end of 2016
Task 2: to be completed by mid 2018
Task 3: to be completed by the end of 2018
Task 4: to be completed by the end of 2019
Task 5: to be completed by the end of 2020
Task 6: to be carried out from the end of 2020 on

Responsible entities/Other Participating Bodies

Ministry of Transport, Ministry of Planning and Sustainable Development

Measure

Upgrade and replacement of aircrafts

Code

TAc4

Program

Action

Action line

New technologies

Objective

Improve the fuel efficiency of the aircraft fleet of Trinidad and Tobago upgrading it and replacing the aircrafts with newer, more efficient aircrafts

Tasks and progress (upon completion of tasks)	**%**
1. Definition of program of activities in order to characterize the aviation fleet of Trinidad and Tobago. The objective of the characterization is to determine the features of the existing fleet and assess the existing options to improve it. This analysis will determine the technical viability of the upgrade and replacement of aircrafts and assess the economic impact that the upgrade and replacement could have. In this initial task, funding opportunities from national and international sources will be detected as well (see section 6 for more information on funding opportunities).	10%
2. Development of characterization. The results of it will establish the existing scope of improvement of the aviation fleet of Trinidad and Tobago compared to the latest trends in the international aviation. Based on that and on the economic assessment of the costs and benefits of upgrading and replacing the aircrafts, a roadmap establishing targets will be proposed, setting GHG emissions limits for the aircrafts.	35%
3. Analysis of proposed roadmap and validation with air transport companies of Trinidad and Tobago. A definite roadmap in which the economic constraints and the need to reduce GHG emissions will be balanced will be developed.	70%
4. Establishment of definitive roadmap. Periodically, the advances of the upgrade and replacement of aircrafts will be reviewed and the targets set reanalysed according to the socio-economic situation, both nationally and internationally.	100%

Schedule

Medium term
Tasks 1: to be completed by the end of 2017
Task 2: to be completed by the end of 2018
Task 3: to be completed by the end of 2019
Task 4: to be carried out from the end of 2019 on

Responsible entities/Other Participating Bodies

Ministry of Finance and the Economy, Caribbean Airlines

Measure

Alternative fuels in aviation

Code

TAc5

Program

Action

Action line

New technologies

Objective

Reduce the GHG emissions of the air transport in Trinidad and Tobago introducing the use of biofuels.

Tasks and progress (upon completion of tasks)	**%**
*This action is related to TAc4.	
1. Definition of program of activities for the assessment of the viability of using alternative fuels in aviation. The objectives of the program of activities include research on types of alternative fuels that can be used in aviation according to the state-of-the-art, the assessment of the technological implications of using biofuels and the quantification of the costs and benefits as well as of the GHG emissions reductions that could be achieved. In this first task, national and international financing sources will be analysed (more on financing sources in section 6).	10%
2. Development of the programme of activities. The results of the analysis will include a selection of possible alternative fuels to be used in aviation, the technical implications of their use, mainly regarding airplane mechanics and the quantification of the costs of the implementation. Additionally, in this stage, the outcomes from TAc4 will be analysed as well, trying to detect synergies between both actions and considering the plan roadmap developed for the upgrade and replacement of aircrafts when proposing the alternative fuels options and targets.	35%
3. Definition of scheme for the use of alternative fuels in aviation based on the results of the assessment of the viability of their use. To do so, a target for the consumption of alternative fuels will be set. This target will come into effect progressively. As such, it will be a growing target, establishing progressive objectives for the consumption of alternative fuels in aviation.	65%
4. Modification of legislation to include the roadmap for the use of alternative fuels in the air transport sector.	80%
5. Beginning of implementation of the roadmap. Yearly, the targets set will be revised, as well as the objectives achieved and the feedback provided by air companies. Additionally, an assessment of the international state-of-the-art will be performed to decide whether additional improvements can be added to the roadmap or not.	100%

Schedule

Long term
Task 1: to be completed by the end of 2023
Task 2: to be completed by mid 2025
Task 3: to be completed by the end of 2027
Task 4: to be completed by mid 2028
Task 5: to be carried out from mid 2028 on

Responsible entities/Other Participating Bodies

Ministry of Finance and the Economy, Ministry of Energy, Caribbean Air Lines, Civil Aviation.

Measure

Efficiency in water transport

Code

TAc6

Program

Action

Action line

New technologies

Objective

Promote energy efficiency practices in the waterborne transport in Trinidad and Tobago in order to reduce the fuel consumption of the sector

