

Antigua and Barbuda Sustainable Low-Emission Island Mobility Project

Part I: Project Information

Name of Parent Program

[Global Programme to Support Countries with the Shift to Electric Mobility.](#)

GEF ID

10281

Project Type

FSP

Type of Trust Fund

GET

CBIT/NGI

CBIT

NGI

Project Title

Antigua and Barbuda Sustainable Low-Emission Island Mobility Project

Countries

Antigua and Barbuda

Agency(ies)

UNEP

Other Executing Partner(s):

Department of Environment, Ministry of Health and the Environment

Executing Partner Type

Government

GEF Focal Area

Climate Change

Taxonomy

Focal Areas, Climate Change, Climate Change Mitigation, Energy Efficiency, Technology Transfer, Sustainable Urban Systems and Transport, Type of Engagement, Participation, Information Dissemination, Consultation, Stakeholders, Civil Society, Academia, Non-Governmental Organization, Community Based Organization, Communications, Awareness Raising, Public Campaigns, Behavior change, Education, Gender Equality, Gender Mainstreaming, Women groups, Beneficiaries, Gender results areas, Access and control over natural resources, Capacity, Knowledge and Research, Innovation, Knowledge Generation, Learning, Capacity Development, Knowledge Exchange, Enabling Activities, Influencing models, Transform policy and regulatory environments, Deploy innovative financial instruments, Strengthen institutional capacity and decision-making, Convene multi-stakeholder alliances, Demonstrate innovative approaches, Private Sector, Capital providers, Individuals/Entrepreneurs, SMEs, Financial intermediaries and market facilitators, Large corporations

Rio Markers

Climate Change Mitigation

Climate Change Mitigation 2

Climate Change Adaptation

Climate Change Adaptation 0

Submission Date

7/24/2020

Expected Implementation Start

11/1/2020

Expected Completion Date

10/31/2024

Duration

48In Months

Agency Fee(\$)

292,050.00

A. FOCAL/NON-FOCAL AREA ELEMENTS

Objectives/Programs	Focal Area Outcomes	Trust Fund	GEF Amount(\$)	Co-Fin Amount(\$)
CCM-1-1	Promote innovation and technology transfer for sustainable energy breakthroughs for electric drive technology and electric mobility	GET	3,245,000.00	9,719,315.00
Total Project Cost(\$)			3,245,000.00	9,719,315.00

B. Project description summary

Project Objective

Promote low-carbon and climate-resilient public and private transportation systems in Antigua and Barbuda.

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing(\$)	Confirmed Co-Financing(\$)
Component 1. Institutionalization of low-carbon and climate-resilient electric mobility	Technical Assistance	1. The Antigua and Barbudan government demonstrates enhanced coordination, capacity and commitment on promoting electric mobility	1.1. A multi-stakeholder consultation strategy is implemented and recommendations for a long-term coordination mechanism are delivered to key government actors 1.2. A comprehensive assessment of the economic, environmental and social viability of fleet electrification, renewable energy capacity penetration and electrical distribution grid stabilization is produced and disseminated with key government decision-makers 1.3. Services for strengthening the capacity of national stakeholders on	GET	351,790.00	615,000.00

technical, financial and regulatory aspects of integrating electric mobility and renewable energy into the electric grid are provided, including through the Global Programme on Electric Mobility

1.4. A national commitment on low-carbon and climate-resilient electric mobility is drafted for adoption by the national government

1.5. A national development plan for low-carbon and climate-resilient electric mobility is drafted for adoption by the national government

1.6. Public and private stakeholders' awareness on the benefits of low-carbon and climate-resilient electric mobility enhanced through a communication campaign and the provision of a public information platform

Component 2. Short term barrier removal through low-carbon e-
Investment

GET

1,698,750.00

2,550,000.00

mobility and climate-resilient
renewable energy
demonstrations

2. Antigua and
Barbudan citizens
begin to use electric
mobility for their
public transport needs

2.1. The effectiveness
of electric vehicle
charging
infrastructure at the
V.C. Bird International
Airport to power
electric taxis with
renewable solar
energy is
demonstrated to
public and private
stakeholders

2.2. The viability of
electric vehicles as
part of the airport taxi
fleet is demonstrated
to public and private
stakeholders

2.3 The effectiveness
of a grid-interactive
solar array at St
John's West bus
station, along with
charging
infrastructure for
electric buses, is
demonstrated to
public and private
stakeholders

2.4. The viability of
electric buses as part
of the public transport
bus fleet is
demonstrated to
public and private
stakeholders

Component 3. Preparing for scale-up and replication of low-carbon electric mobility and climate-resilient renewable energy	Technical Assistance	3. The Antigua and Barbuda government takes actions towards financing and implementing policy frameworks for low-carbon electric mobility	<p>3.1. An electric mobility funding window under the Sustainable Island Resource Framework (SIRF) Fund is operational to provide financing for public and private consumers</p> <p>3.2. Standards and a policy framework for regulating the importation of electric and conventional vehicles are developed and drafted for adoption by government ministries</p> <p>3.3. Standards and a policy framework for regulating the quality of imported fuel are developed and drafted for adoption by government ministries</p> <p>3.4. Regulations for the installation of private and public electric vehicle charging infrastructure are developed and drafted for adoption by government ministries</p> <p>3.5. A data acquisition and management system for the</p>	GET	939,450.00	3,650,000.00
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transport and energy sectors is used by key public organizations

Component 4. Long-term environmental sustainability of low-carbon electric mobility	Technical Assistance	4. The Antigua and Barbuda government takes action towards implementing policy frameworks and building capacity to ensure for ensuring the long-term sustainability of electric mobility	<p>4.1. Waste companies are trained in reusing, recycling and disposing used vehicles (both conventional and electric) and electric vehicle batteries</p> <p>4.2. Standards and a policy framework for regulating the disposal of electric and conventional vehicles are developed and drafted for adoption by government ministries</p> <p>4.3. Standards and a policy framework for regulating emissions from the power generation sector, as well as for integrating renewable energy into the grid, are developed and drafted for adoption by government ministries</p>	GET	100,486.00	2,889,315.00
Sub Total (\$)					3,090,476.00	9,704,315.00

Project Management Cost (PMC)

GET	154,524.00	15,000.00
Sub Total(\$)	154,524.00	15,000.00
Total Project Cost(\$)	3,245,000.00	9,719,315.00

C. Sources of Co-financing for the Project by name and by type

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Investment Mobilized	Amount(\$)
Recipient Country Government	Department of Environment, Ministry of Health and the Environment	Grant	Investment mobilized	8,000,000.00
Recipient Country Government	National Solid Waste Management Authority	In-kind	Recurrent expenditures	450,000.00
Recipient Country Government	Department of Environment, Ministry of Health and the Environment	In-kind	Recurrent expenditures	700,000.00
Donor Agency	NDC Partnership	Grant	Investment mobilized	569,315.00
			Total Co-Financing(\$)	9,719,315.00

Describe how any "Investment Mobilized" was identified

• The Ministry of Health and the Environment, through its Department of Environment, will mobilize new investment to deploy utility scale solar photo-voltaic (PV) panels and battery electric storage technologies, to ensure vehicle charging infrastructure is supplied with renewable energy, improve grid resilience and support the scale-up of low carbon electric mobility. This will be financed with through a loan of the Abu Dhabi Fund for Development (US\$7,000,000). Furthermore, new investment will also be used to increase the penetration of renewable energy sources by providing PV systems to schools throughout the country. This will be financed with support of a grant provided by Government of India (US\$1,000,000). • The NDC partnership will mobilize new investment, through grants of the Organization of Eastern Caribbean States (OECS) and the Global Green Growth Institute (GGGI), to undertake activities related to the mapping and engaging of stakeholders related to, developing of communication plans for, and establishing gaps in the current progress to reduce GHG emissions in relation to the NDC conditional mitigation targets. Furthermore, it will identify emission mitigation activities and how these contribute to meeting the NDC targets, develop structures for social and financial inclusion of local population and develop training and re-training programs to cover specialized areas required to facilitate a just transition of the workforce throughout the transition to a low emission economy (US\$569,315). This co-financing is related to outputs 1.1, 1.2, 1.4, 1.5, 1.6, 3.1 and 4.1, in particular on multi-stakeholder consultations and the development of long-term plans and communication plans for achieving a long-term target on electric mobility.

D. Trust Fund Resources Requested by Agency(ies), Country(ies), Focal Area and the Programming of Funds

Agency	Trust Fund	Country	Focal Area	Programming of Funds	Amount(\$)	Fee(\$)
UNEP	GET	Antigua and Barbuda	Climate Change	CC STAR Allocation	3,245,000	292,050
Total Grant Resources(\$)					3,245,000.00	292,050.00

E. Non Grant Instrument

NON-GRANT INSTRUMENT at CEO Endorsement

Includes Non grant instruments? **No**

Includes reflow to GEF? **No**

F. Project Preparation Grant (PPG)

PPG Required



PPG Amount (\$)

20,000

PPG Agency Fee (\$)

1,800

Agency	Trust Fund	Country	Focal Area	Programming of Funds	Amount(\$)	Fee(\$)
UNEP	GET	Antigua and Barbuda	Climate Change	CC STAR Allocation	20,000	1,800
Total Project Costs(\$)					20,000.00	1,800.00

Core Indicators

Indicator 6 Greenhouse Gas Emissions Mitigated

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
Expected metric tons of CO ₂ e (direct)	0	218698	0	0
Expected metric tons of CO ₂ e (indirect)	0	215496	0	0

Indicator 6.1 Carbon Sequestered or Emissions Avoided in the AFOLU (Agriculture, Forestry and Other Land Use) sector

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
Expected metric tons of CO ₂ e (direct)		218,698		
Expected metric tons of CO ₂ e (indirect)		215,496		
Anticipated start year of accounting		2021		
Duration of accounting		15		

Indicator 6.2 Emissions Avoided Outside AFOLU (Agriculture, Forestry and Other Land Use) Sector

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
Expected metric tons of CO ₂ e (direct)				
Expected metric tons of CO ₂ e (indirect)				
Anticipated start year of accounting				
Duration of accounting				

Indicator 6.3 Energy Saved (Use this sub-indicator in addition to the sub-indicator 6.2 if applicable)

Total Target Benefit	Energy (MJ) (At PIF)	Energy (MJ) (At CEO Endorsement)	Energy (MJ) (Achieved at MTR)	Energy (MJ) (Achieved at TE)
Target Energy Saved (MJ)		3320359686.0000000000		

Indicator 6.4 Increase in Installed Renewable Energy Capacity per Technology (Use this sub-indicator in addition to the sub-indicator 6.2 if applicable)

Technology	Capacity (MW) (Expected at PIF)	Capacity (MW) (Expected at CEO Endorsement)	Capacity (MW) (Achieved at MTR)	Capacity (MW) (Achieved at TE)

Indicator 11 Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment

	Number (Expected at PIF)	Number (Expected at CEO Endorsement)	Number (Achieved at MTR)	Number (Achieved at TE)

Female		1,850		
Male		1,820		
Total	0	3670	0	0

Part II. Project Justification

1a. Project Description

Changes in project design

The following changes have been implemented in the project design compared to the original child project concept note:

1. The content of components and outputs have been aligned with the global programme and consequently modified:

- Component 1 is based on component 4 of the concept note which aimed to increase awareness and build capacity for low-emission electric mobility. It has now been expanded to focus also on strengthening the institutional framework to transition to a low-carbon and climate-resilient electric mobility system. Outputs related to the strengthening the enabling environment, which were in component 1 of the concept note, have been moved to component 3.
- Component 2 combines components 2 and 3 of the concept note focused on the demonstration of electric mobility and renewable energy technologies.
- Component 3 combines elements of components 1 and 3 of the concept note. It focuses on the sustainable scale-up of electric mobility by providing finance for early technology adopters and establishing an enabling environment to support an effective deployment of low-carbon and climate-resilient electric mobility and its required infrastructure.
- Component 4 addresses the long-term environmental sustainability of low carbon electric mobility. It focuses on establishing standards and regulations for vehicle end of life disposal and on emission standards for the electric matrix to guarantee a transition to a low carbon system.

2. Indicators have been refined. Whilst the concept note estimated direct and indirect emission mitigations of 128,619 tCO₂ and 127,551 tCO₂, respectively, calculations using a revised methodology and based on the final project activities have resulted in estimated direct greenhouse gas emission reductions of 218,698 and indirect reductions of 215,496. The overall impact is higher than originally estimated, due to a more in-depth analysis of the impact of the policy measures and financing window. The overall number has also been reduced in part due to the country's decision to execute the project in three years instead of four. This reduction in project years results in a more ambitious timeline and a reduced period of time for the pilots.

3. The proposed renewable energy capacity installed by the project has been reduced from 1 MW to 0.15 MW. The installed renewable energy capacity was established based on the energy requirements of the four vehicles implemented in the two pilot projects. The currently proposed scale of the renewable energy plants is large enough to address the different requirements of the pilot projects. Moreover, given the current high price of PV systems in the island (in the range

of USD 4000 per kW), installing the originally proposed 1MW system would not be feasible with the available funds. Also, significant co-financing is destined to the installation of renewable energy power generation systems, reducing the need for the purchase and installation of large renewable energy capacity through GEF funds. This thus facilitating the use of GEF funds for other activities related to policy and financial mechanism development (component 3).

4. Co-financing for the project is of the same scale as indicated at the project concept note, shifting from US\$ 9,735,000 to US\$ 9,719,315. Changes to co-financing partners and amounts are captured in the following table.

Co-finance partner	Estimated co-finance contribution as per the programme framework document (US\$)	Committed co-finance at CEO endorsement (US\$)	Explanation for the changes
Department of Environment, Ministry of Health and the Environment (investment mobilized)	\$2,885,000	\$8,000,000	See description under the table C above.
National Solid Waste Management Authority	\$0	\$450,000	See description under the table C above.
Department of Environment, Ministry of Health and the Environment (in-kind)	\$0	\$700,000	See description under the table C above.
NDC Partnership	\$0	\$569,315	See description under the table C above.
NREL for Antigua and Barbuda	\$25,000	\$0	Co-financing committed and spent prior to GEF project commencement.
Municipalities/City Council Administrations for Antigua and Barbuda	\$150,000	\$0	Due to the COVID-19 pandemic, city resources were allocated to other priorities.
Utilities such as the Antigua Power Company, financial institutions and technology suppliers for Antigua and Barbuda	\$6,000,000	\$0	Due to the COVID-19 pandemic, resources were allocated to other priorities.
UNEP	\$50,000	\$0	Channeled as co-financing through the global programme.

1) Global environmental and/or adaptation problems, root causes and barriers that need to be addressed

Global environmental problem

A global transition to low- and zero- emission mobility is essential to meet international climate commitments, including the Paris Climate Agreement. The transport sector is currently responsible for approximately one quarter of energy-related carbon dioxide emissions,[1] with these expected to grow by 2050. In addition, the transport sector is a leading contributor of short-lived climate pollution, especially black carbon. Almost all transport related greenhouse gas emission growth is expected to take place in low- and middle-income countries. By 2050, three out of every five cars will be found in developing countries.[2] This means that achieving global climate targets will require a considerable modal shift away from the use of private vehicles and a shift to zero emissions mobility in all countries.

The situation in Antigua and Barbuda is emblematic of the aforementioned global problem. As a small island developing state (SIDS), Antigua and Barbuda's greenhouse gas (GHG) emissions represent just 0.0015% of the world's total.[3] However, the country's per capita GHG emissions are higher than those of Spain and France. Antigua and Barbuda's biggest challenge is the energy sector, which, due to fossil fuel combustion activities, accounts for 76% of the country's total emissions.

The electricity generation and transport sub-sectors are the cause of the problem, as they rely almost entirely on imported petroleum-based fuels. Electricity generation is responsible for close to 40% of total GHG emissions, as it relies almost entirely on heavy fuel oil thermal power plants and experiences high distribution grid inefficiencies. As a result, the emission intensity per MWh of the electricity consumed is around 1000 kg of CO₂ per MWh generated, almost double the global average. The transport sub-sector is similarly problematic, with road transport accounting for more than 20% of total national GHG emissions. [4]

The reliance on fossil fuel imports for electricity generation and road transport has a substantial impact on the country's gross domestic product (GDP). Annual expenditures on such imports reach up to 13.7% of the country's GDP. In 2012, total fuel imports for electricity generation and road transportation each represented approximately 35% of the total energy imports of the country, with the remaining 30% used in aviation applications.