Tasks and progress (upon completion of tasks)	**%**
1. Creation of program of activities to develop an analysis of possible efficiency practices to be implemented in the waterborne transport sector in Trinidad and Tobago. To do so, the waterborne transport will be characterized, additionally, different energy efficiency measures will be analysed in terms of GHG emissions reductions and implementation costs and benefits. In this first task, national and international funding sources will be detected as well (for more information on funding sources, see section 6).	10%
2. Development of report on potential energy efficiency practices. The results will include a set of energy efficiency actions which could be implemented in the waterborne transport sector of Trinidad and Tobago. For every action, an analysis of the GHG emissions reductions that could be achieved, the costs and benefits calculation and a detailed implementation plan will be developed. Additionally, a scheme for the implementation of the actions will be proposed. In this case, a voluntary scheme in which tax deductions will be offered to companies implanting energy efficiency actions could be developed. The tax deductions will be granted to companies that can demonstrate the implementation of energy efficiency actions and the results achieved and their amount will depend on the energy savings achieved.	35%
3. Development of capacity building sessions for waterborne transport companies, informing them on the existence of the voluntary scheme and the benefits they could get from the implementation of energy efficiency actions. Additionally, they will be provided with information on how to implement these actions.	50%
4. Pilot companies will be selected for the implementation of energy efficiency actions. The selection of the actions to implement will be based on their type of activity and vessels. The actions will be implemented, the results achieved analysed and, if deemed necessary, corrective actions will be applied in the designed scheme.	75%
5. Development of voluntary scheme. Any company will be able to take part in it, they will need to justify the energy efficiency actions implemented and the results achieved and, based on that information, tax deductions will be applied. A continuous monitoring of the scheme will be carried out as well, in order to maximize the results achieved and adapt it to the latest reality of energy efficiency in the waterborne navigation sector.	100%

Schedule

Long term
Task 1: to be completed by the end of 2020
Task 2: to be completed by the end of 2021
Task 3: to be completed by mid 2022

Task 4: to be completed by the end of 2023
Task 5: to be carried out from the end of 2023 on

Responsible entities/Other Participating Bodies

Ministry of Transport, Ministry of Energy and Energy Affairs

Measure

Alternative fuels in Marine Navigation

Code

TAc7

Program

Action

Action line

New technologies

Objective

Introduce the use of LNG or biofuels in the waterborne transport sector of Trinidad and Tobago

Tasks and progress (upon completion of tasks)	**%**
1. Definition of program of activities for the assessment of the viability of using alternative fuels in the navigation sector. The objectives of the program of activities include research on types of alternative fuels that can be used in navigation according to the state-of-the-art, the assessment of the technological implications of using alternative fuels such as biofuels or LNG and the quantification of the costs and benefits as well as of the GHG emissions reductions that could be achieved. In this first task, national and international financing sources will be analysed (more on financing sources in section 6).	10%
2. Development of the programme of activities. The results of the analysis will include a selection of possible alternative fuels to be used in navigation, the technical implications of their use, mainly regarding vessel mechanics and the quantification of the costs of the implementation.	35%
3. Definition of scheme for the use of alternative fuels in navigation based on the results of the assessment of the viability of their use. To do so, a target for the consumption of alternative fuels will be set. This target will come into effect progressively. As such, it will be a growing target, establishing progressive objectives for the consumption of alternative fuels in the waterborne transport sector.	65%
4. Modification of legislation to include the roadmap for the use of alternative fuels in the navigation sector.	80%
5. Beginning of implementation of the roadmap. Yearly, the targets set will be revised, as well as the objectives achieved and the feedback provided by vessel companies. Additionally, an assessment of the international state-of-the-art will be performed to decide whether additional improvements can be added to the roadmap or not.	100%

Schedule

Long term
Task 1: to be completed by the end of 2022
Task 2: to be completed by the end of 2023
Task 3: to be completed by mid 2025
Task 4: to be completed by mid 2026
Task 5: to be carried out from mid 2026 on

Responsible entities/Other Participating Bodies

Ministry of Transport, Ministry of Energy and Energy Affairs

Measure

Promotion of energy conservation

Code

EAw1

Program

Awareness raising

Action line

Energy conservation

Objective

Promote energy conservation actions in housing, commercial and institutional sectors of Trinidad and Tobago

Tasks and progress (upon completion of tasks)	**%**
1. Definition of program of activities, including the target sectors, the types of energy conservation options to promote and the type of awareness raising actions to develop. In this task, the cost of the development of the awareness raising actions will be assessed as well. Furthermore, possible funding sources for the program from national and international sources will be detected (see section 6 for more information on this).	30%
2. Execution of multi-annual awareness raising program, which can include workshops, leaflets, TV and radio ads, public participation meetings, awareness raising campaigns at schools, etc. Additionally, energy efficiency and climate action offices could be created in some municipalities to have reference places for the population to facilitate their access to information. In these offices, working groups could be created with families, stores and other types of entities to help them implement energy efficiency actions (EAc4), understand the ESCO scheme and provide general support on issues related with energy efficiency and climate change.	85%
3. Conduction of surveys for the analysis of achieved results.	100%

* This action is linked to EAc4

Schedule

Short term
Task 1: to be completed by the end of 2015
Task 2: to be carried out from the end of 2015 on
Task 3: to be carried out from the end of 2015 on

Responsible entities/Other Participating Bodies

Ministry of Energy and Energy Affairs

Measure

Promotion of energy conservation and lower waste generation

Code

IAw1

Program

Awareness raising

Action line

Energy conservation

Objective

Promotion of best practices to reduce the consumption of resources and waste generation in the industrial sector of Trinidad and Tobago

Tasks and progress (upon completion of tasks)	**%**
1. Definition of program of activities, including the target sectors, the types of energy conservation and lower waste generation options to promote and the type of awareness raising actions to develop. In this task, the cost of the development of the awareness raising actions will be assessed as well. Furthermore, possible funding sources for the program from national and international sources will be detected (see section 6 for more information on this).	30%
2. Execution of multi-annual awareness raising program, which can include workshops, leaflets, etc. Additionally, an energy efficiency and climate action office for industries could be created, with the objective of providing a reference site for the industry of Trinidad and Tobago on energy efficiency and climate change related topics. In these offices, working groups could be created with companies of similar sectors to help them implement energy efficiency actions (IAc1 and IAc5), understand the ESCO scheme and provide general support on issues related with energy efficiency and climate change in the industrial sector.	85%
3. Conduction of surveys for the analysis of achieved results.	100%
* This action is linked to IAc1 and IAc5.	