An additional challenge to those above is that under business as usual (BAU) conditions overall emissions are expected to continue to rise considerably over the next decade (see Figure 1).[5] This is primarily due to increases in electric demand and growth in individual transport usage, with BAU estimations that the private vehicle fleet could grow at an annual rate of 6.5% per year (see section 2 for more information).

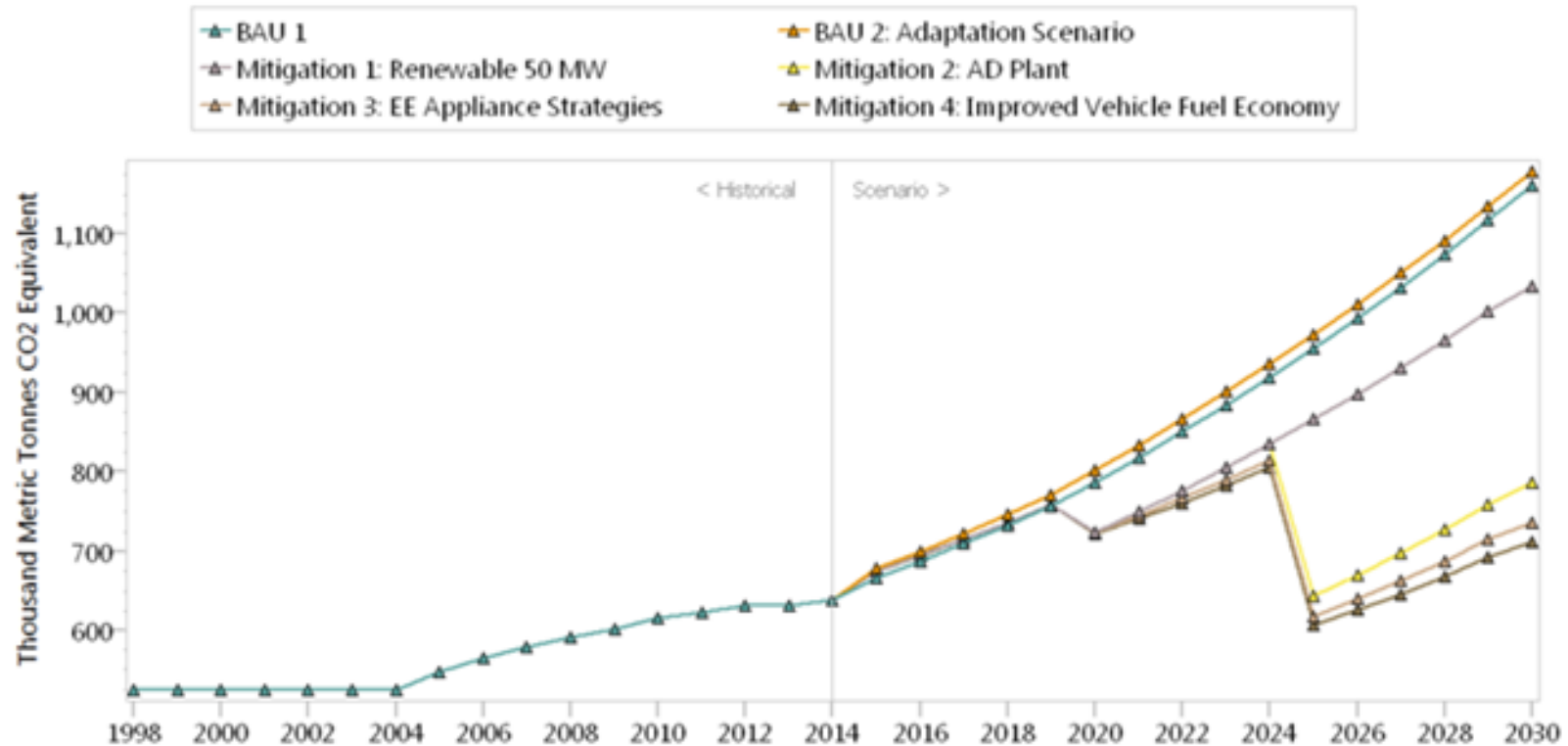


Figure 1. emissions projections for Antigua and Barbuda to 2030³

Root causes of the global environmental problem and barriers to change

The root causes and barriers of these challenges, holding Antigua and Barbuda back from transitioning to a low-emission and climate resilient transport sector, are the following:

1. Lack of institutional framework and capacity.

a) One of the key barriers identified by country studies is that Antigua and Barbuda faces a lack of consultation and coordination between national governmental entities and with the private sector and civil society in undertaking actions related to the electricity and transport sectors (see for example IRENA: Antigua and Barbuda. Renewables Readiness Assessment).^[6] This is leading to the development and implementation of policies and projects which have not fully considered the views and interests of different public and private actors. This results in actions that don't have the buy-in of key governmental, private sector and civil society actors and consequently don't effectively support the transition to a low-carbon and climate-resilient transport sector.

b) Public decision-making is also affected by a lack of in-depth knowledge of government officials on how the technical, social, economic and environmental impacts of a large-scale uptake of renewable energy and electric vehicles.^[7] As a twin-island country in the Caribbean, Antigua and Barbuda has enormous potential to transition to a carbon neutral island, with electric provided through renewable energy furnished by the significant solar and wind resources the island has. However, without presence of electric vehicles in the country and limited experience with renewable energy technologies, there is a lack of in-depth knowledge of the technical, social and economic impacts of effectuating a transformation to low-carbon transport. In this context, policy-makers hold incomplete and differing information and ideas on the cost and effort required for the transition. This leads to coordination challenges, as public actors are unsure of the benefits of coordination, and the propensity to develop enabling environments that incentivize business-as-usual fossil fuel interventions.

d) A significant non-financial barrier for a sustainable uptake of clean renewable energy and low carbon electric mobility in Antigua and Barbuda is the need for improved coordination among key decision-makers on transitioning to a low-emission and climate-resilient energy sector. While the country has set ambitious long-term NDC targets, endorsed by the Prime Minister (see section 2), these have not yet been translated into specific targets and a roadmap of actions for the electricity and transport sectors. This has resulted in the absence of a clear long-term political signal in these sectors, creating uncertainty for the private sector and consequently delaying the uptake of low-emission technologies, including mature technologies such as photovoltaic solar panels.

d) A significant non-financial barrier for a sustainable uptake of clean renewable energy and low carbon electric mobility in Antigua and Barbuda is the lack of political unity among key decision-makers on transitioning to a low-emission and climate-resilient energy sector. While the country has set ambitious long-term NDC targets, endorsed by the Prime Minister (see section 2), these are yet to translate into specific targets and a roadmap of actions for the energy and transport sectors, highlighting political challenges in developing ministerial responsibility for the targets. This results in the absence of a clear long-term political signal in these sectors, creating uncertainty for the private sector and consequently delaying the uptake of low-emission technologies, including mature technologies such as photovoltaic solar panels.

e) In this context, there is also a lack of a long-term plan for a national transition to a low-carbon and climate-resilient transport system. This creates uncertainty for stakeholders (in particular the private sector) on participating in such a transition and also leads to uncoordinated actions of different government institutions (due to the lack of clear strategic direction).

f) Finally, the general public has a lack of awareness of the environmental, health and economic impacts of the current fossil-based energy and transport sectors, and of the benefits and viability of low-carbon and climate-resilient energy and transport systems for the twin-islands. This results in a lack of bottom-up pull from civil society for transitioning to renewable energy and electric mobility.

2. Lack of awareness and confidence in the technology.

Key national stakeholders lack awareness and confidence in low-emission and climate-resilient technologies for providing the country's electricity generation and transport needs. On electricity generation, the utility company and other public and private stakeholders lack awareness of and confidence in the technical and economic viability of renewable energy technologies for servicing increasing energy requirements. This results in a lack of investment in and policy-making

to promote renewable energy technologies, leading to continued investment in business-as-usual fossil fuel technologies. While the country's current electricity supply is in excess of its demand (see section 2), this is a standard characteristic of all national electricity systems, and particularly those of small island developing states, which need to ensure excess capacity to cater for potential failures in any one of the providing power plants (especially to ensure resilience during cyclone season). Decision-makers currently lack confidence and awareness as to the adequacy of renewable energy systems to cater for this excess (and eventually the majority) supply of the system. This is also related to lack of awareness and confidence on how the existing grid may accommodate renewable energy supply.

Similarly, the lack of demonstrations of electric vehicles in Antigua and Barbuda leads policy- and decision-makers and private investors and civil society to believe that such a technology will not work in 'island conditions.' This leads to a lack of investment in supporting infrastructure (i.e. electric vehicle chargers), a lack of policy incentives, and a lack of bottom-up pull by consumers for electric vehicles. Furthermore, this lack of awareness and confidence in these technologies leads to a lack of understanding as to the viability and benefits (for instance, in improved service) in the public transport sector, as substitutes for existing polluting buses and taxis. The introduction of electric buses in the islands transport fleet, together with the introduction of fixed routes, timetables, bus stops and novel connectivity systems, would help improve the perception of system and thus support a modal shift from private passenger cars to public transport. This would result in a drop of the vehicle fleet growth rate, with a possible significant reduction on GHG emissions and air contamination.

3. Lack of enabling environment for promoting low-emission and climate resilient technologies.

- a) With electric vehicles currently having a higher upfront cost than traditional internal combustion engines (ICEs), there is currently a lack of financial instruments to support private consumers and public transport operators (buses and taxis) to cover the incremental costs of purchasing electric vehicles. This is due in part to the lack of experience with electric vehicles in the Caribbean, which leads to difficulties for private banks to calculate the risk and express interest to support this market; most private banks in Antigua and Barbuda are subsidiaries of international or regional conglomerates. Furthermore, the Antigua and Barbuda Development Bank, which might play the role of market creator, has liquidity challenges.^[8] There is thus a need for public financial support which can act as an early adopter and kick-start the financing of low-carbon electric vehicles in the country, creating a market and increasing confidence for the private financial sector to invest in this technology. This is especially relevant for the public transport sector, where financial instruments that support taxi and bus owners to purchase electric vehicles would lead to the adoption of the technology in highly visible sectors.
- b) Another financial barrier is the combination of higher upfront costs and high electricity costs (see section 2) which results in a longer payback period for local purchases of electric vehicles to break even with internal combustion engines. Key factors resulting in this upfront cost differential and long payback period is the lack of policies and regulatory framework to incentivize the uptake of low-carbon electric mobility and disincentivize alternative high-carbon options:
 - a. There are no vehicle emission standards and no technical restrictions for imported vehicles. Thus 10- to 15-year-old cars from developed countries are imported into the island, resulting in a fleet that increases its GHG emissions each year. This lack of legislation leads to an influx of cheap polluting vehicles, creating a barrier to the introduction of electric vehicles due to the resulting significant cost incremental between such vehicles and electric vehicles. The existing Environmental Protection Levy Act of 2002 provides for a levy on imported vehicles to protect, preserve, and enhance the environment, but does not provide technical limitations. The only limitations are on the import of vehicles with ozone-depleting substances. There is no age limit nor vehicle inspections.

- b. Furthermore, Antigua and Barbuda has no restrictions on the content of sulphur in the fuels it imports. Fuels traded in the region are reported to have more than 2000ppm of sulphur. ^[9] The lack of fuel quality standards results in low fuel prices, providing a barrier to reducing the cost incremental between internal combustion engine vehicles and electric ones. It also results in an increase in local toxic emissions, reducing air quality.
 - c. There is currently no legislation regarding the type, characteristics, and installation requirements for the deployment of electric vehicle charging infrastructure in either private or public areas. This lack of legislation generates uncertainty for investors and developers seeking to promote electric mobility. Furthermore, if such infrastructure is installed without legislation it could damage the power generation and distribution system, block pedestrian pavements and increase congestion in urban areas.
- c) One of the barriers to the development of effective policies and regulations is the lack of data on the transport sector and mechanisms for data collection on public transport. With an absence of data and mechanisms for data collection, policy-makers lack of supporting information for developing evidence-based policies and regulations that promote and incentivize the use of electric vehicles as substitutes for conventional vehicles in the transport sector.

4. Lack of understanding of environmental implications.

- a) Antigua and Barbuda has a lack of regulations, policy framework and capacity for managing the disposing of vehicles across the country (see section 2). Due to its antiquity, the Solid Waste Management Act of 1995 (revised in 2005), does not have specific regulations related to the reuse, recycling and final disposal of vehicles (conventional or electric) or electric batteries. As a consequence, currently hundreds of conventional vehicles lay abandoned across the island. This uncertainty about the long-term environmental impact and related costs of the disposal of vehicles, and especially electric vehicles, leads to policy hesitation amongst decision-makers on promoting e-mobility. On the one hand, this hesitation is related to a lack of understanding of the environmental implications of the reuse of electric vehicle batteries and the disposal of electric vehicles, as the country is a tourist destination and strives to maintain its green reputation for economic income. On the other hand, this hesitation is related to lack of understanding of possible additional costs that the disposal of electric vehicles may bring. This hesitation results in an absence of a clear market signal to the private sector, reducing private sector interest in promoting electric mobility.
- b) Additionally, waste management companies in the country lack capacity in the reusing and recycling (including to export markets) and disposing of used vehicles (both conventional and electric) and electric batteries. Such lack of capacity leads to reduced interest of decision-makers and policy-makers to promote e-mobility as they perceive that the country does not have the capacity to support effective reuse and disposal of such vehicles. Increasing such capacity will support the country to effectively manage scraped vehicles which are currently abandoned across the country and pose a challenge for the National Solid Waste Management Authority, established under the Solid Waste Management Act.
- c) Finally, the efficiency of both the power generation plants and the power distribution system in the country is low, resulting in high carbon-intensive electricity. The lack of efficiency and GHG gas emission standards of the thermal power plants results in a disincentive for investment in new technology, as it promotes the continued usage of old, inexpensive, and unreliable systems.

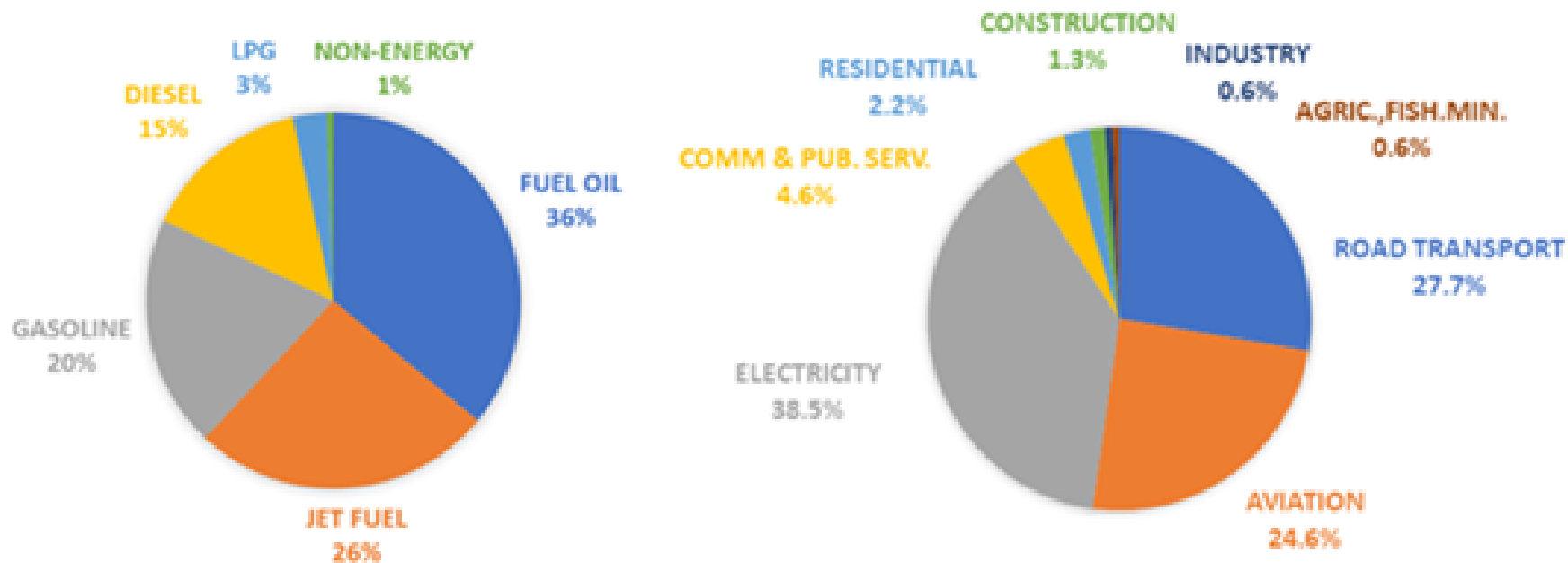
2) Baseline scenario and any associated baseline projects