Schedule

Medium term
Task 1: to be completed by the end of 2019
Task 2: to be carried out from the end of 2019 on
Task 3: to be carried out from the end of 2019 on

Responsible entities/Other Participating Bodies

Ministry of Energy and Energy Affairs, Ministry of the Environment and Water Resources, EMA

Measure

ICT technologies

Code

TAw1

Program

Awareness raising

Objective

Promote of ICT technologies to avoid the need to travel

Tasks and progress (upon completion of tasks)	**%**
1. Definition of program of activities, including the target sectors, the actions to promote and the type of awareness raising actions to develop. In this task, the cost of the development of the awareness raising actions will be assessed as well. Furthermore, possible funding sources for the program from national and international sources will be detected (see section 6 for more information on this).	30%
2. Execution of multi-annual awareness raising program, which can include workshops, leaflets, TV and radio ads, public participation meetings, awareness raising campaigns at schools, etc. The offices proposed in EAw1 could also be the reference site to provide information on this topic. In order to enhance the implementation of this action among private companies, a Voluntary Scheme could be created. Companies would need to demonstrate that they work to reduce their journeys through the application of these technologies and, in exchange for it, they could receive tax deductions which would be calculated based on the GHG emissions reductions achieved with the implementation of ICT technologies. Furthermore, for those companies which choose to promote this action in their working scheme	85%
3. Conduction of surveys for the analysis of achieved results.	100%

Schedule

Medium term
Task 1: to be completed by the end of 2017
Task 2: to be carried out from the end of 2017 on
Task 3: to be carried out from the end of 2017 on

Responsible entities/Other Participating Bodies

Ministry of Energy and Energy Affairs

Measure

Low emissions driving practices and standards

Code

TAw2

Program

Awareness raising

Action line

Energy conservation

Objective

Disseminate low emissions driving practices and standards to reduce GHG emissions of the road transport.

Tasks and progress (upon completion of tasks)	**%**
1. Definition of program of activities, including the target sectors, the practices and standards to promote and the type of awareness raising actions to develop. In this task, the cost of the development of the awareness raising actions will be assessed as well. Furthermore, possible funding sources for the program from national and international sources will be detected (see section 6 for more information on this).	25%
2. Execution of multi-annual awareness raising program, which can include workshops, leaflets, TV and radio ads, public participation meetings, awareness raising campaigns at schools, etc. The offices proposed in EAw1 could also be the reference site to provide information on this topic.	60%
3. Furthermore, in order to ensure that any person applying for a Driver's Licence in Trinidad and Tobago is knowledgeable of these practices and standards, they could be included in the Light Motor Vehicle Driver's Examination Study Guide and Highway Code and be evaluated in the driving test.	85%
4. Conduction of surveys for the analysis of achieved results.	100%

Schedule

Short term
Task 1: to be completed by the end of 2015
Task 2: to be carried out from the end of 2015 on
Task 3: to be carried by the end of 2016
Task 4: to be carried out from the end of 2016 on

Responsible entities/Other Participating Bodies

Ministry of Transport

Measure

Awareness raising campaigns to reduce the use of private vehicles

Code

TAw3

Program

Awareness raising

Action line

Energy conservation

Objective

Development of awareness raising campaigns to reduce the use of private vehicles and promote other transportation modes

Tasks and progress (upon completion of tasks)	**%**
1. Definition of program of activities, including the target sectors, the sustainable practices to promote and the type of awareness raising actions to develop. In this task, the cost of the development of the awareness raising actions will be assessed as well. Furthermore, possible funding sources for the program from national and international sources will be detected (see section 6 for more information on this).	30%
2. Execution of multi-annual awareness raising program, which can include workshops, leaflets, TV and radio ads, public participation meetings, awareness raising campaigns at schools, etc. The offices proposed in EAw1 could also be the reference site to provide information on this topic.	85%
3. Conduction of surveys for the analysis of achieved results.	100%

Schedule

Short term
Task 1: to be completed by the end of 2017
Task 2: to be carried out from the end of 2017 on
Task 3: to be carried out from the end of 2017 on

Responsible entities/Other Participating Bodies

Ministry of Transport

Measure

Air Traffic management systems

Code

TAw4

Program

Awareness raising

Action line

Energy conservation

Objective

Implementation of air traffic management system to reduce fuel consumption in air transport operations.

Tasks and progress (upon completion of tasks)	**%**
1. Development of program of activities to analyse the viability of the implementation of air traffic management systems in Trinidad and Tobago. The objective is to determine if an air traffic management system could help reduce fuel consumption in air transport activities through the implementation of actions to improve the efficiency of the operations. In this first task, national and international financing sources which could be available for the implementation of the action will be analysed as well.	20%
2. Execution of the program of activities. The results provided will include an analysis of different air traffic management systems based on the features of Trinidad and Tobago. Additionally, they will include a roadmap for the implementation of the air traffic management system and the quantification of the costs and expected benefits of its implementation.	55%
3. Implementation of air traffic management system, installing necessary technology.	90%
4. During the functioning of the air traffic management system, data will be monitored continuously to assess the results of the system, the fuel savings and the GHG emissions avoided.	100%

Schedule

Medium term
Task 1: to be completed by the end of 2020
Task 2: to be completed by the end of 2021
Task 3: to be completed by the end of 2023
Task 4: to be carried out from the end of 2023 on

Responsible entities/Other Participating Bodies

Ministry of Transport

Measure

Best practices to reduce fuel consumption in waterborne navigation

Code

TAw5

Program

Awareness raising

Action line

Energy conservation

Objective

Dissemination of best practices to reduce fuel consumption and GHG emissions in waterborne navigation.

Tasks and progress (upon completion of tasks)	**%**
1. Definition of program of activities, including the target sectors, the sustainable practices to promote and the type of awareness raising actions to develop. In this task, the cost of the development of the awareness raising actions will be assessed as well. Furthermore, possible funding sources for the program from national and international sources will be detected (see section 6 for more information on this).	30%
2. Execution of multi-annual awareness raising program for the waterborne sector, which can include workshops, leaflets, etc. The offices proposed in EAw1 could also be the reference site to provide information on this topic.	85%
3. Conduction of surveys for the analysis of achieved results.	100%

Schedule

Medium term
Task 1: to be completed by the end of 2020
Task 2: to be carried out from the end of 2020on
Task 3: to be carried out from the end of 2020 on

Responsible entities/Other Participating Bodies

Ministry of Finance and the Economy, Caribbean Air Lines, Civil Aviation

Measure

Renewable energy systems

Code

EPo1

Program

Policy

Action line

Renewable energy

Objective

Development of policies to promote renewable energy systems in housing, commercial and institutional sectors of Trinidad and Tobago to facilitate the implementation of the

Tasks and progress (upon completion of tasks)	**%**
1. Analysis of measures necessary for the creation of an enabling environment for the development of a renewable energy system, success cases of countries with high implementation of renewable energy sources can be used as a reference.	30%
2. Development of plan for the creation of an enabling environment for the development of a renewable energy system, the information obtained from the solar and wind atlases should be the basis for the plan, since they will provide information on the potential and the best locations for the implementation of renewable energies.	85%
3. Implementation of plan, including amendments of T&TEC Act (to allow private sector investment in renewable energy technologies for power generation allowing net metering/billing systems), RIC Act (deal with pricing issues to support RE grid integration), implementation of feed-in tariff policy and price setting and quantity forcing policies to mandate preferential prices to be paid for power generation from renewable energy sources.	100%

Schedule

Short term
Task 1: to be completed by the end of 2016
Task 2: to be completed by the end of 2017
Task 3: to be carried out from the end of 2017 on

Responsible entities/Other Participating Bodies

Ministry of Energy and Energy Affairs, T&TEC, UWI

Measure

Decentralization of renewable energy generation

Code

EPo2

Program

Policy

Action line

Renewable energy

Objective

Install renewable energy systems in commercial, institutional and residential sectors of Trinidad and Tobago to reduce the fossil fuel consumption in the electricity generation sector.

Tasks and progress (upon completion of tasks)	**%**
1. Definition of program of activities for the analysis of the viability of the implementation of renewable energies in housing, commercial and institutional sectors of Trinidad and Tobago. The analysis will include types of technologies which could be implemented, the sectors in which the implementation would take place and the scheme for the implementation of these actions. Additionally, in this task the financing sources for the action will be assessed as well (see section 6 for more information on financing sources).	10%
2. Development of the analysis of the viability of the implementation of renewable energy sources in housing, commercial and institutional sectors of Trinidad and Tobago. As a result of the analysis, the types of technologies to implement in every sector as well as the capacity for the implementation of these technologies and the cost of the implementation will be determined, based on which the recommendations will be developed. Additionally, the scheme for implementation will be proposed. That scheme could include two variations, a compulsory program for new or renovated buildings, which would need to implement renewable energy sources in the construction process according to the specifications set in the Building Code, which will depend on the results of the previous analysis. On the other hand, for already existing buildings, a credit system would be created, granting credits in good conditions for any person or entity willing to install these technologies as long as their installations meet the recommendations established. Furthermore, all the owners of renewable energy technologies benefit from the feed-in-tariff if established according to EPo1.	35%
3. Modification/creation of Building Code including the requirements in terms of renewable energy sources for newly built and renewed buildings. In this task, the credit system to be set will be developed as well.	60%
4. Development of awareness raising campaigns to disseminate the existence of the program among the general population and particularly on the target sectors. In order to do so, the awareness raising campaign will include different features based on the target population and the results of the viability analysis for each sector.	75%
5. Execution of renewable energy implementation programme. This task will include a yearly revision of the results achieved and, if necessary, the implementation of corrective actions.	100%

Schedule

Short term
Task 1: to be completed by the end of 2015
Task 2: to be completed by mid 2017
Task 3: to be completed by mid 2018
Task 4: to be completed by the end of 2018

Task 5: to be carried out from the end of 2018 on

Responsible entities/Other Participating Bodies

Ministry of Energy and Energy Affairs, T&TEC

Measure

Review energy pricing

Code

EPo3

Program

Policy

Action line

Energy conservation

Objective

Review current electricity pricing system to promote lower electricity consumption habits