Baseline scenario for energy and transport sectors

Energy

Antigua and Barbuda relies almost entirely on fossil fuel imports to cover its energy demands. Electricity is supplied by diesel generation by the Antigua Public Utilities Authority (the APUA) and one independent power producer (IPP), the Antigua Power Company Limited (APC). Electricity on Antigua is provided by five power plants with an installed capacity estimated at just over 100MW (including both APUA and APC) before accounting for significant transmission losses (see below). Peak load is estimated at 51MW, with surplus, typical for small islands, provided to ensure adequate power supply in the event of plant failure, including to ensure resilience during cyclone events. The electricity sector largely relies on a single fuel supplier, the West Indies Oil Company (WIOC).

This dependency results in high GHG emissions from the electricity generation sub-sector, with it being responsible for close to 40% of total GHG emissions. As Figure 2 shows, the country's energy matrix is heavily dependent on fuel oil used for electricity generation in thermal power plants. These represent 98.5% of the total power generation installed capacity, with the remaining 1.5% being solar photovoltaic (PV) generation. This includes a 4 MW ground mounted array in Bethesda, a 3 MW of solar photovoltaic panels installed in the grounds of the VC Bird International Airport and 800 kW of aggregated solar capacity distributed across government buildings in both islands. It is estimated that the electricity grid would be able to host 37.5 MW of solar PV, covering around 17% of the current annual electricity demand and with levels of curtailment below 2%, without violating established reliability criteria or the need for major system upgrades.[10]



Energy sector GHG emissions distribution by source.

Energy sector GHG emissions distribution by sector.

Figure 2. Energy sector GHG emissions distribution [11]

Electricity costs in Antigua and Barbuda are highly volatile due to the country’s dependence on imported petroleum-based fuels. APUA’s rate structure includes both a standard energy rate and a fuel variation charge to cover the fluctuating fuel costs associated with energy production. Currently the fuel variation charge makes up more than half of the total per-kilowatt-hour cost for the residential and commercial sectors subject to significant fluctuation due to changes in global fuel costs. Current prices are approximately USD 0.37/kWh.[12] As shown in Figure 3, transmission losses and clandestine connections add up to 28% of total electric generation. This scenario is in addition to a highly carbon intensive energy system, with an emission intensity of around 1T of CO₂/MWh consumed. Figure 3 shows that electricity consumption is expected to keep growing into the future. This is consistent with business-as-usual projections depicted in Figure 1, which show a sharp increase in the country’s overall emissions.

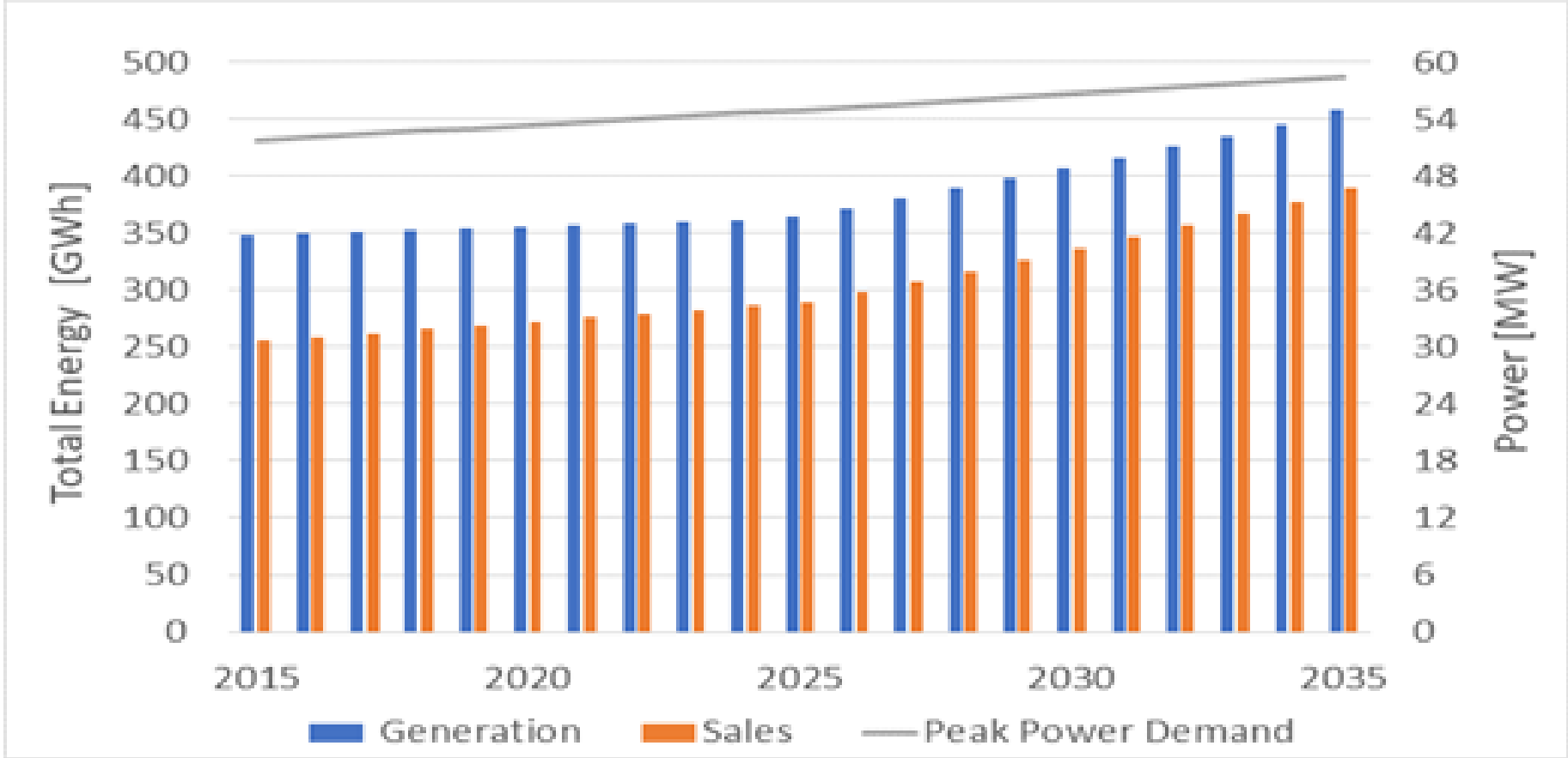


Figure 3. Electric energy sales, generation and peak power projection to 2035 [13]

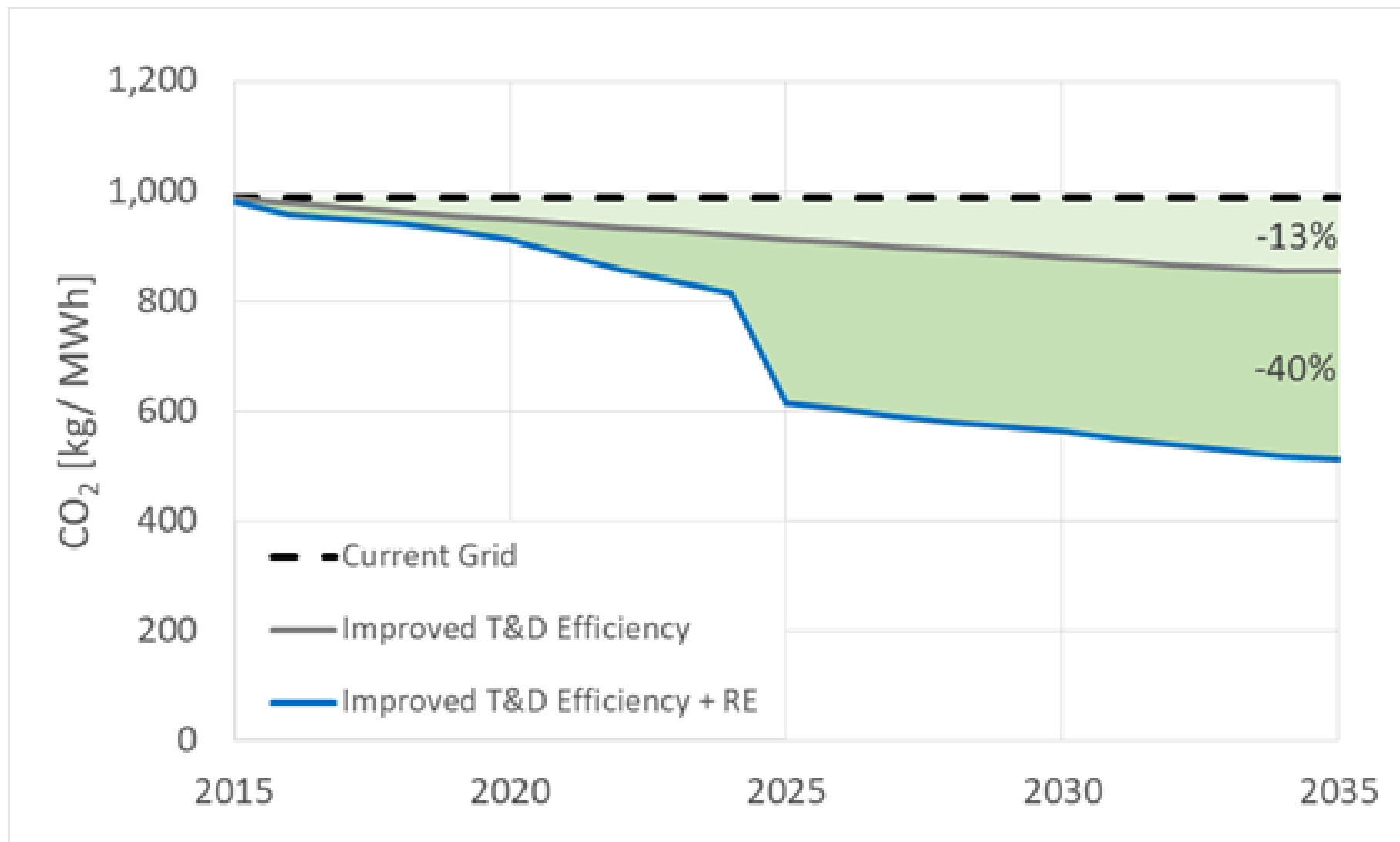


Figure 4. Electric grid GHG emissions factor projections for an improved transmission and distribution efficiency scenario^[14]

To address the above, the country has identified approximately 21 MW of additional renewable power generation capacity that could be deployed. The type and rollout of investment is still to be established,⁷ with baseline projects supporting this listed below. Improvement in the energy distribution system would result in a further considerable reduction of the electricity system carbon intensity. As a result, as shown in Figure 4, the grid GHG emission intensity would be reduced to around 50% of current values. This is in direct correlation with the country's NDC conditional mitigation targets, which states that by 2030 its energy matrix should have incorporated 50 MW of renewable electricity from both on and off grid generation and is consistent with projections presented in the "Antigua and Barbuda's First Biennial update Report, Government of Antigua and Barbuda 2020"³. As inefficiencies in the distribution grid are reduced and higher penetration of renewable power generation is deployed, vehicle fleet electrification becomes more beneficial in terms of GHG emission mitigation. The government is currently considering options to enhance the grid to reduce transmission losses, integrate renewable energy sources and make it more resilient to extreme climatic events. It is currently

undertaking a project to resilience of the grid by burying all electrical lines along Friar’s Hill Road underground, thereby reducing the damage potential to the lines during a tropical cyclone. It is also undertaking works through-out the country to reduce transmission losses by improving tower connectors and addressing corrosion. Furthermore, the Antigua Public Utilities Authority (APUA) is currently procuring energy storage technologies to eliminate curtailing of energy produced through the 3 MW solar array located on the grounds of the VC Bird International Airport, ensuring full utilization of the solar energy generated through this array as a contribution to greening the grid.

Transport

The road transport sector also contributes significantly to the country’s national GHG emissions, representing approximately 20% of total national GHG emissions. The vehicle fleet (Table 1) is constituted of private vehicles (72%), with the rest of the fleet integrated by light duty vehicles (vans, etc.) (18%), heavy duty vehicles (5%), buses (4%) and motorcycles (1%). The lack of vehicle emission standards and technical restrictions on vehicles has resulted in the importing of 10 to 15-year-old cars from developed countries, resulting in a fleet that increases its GHG emissions each year. In recent years, the country has imported approximately 6000-7000 vehicles each year, with new vehicles constituting 30-40% of the imports. Moreover, the lack of fuel quality standards results in an increase in local toxic emissions, and consequently air quality has become an issue across the country. In addition, the lack of a plan for the final disposal of vehicles altogether with the lack of regulations for technical and safety revisions makes vehicle scrapping uncommon and vehicles stay on the road while mechanically capable of doing so and are then abandoned.

Table 1. ROAD TRANSPORT SECTOR FLEET COMPOSITION IN THE YEAR 2015, CATEGORIZED BY TYPE OF WEIGHT, FUEL AND OPERATION⁶.

Category	Weight	Fuel Type	Operation	Quantity (% of total)
Motorcycles	Light	Gasoline	Private passenger	570 (1%)
Private vehicles	Light	Mostly gasoline	Private passenger	35,350 (72%)
Light-duty vehicles	Light	Gasoline/Diesel	Products and services	8,800 (18%)
Heavy-duty vehicles	Heavy	Mostly diesel	Products and services	2,330 (5%)
Buses	Heavy	Diesel	Public passenger	1,840 (4%)
Total fleet				48,900

In addition to the significant fuel consumption and the substantial amount of greenhouse gas emissions produced by the transport sector, fossil fuel combustion produces localized pollution and noise which have a negative impact on the population’s health. This scenario, added to the lack of vehicle emission standards, makes urban air quality a major concern. Figure 5 shows the road transport sector GHG, nitrogen oxides (NOx) and particulate matter (PM) emission distribution by fleet. While the main aggregate source of GHG emissions is light duty vehicle fleets, heavy duty vehicles and buses are responsible for 85% and 96% of the fleet’s NOx and PM emissions, respectively. This is mainly because the latter run on high sulphur diesel. Antigua and Barbuda does not have fuel and toxic emission standards, and fuels with sulphur content over 2000ppm are being imported into the country. The high contribution of private cars towards GHG emissions is mainly due to their share of the total fleet (72% of all road vehicles).