Tasks and progress (upon completion of tasks)	**%**
1. Establishment of program of activities for the review of the electricity pricing. The analysis will include a review of the types of pricing schemes which could be implemented, assessing the benefits and disadvantages of each of them and determining their economic impact. In this task, the financing sources for the action will be assessed as well (see section 6 for more information on financing sources).	10%
2. Development of the analysis of the electricity pricing options. Several schemes will be presented and analysed. The analysis will be based on the economic implications of their implementation, the expected electricity consumption achieved and the technical feasibility of their development in terms of metering. Nevertheless, all the schemes will include a progressive elimination of the subsidies in the electricity sector and it will be reflected in the economic assessment of every scheme as well. Furthermore, the analysis will also include recommendations for the use of the economic savings which could be derived from the elimination of the subsidies and the modification of the electricity tariff in order to promote green growth.	35%
3. Selection of pricing system to implement based on the results of the analysis and modification of any applicable legislation in order to establish it.	60%
4. Development of awareness raising campaigns to disseminate the new pricing system established, explain its advantages and the actions to be implemented to promote green growth thanks to the implementation of the new pricing system.	75%
5. Set up of new pricing system. Periodically, the results achieved will be revised and any corrective actions will be implemented if deemed necessary.	100%

Schedule

Short term
Task 1: to be completed by the end of 2015
Task 2: to be completed by the end of 2016
Task 3: to be completed by mid 2017
Task 4: to be completed by the end of 2017
Task 5: to be carried out from the end of 2017 on

Responsible entities/Other Participating Bodies

T&TEC, RIC, Ministry of Energy and Energy Affairs, Ministry of Finance and the Economy

Measure

Review fuel subsidies for the industry sector

Code

IPo1

Program

Policy

Action line

Energy conservation

Objective

Review fuel subsidies applied to the industries of Trinidad and Tobago.

Tasks and progress (upon completion of tasks)	**%**
1. Establishment of program of activities for the review of the fuel subsidies in the industrial sector. The analysis will include a review of the subsidies applied and recommendations on how to eliminate them through a progressive path of action minimizing the risks involved. In this task, the financing sources for the action will be assessed as well (see section 6 for more information on financing sources).	10%
2. Development of the subsidy analysis. The results will include a quantification of the current costs of the application of the subsidies, a risk analysis on the implications the elimination of the subsidies could have for the country and suggestions on how to mitigate these risks and promote green growth using the economic savings obtained from the removal of subsidies. Given the importance of the industrial sector for the economy of Trinidad and Tobago, a roadmap for the removal of subsidies will be developed considering all the factors mentioned previously and, as far as possible, agreements will be reached with the agents involved.	35%
3. Approval of roadmap for the removal of subsidies on fuels for the industrial sector and modification of legislation accordingly.	60%
4. Development of awareness raising campaigns to disseminate the roadmap to be implemented, explain its advantages and the actions to be developed to promote green growth with the savings obtained from the removal of subsidies.	75%
5. Removal of subsidies according to roadmap. Periodically, the results achieved will be revised and any corrective actions will be implemented if deemed necessary.	100%

Schedule

Short term
Task 1: to be completed by the end of 2015
Task 2: to be completed by the end of 2016
Task 3: to be completed by mid 2017
Task 4: to be completed by the end of 2017
Task 5: to be carried out from the end of 2017 on

Responsible entities/Other Participating Bodies

Ministry of Energy and Energy Affairs, Ministry of Finance and the Economy

Measure

Public transport systems

Code

TPo1

Program

Policy

Action line

Energy conservation

Objective

Analyze and propose actions to improve the public transport system of Trinidad and Tobago to promote its use instead of the use of private vehicles

Tasks and progress (upon completion of tasks)	**%**
1. Development of program of activities to analyse the options to improve the current public transport system of Trinidad and Tobago. The objective of the analysis will be to establish the roadmap to create an attractive transport net in Trinidad and Tobago, characterizing the currently existing net and developing different options for its improvement. In this task, national and international funding sources available for the implementation of this action will be analysed as well (see section 6 for more information on funding sources).	10%
2. The analysis of the transport sector will be comprised by different phases, it will be started by a characterization of the currently existing system, it will also include an assessment of different options that could be implemented to improve it and will finally present a roadmap for action based on the results of the previous stages. It will include an economic assessment of the costs and benefits of the implementation of the transport system, considering the benefits that could be obtained by the removal of the fossil fuels in the transport sector (see action TPo2 for more information) and the application of vehicle registration fees and taxes (see action TPo3 for more information). Additionally, it will also address the environmental advantages of promoting a sustainable transport system.	35%
3. Approval of roadmap for the improvement of the transport system of Trinidad and Tobago. If necessary, applicable legislation will be modified at this stage.	60%
4. Development of awareness raising campaigns to disseminate the roadmap to be implemented and explain its advantages.	75%
5. Beginning of implementation of actions for the application of the roadmap. A periodical revision will be undertaken, assessing the advance and proposing and implementing any corrective actions which may be necessary.	100%

Schedule

Short term
Task 1: to be completed by the end of 2015
Task 2: to be completed by the end of 2016
Task 3: to be completed by mid 2017
Task 4: to be completed by the end of 2017
Task 5: to be carried out from the end of 2017 on

Responsible entities/Other Participating Bodies

Ministry of Transport

Measure

Review fuel subsidies for the transport sector

Code

TPo2

Program

Policy

Action line

Energy conservation

Objective

Review fuel subsidies applied to the fuel used for public and private transportation in Trinidad and Tobago

Tasks and progress (upon completion of tasks)	**%**
1. Establishment of program of activities for the review of the fuel subsidies in the transport sector. The analysis will include a review of the subsidies applied and recommendations on how to eliminate them through a progressive path of action minimizing the risks involved. In this task, the financing sources for the action will be assessed as well (see section 6 for more information on financing sources).	10%
2. Development of the subsidy analysis. The results will include a quantification of the current costs of the application of the subsidies, a risk analysis on the implications the elimination of the subsidies could have and suggestions on how to mitigate these risks and promote green growth using the economic savings obtained from the removal of subsidies (see TPo1). A roadmap for the removal of subsidies will be developed considering all the factors mentioned previously and, as far as possible, agreements will be reached with the agents involved.	35%
3. Approval of roadmap for the removal of subsidies on fuels for the transport sector and modification of legislation accordingly.	60%
4. Development of awareness raising campaigns to disseminate the roadmap to be implemented, explain its advantages and the actions to be developed to promote green growth with the savings obtained from the removal of subsidies.	75%
5. Removal of subsidies according to roadmap. Periodically, the results achieved will be revised and any corrective actions will be implemented if deemed necessary.	100%

Schedule

Short term
Task 1: to be completed by the end of 2015
Task 2: to be completed by the end of 2016
Task 3: to be completed by mid 2017
Task 4: to be completed by the end of 2017
Task 5: to be carried out from the end of 2017 on

Responsible entities/Other Participating Bodies

Ministry of Transport, Ministry of Finance and the Economy

Measure

Vehicle registration fees and taxes

Code

TPo3

Program

Policy

Action line

New technologies

Objective

Establish vehicle registration fees and taxes in order to control the car fleet of the country and promote efficient vehicles with lower fossil fuel consumption

Tasks and progress (upon completion of tasks)	**%**
1. Definition of program of activities to define a policy for the establishment of vehicle registration fees and taxes. In this task, the actions to undertake in order to determine the viability and best practices for the implementation of the policy will be defined, the analysis will include the characterization of the car fleet of the country and the analysis of different fees and taxes schemes which could be applied. Furthermore, in this task an analysis of possible national and international funding sources will be developed as well (see section 6 for more information on financing sources).	10%
2. Development of policy definition activities. The vehicle fleet of the country will be characterized and different tax and fee schemes will be analysed in terms of technical and financial viability. A roadmap for the implementation of a tax and fee scheme for the vehicles of Trinidad and Tobago will be designed based on the results of the characterization and the analysis of tax and fee schemes.	35%
3. Approval of roadmap for the application of vehicle registration fees and taxes and modification of legislation accordingly.	60%
4. Development of awareness raising campaigns to disseminate the roadmap to be implemented, explain its advantages and the actions to be developed to promote green growth with the savings obtained from the application of the scheme.	75%
5. Application of fees and taxes according to the roadmap defined. Periodically, the results achieved will be revised and any corrective actions will be implemented if deemed necessary.	100%

Schedule

Medium term
Task 1: to be completed by the end of 2017
Task 2: to be completed by the end of 2018
Task 3: to be completed by the end of 2019
Task 4: to be completed by the end of 2020
Task 5: to be carried out from the end of 2020 on

Responsible entities/Other Participating Bodies

Ministry of Transport, Ministry of Finance and the Economy

Measure

National program for NAMAs

Code

CPo1

Program

Policy

Action line

Good governance

Objective

Create a national program for the development of NAMA in Trinidad and Tobago

Tasks and progress (upon completion of tasks)	**%**
1. Definition of program of activities to be performed to define a roadmap for the implementation of NAMA in Trinidad and Tobago. The objective is to include all the steps that will need to be outlined in the roadmap to ensure that all the necessary steps for the definition of the NAMA scheme are taken. In this task, national and international funding sources will be analysed as well (see section 6 for more information on funding sources).	10%
2. Development of roadmap for the implementation of NAMA in Trinidad and Tobago, it will include, at least, a detailed definition of the following steps: ▪ Policy formulation: need to develop a national low carbon development strategy, which will be based on current electricity generation, industry and transport strategy. ▪ Capacity building: in this step, the actions will be designed to ensure that support for preparation of NAMA and, if necessary, the calculation of GHG Inventory, is provided. ▪ Definition of the steps for NAMA development: collection of information on relevant policies and strategies, collection of data for BaU, Quantification of GHG emissions of BaU, Examination and selection of NAMA options (unilateral NAMAs, supported NAMAs, creditable NAMAs) and quantification of GHG emissions reductions by NAMA. ▪ Analysis of mitigation financing options. ▪ Definition of MRV scheme for the NAMA (see CPo2 for more information on MRV).	35%
3. Approval of roadmap for NAMA and creation or modification of legislation if necessary.	45%
4. Implementation of preparatory actions before the selection and creation of NAMA: policy formulation and capacity building.	
5. Selection of NAMAs to be implemented in Trinidad and Tobago.	60%
6. Set up of MRV scheme for NAMA.	75%
7. Periodical review of roadmap and the implementation, including the analysis of the possibility to define more NAMA for Trinidad and Tobago. If corrective actions are needed to enhance the functioning of the NAMA scheme, they will be implemented as well.	100%