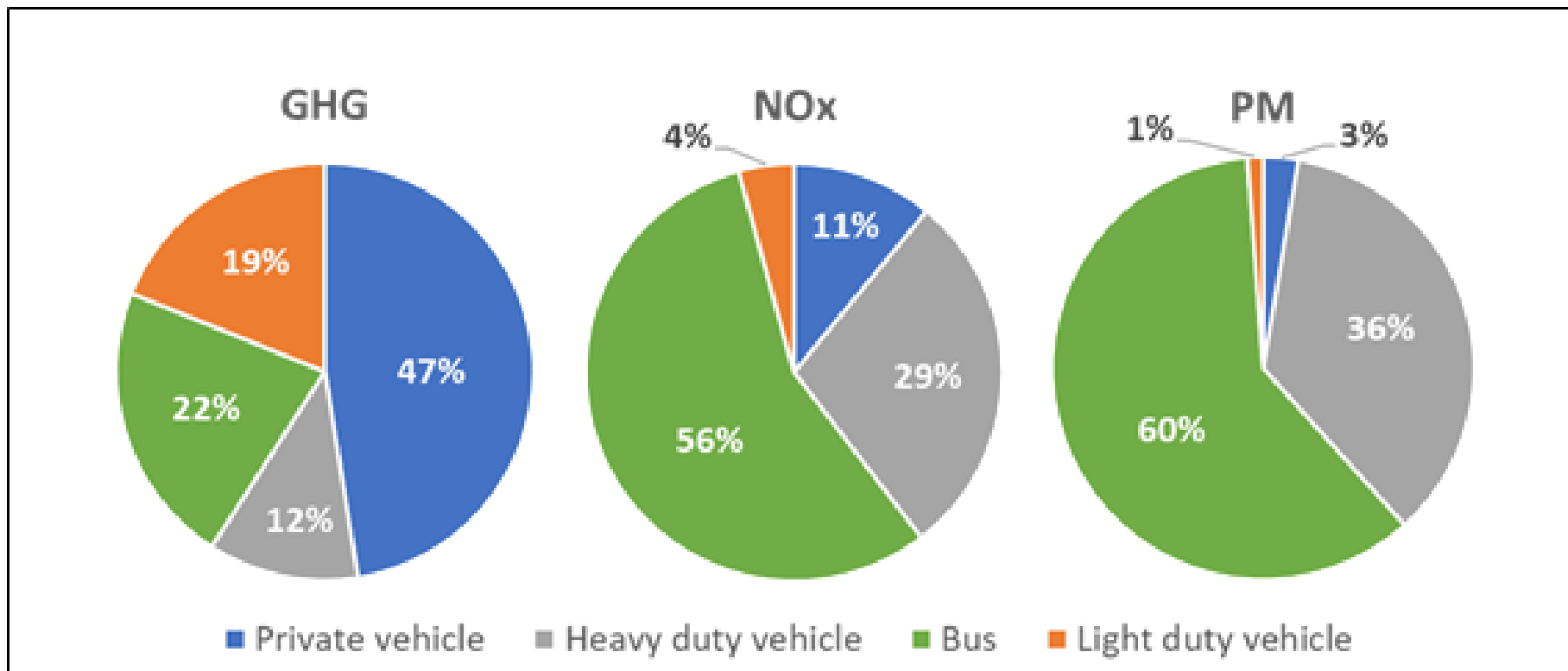


Figure 5. EMISSIONS OF GREEN HOUSE GASES (GHG) NITROUS OXIDE (NO_x) AND PARTICULATE MATTER (PM) FROM TRANSPORT BY MODE⁶.

With the high fleet emission factors and energy consumption posing a significant environmental, economic and social problem, the situation is compounded when the fleet historic growth rates are taken into consideration and the projected growth in the fleet is estimated. The Antigua and Barbuda road fleet has experienced a considerable growth in past years, with all sectors of the transport sector experiencing an annual growth rate in excess of 6.5% throughout the last decade (Table 2).

Table 2. Average growth rate over the last decade of the Road Transport Sector of Antigua and Barbuda by vehicle category⁶

Category	Growing Rate
Private vehicle	6.5%
Light duty vehicle	6.8%
Heavy duty vehicle	8.7%
Buses	7.6%

Based on this, Figure 6 and Figure 7 show the country's projected vehicle fleet and GHG emission till 2035 under BAU conditions. If recent trends in vehicle ownership are maintained, Antigua and Barbuda will double the population of vehicles on the road by 2035, which will in turn result in a doubling of the road transport sector GHG emissions.

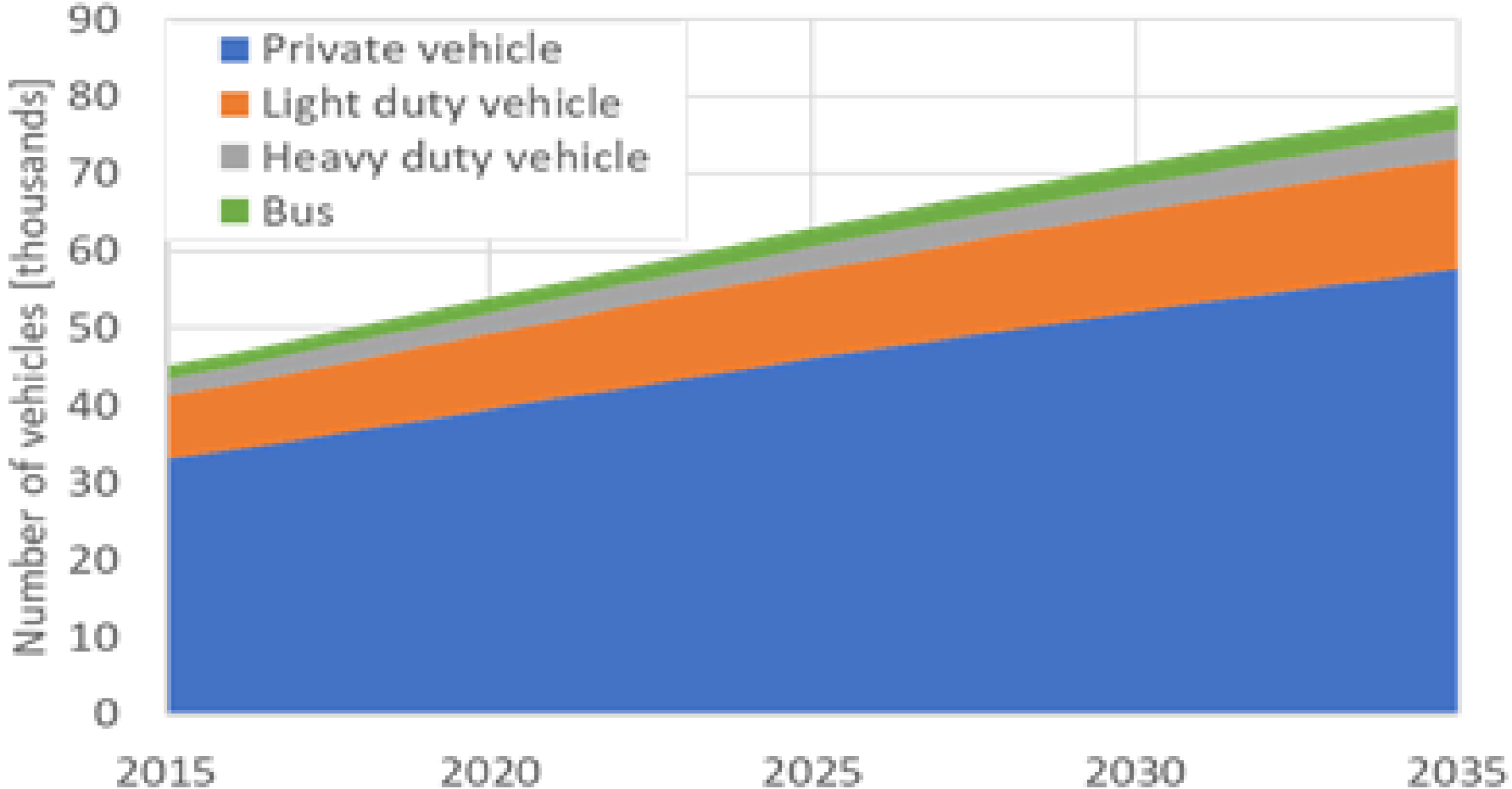


Figure 6. - ROAD TRANSPORT FLEET PROJECTIONS TO THE YEAR 2035⁶.