Schedule

Short term
Task 1: to be completed by the end of 2016
Task 2: to be completed by the end of 2017
Task 3: to be completed by mid 2018
Task 4: to be completed by mid 2019
Task 5: to be completed by the end of 2019
Task 6: to be completed by the end of 2020
Task 7: to be carried out from the end of 2020 on

Responsible entities/Other Participating Bodies

Ministry of the Environment and Water Resources, EMA, Ministry of Energy and Energy Affairs

Measure

National MRVsystem

Code

CPo2

Program

Policy

Action line

Good governance

Objective

Develop a national MRV system to help implement and quantify GHG mitigation actions such as the NAMA or the national market mechanism

Tasks and progress (upon completion of tasks)	**%**
1. Definition of the program of activities to develop a MRV system for the NAMA defined in CPo1. The objective of this action is to create a precise, exhaustive, conservatively oriented, coherent, comparable and transparent system. In this task, national and international financing sources which could provide funding for the implementation of the MRV system will be analysed (see section 6 for more information on financing sources).	10%
2. Development of program of activities to create MRV system in Trinidad and Tobago for the selected NAMA actions. The analysis will include, at least the following steps: ▪ Type of MRV to implement, which will depend on the areas to be monitored, reported and verified: MRV of emissions, MRV of NAMAs, MRV of support. ▪ Analysis of data availability and data compilation system. ▪ Development of indicators. ▪ Analysis of methodologies. ▪ Assessment of institutional arrangements and coordination projects. ▪ Capacity building needs. ▪ Legal and regulatory instruments. ▪ QA/QC procedures. ▪ International monitoring As a result, a roadmap for the implementation of a MRV system in Trinidad and Tobago, according to the country's reality and needs will be obtained.	40%
3. Modification of any applicable legislation and implementation of MRV system according to the roadmap developed.	80%
4. Once the system is established, information will be gathered on its functioning and, if necessary, corrective actions will be carried out to improve the implemented MRV system.	100%

Schedule

Medium term
Task 1: to be completed by the end of 2018
Task 2: to be completed by the end of 2019
Task 3: to be completed by the end of 2020
Task 4: to be carried out from the end of 2020 on

Responsible entities/Other Participating Bodies

Ministry of the Environment and Water Resources, EMA, Ministry of Energy and Energy Affairs

Measure

Implementation of a pilot national market mechanism

Code

CPo3

Program

Policy

Action line

Good governance

Objective

Create a pilot national emissions trading mechanisms to reduce GHG emissions in the industrial sector

Tasks and progress (upon completion of tasks)	**%**
1. Definition of program of activities for the creation of the roadmap of the pilot national market mechanism. The objective is to define the steps which would need to be taken to implement this system in Trinidad and Tobago, selecting carefully the features of the system to guarantee its appropriate implementation and results. In this task, available national and international financing sources which could provide funding for the development of the roadmap and the establishment of the system will be analysed as well (see section 6 for additional information on funding sources).	10%
2. Development of the roadmap for the implementation of a pilot national market mechanism in Trinidad and Tobago. The roadmap will be based on the result of the analysis of the next features: ▪ Conditions on the market, industry and environment of the country. ▪ Institutional capacity for the implementation of a cap-and-trade system. Based on that information, the sectors and types of companies to be included in the cap-and-trade system, the reporting system to be used (see CPo2 for information on MRV), the cap to be set and the baseline year and the legislative modifications which need to be carried out will be established. Additionally, the phases for the implementation of the system will also be defined, as well as other features, such as sanctions, to consider. Furthermore, for the definition of the roadmap, an economic analysis of the impact of the cap-and-trade scheme will be developed and the destination of the benefits obtained from the cap-and-trade system in order to promote green growth in Trinidad and Tobago will also be established.	35%
3. Approval of the roadmap defined in the previous task and modification or creation of relevant legislation.	60%
4. Implementation of the preparatory actions defined in the roadmap: ▪ Development and review of GHG Inventories of industries to quantify current GHG emissions and define market cap. ▪ Development of capacity building sessions for industrial companies affected by the cap-and-trade system, providing information on its features, the functioning and the monitoring, verification and reporting process. ▪ Selection of sector and entities for the pilot application of the market mechanism. The beginning of the implementation of the mechanism could be developed within a selected sector, with a reasonable cap and with moderate MRV requirements, in order to develop a trial with the main purpose of finding out how companies adapt to it and if any redefinition of the system is needed before its definitive start.	75%
5. If necessary, redefinition of the cap-and-trade system of development of corrective actions.	85%
6. Start of normal functioning of cap-and-trade system. Periodically, the results of the implementation will be analysed to improve the MRV system and redefine the sectors included and the cap defined if necessary.	100%

Schedule

Medium term
Task 1: to be completed by the end of 2017
Task 2: to be completed by mid 2019
Task 3: to be completed by the end of 2019
Task 4: to be completed by mid 2021
Task 5: to be completed by mid 2022
Task 6: to be carried out from mid 2022 on

Responsible entities/Other Participating Bodies

Ministry of the Environment and Water Resources, Ministry of Energy and Energy Affairs, EMA

Measure

National research and development plan

Code

CPo4

Program

Policy

Action line

Good governance

Objective

Create a national research and development plant to promote the development of these sectors in Trinidad and Tobago

Tasks and progress (upon completion of tasks)	**%**
1. Definition of program of activities for the development of a national research and development plan for Trinidad and Tobago. The objective is to coordinate the Research and Development activities carried out in the country in a centralized manner, defining which topics are to be addressed and establishing a roadmap for the research activities. To do so, the necessary steps for the development of a roadmap that will be implemented will be established. In this task, national and international financing sources will be analysed (see section 6 for more information on financing sources).	10%
2. Development of roadmap, defining the necessary steps to create a Research and Development Plan for Trinidad and Tobago. The roadmap will include, at least, the following tasks: ▪ Characterization of current R&D and Innovation activities performed in Trinidad and Tobago. To do so, surveys will be prepared and delivered to universities, companies and other relevant entities. ▪ Definition of strategic and specific objectives of Trinidad and Tobago's R&D Plan. They will be based on strategic development plans approved and on the current situation of the R&D sector in Trinidad and Tobago. ▪ Selection of specific research areas and topics, if desired, to be included in the R&D Plan. ▪ Establishment of research budget, considering the total budget and the specific budgets for different research topics. The need to define the conditions for funding will be established as well. ▪ Drafting of R&D Plan.	30%
3. Approval of roadmap, this step will include the creation/modification of any legislation, if applicable.	50%
4. Development of preparatory tasks included in the roadmap, which will be concluded with the drafting of the R&D Plan.	75%
5. Approval of R&D Plan, this step will include the creation/modification of any legislation, if applicable.	90%
6. Beginning of implementation of R&D Plan. Periodically, the strategic and specific objectives will be reviewed and, if necessary, they will modified and the research topics and funding conditions accordingly as well.	100%

Schedule

Medium term
Task 1: to be completed by the end of 2018
Task 2: to be completed by mid 2020
Task 3: to be completed by the end of 2020
Task 4: to be completed by mid 2022
Task 5: to be completed by mid 2023

Task 6: to be carried out from mid 2023 on

Responsible entities/Other Participating Bodies

Ministry of Science and Technology, Ministry of Finance and the Economy, University of the West Indies, University of Trinidad and Tobago

Measure

Data Retrieval System

Code

CPo5

Program

Policy

Action line

Good Governance

Objective

Improve the quality of the data retrieved in order to quantify GHG emissions from the electrical power generation, industry and transport sectors of Trinidad and Tobago through the creation of a Data Retrieval System containing information on environmental parameters with the information provided by private companies and public entities.

Tasks and progress (upon completion of tasks)	**%**
1. Definition of contents to be included in the analysis of the implementation of a Data Retrieval System in Trinidad and Tobago: type of information to include in the System (GHG emissions, air polluting emissions, water discharges, waste production, noise, etc.), platform to use for the delivery and archive of information, necessity to create or modify existing legislation for the creation of a compulsory framework for the delivery of information. In this task, national and international opportunities for funding will be analysed as well, both for the assessment phase and for the development of the Data Retrieval System(more on this in section 6).	5%
2. Development of implementation analysis, including results for all the contents specified in task 1. The implementation analysis will pay particular care to the data safety in order to guarantee that no confidential information is displayed without permission and that the data presented cannot be used to harm its owner. Additionally, the Data Retrieval System will be designed considering the needs of the users, that is, simplifying the access and creating simple templates for the data retrieval. In fact, different templates will be created for the different activities of the companies and entities.	20%
3. Creation or modification of legislation, if necessary, for the establishment of the Data Retrieval System.	30%
4. Development of the Data Retrieval System according to the requirements detected in task 2.	40%
5. Selection of companies for pilot implementation of Data Retrieval System.	45%
6. Development of training courses for pilot companies and entities, explaining the data that needs to be retrieved and the use of the platform.	50%
7. Development of pilot implementation, during a representative period of time (selected depending on the reporting periods selected), the Data Retrieval System will be used by several companies and entities to detect any malfunctioning or needed improvements.	65%
8. Implementation of final improvements to the Data Retrieval System.	70%
9. Development of training courses for all companies, explaining the data that needs to be retrieved and the use of the platform.	75%
10. Development of first reporting period.	85%
11. Analysis of results of first reporting period, including audits in companies to validate reported data. During this first period, companies will be notified if data is not delivered correctly but will not be sanctioned.	90%
12. Implementation of improvement actions in the Data Retrieval System, both in terms of functioning of the platform and in management.	95%
	100%

13. Development of rest of reporting periods, including applying sanctions for companies not fulfilling legal requirements and analysis of yearly results and latest international trends in the field to include continuous improvement actions in the Data Retrieval System.

Schedule

Short term
Task 1: to be completed by mid 2015
Task 2: to be completed by mid 2016
Tasks 3 and 4: to be completed by the end of 2016
Task 5 and 6: to be completed by mid 2017
Task 7 and 8: to be completed by mid 2018
Task 9: to be completed by the end of 2018
Tasks 10, 11 and 12: to be completed by the end of 2019
Task 13: to be carried on from the end of 2019 on

Responsible entities/Other Participating Bodies

EMA, CSO,Ministry of the Environment and Water Resources, industrial firms.