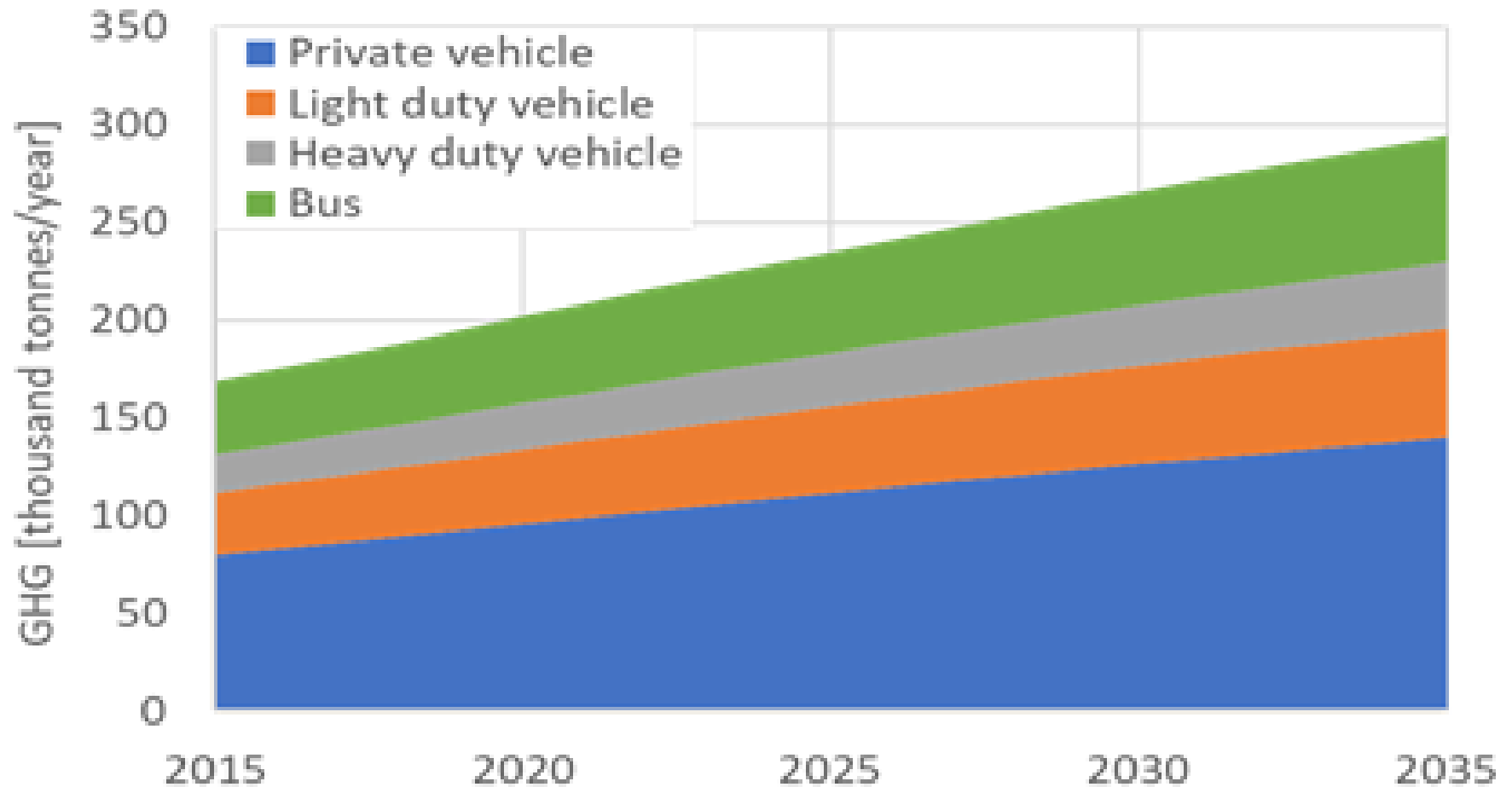


Figure 7. PROJECTIONS OF GREENHOUSE GASES FROM Road TRANSPORTATION TO THE YEAR 2035⁶

In addition to the environmental problems caused by the road transport fleet, transport infrastructure in Antigua and Barbuda shows clear signs of saturation and congestion. Only 23% of the population of Antigua uses public transportation to go to work. This is surprising given that the bus fleet grew 7.6% per annum over the last decade. Based on the Antigua and Barbuda Transport Board (ABTB)'s records, the current bus fleet consists of 1,096 vehicles. ABTB defines a bus as all vehicles with over 12 seats; using the data provided by the ABTB this was disaggregated into public buses (397 units), school buses (46 units), other government vehicles (91 units), large taxis (415 units) and commercial fleets, for instance, of the hotel industry (147 units). The public transport system is serviced by 397 buses, out of which 323 are currently active. Most of these vehicles are owned by their drivers, who operate a given route but do not have to comply with a given time schedule or fixed bus stops. System indicators, passengers transported, fare collection, system costs and overall economic performance of the system is unknown. This results in a precarious and atomized system, with little to no access to capital financing to enable future improvements. Modal shift to buses, through an enhanced service (more modern buses, fixed bus stops and timetables) would have a significant impact in reducing GHG emissions. The Antigua and Barbuda Bus Association represents drivers with regards to policies, regulations and government interaction.

The taxi system has a similar structure to the bus system, with vehicles generally owned by their drivers. There are 1,706 registered taxis out of which 1,233 are operational. The average age of vehicles is 15 years, with the oldest vehicle actively operating being almost 40 years old. 15 new taxis were incorporated into the fleet in 2019, perhaps demonstrating that current regulations do not incentivize the incorporation of newer more efficient cars. In terms of interaction with the government, there are three taxi associations. One represents taxis operating from the airport, another one taxis operating from the capital city of St John's and the third taxi working across the island. The Public Transport Union represents all taxis and bus drivers.

Antigua and Barbuda does not have policies or regulations on taxi replacement. As a consequence, there is no requirement to retire a taxi from the fleet at a certain vehicle age or level of usage (vehicles are only retired involuntarily only if certified as unroadworthy). When a taxi driver decides to replace a taxi (based on their autonomous decision), purchases are made through a combination of cash and loans from local financial institutions and car dealerships. They can buy an imported new or used vehicle to use as a taxi. The taxi driver generally sells their used vehicle or dumps it (a well-documented challenge in the country, see section 1). If they have a newer used car (1-5 years old), they also have the option to trade it back to the car-dealer which they bought it from. Car-dealerships are not interested in receiving old vehicles due to the lack of resale value and potential disposal issues. For newer second-hand cars, trade ins are not a barrier as there is a strong second-hand market for such vehicles. For loans from local financial institutions, such as the Antigua Commercial Bank and the Community First Co-operative Credit Union, a cash deposit of 0-50% is required, with loan interest rates ranging between 8 and 15%;^[15] The cash deposit and interest rates are higher for used vehicles. Taxis are purchased individually, with taxi leasing not been used in the country.

Baseline policies and strategies

To address the business-as-usual scenario for its electricity generation and transport sub-sectors, Antigua and Barbuda has begun to introduce a series of ambitious targets and policy measures. In its nationally determined contribution (NDC) (2015), it committed to achieving an energy matrix with 50MW of electricity from renewable sources. The country is now revising its NDC and is considering including a transition to 100% renewable energy in the energy sector by 2030 and 100% electrification of the transport sector by 2040. The government intends to finalize the updated NDC in 2020 and well before COP 26 in Glasgow.

Antigua and Barbuda has been steadily working to introduce energy policies that advance the deployment of renewable energy technologies. In 2011, it established the National Energy Policy (NEP), which aims for 15% of energy to come from renewable sources. The NEP was followed by the Sustainable Energy Action Plan (SEAP), which outlined a roadmap of strategies to assist in achieving the aims of the NEP, such as increasing energy efficiency and accelerating the deployment of renewable energy technologies. In 2015, the Renewable Energy Act was passed which aims to increase the adoption of renewable technologies through the use of net-billing policies. Although these policies and plans are in place, a change in the utility's feed-in-tariff mechanism has lengthened the payback time for these systems when compared with past net metering policies, and resultantly have slowed the uptake of solar PV systems.

Another key public strategic document is Antigua and Barbuda's agenda for socio-economic development, its "Medium-Term Development Strategy (MTDS)." Prepared by the Ministry of Finance and Corporate Governance, under the directive of Prime Minister, the MTDS was completed in 2015 and represents a set of strategies and actions to be undertaken by Antigua and Barbuda over the medium-term (2016 to 2020) with the intention to set guidelines and targets in moving the country towards its long-term goals of embodying sustainability. Included in its seven flagship priorities are priorities related to promoting low-carbon and climate-resilient electric mobility:

1. Adequate Infrastructure;
3. Transform Barbuda into a Green, Low Density, High-End Tourism Destination; and

6. Reducing the Cost of Energy and Improving Energy Security.[16]

Within these flagship priorities are ‘actions’, including as related to renewable energy and efficient transport.[17] The government is currently working on a new development strategy, with efforts delayed due to the need to focus on the response to the COVID pandemic. The new strategy will be aligned with the updated NDC.

Furthermore, in 2019 the Government of Antigua and Barbuda established the Environmental Protection and Management Act (EPMA) (2019). The EPMA serves as the principal guiding policy for the Department of the Environment. It establishes and consolidates the implementation of the Multilateral Environmental Agreements in one legal regime and provides the financial framework for implementation. Within the EPMA, Sections 24 – 37, is a mandate for registering and setting standards for various pollutants as well as penalties for breaking established standards. This includes the emission of greenhouse gases (GHG) and thus has implications for the sectors which are the primary sources of GHG: the energy and transportation sector.

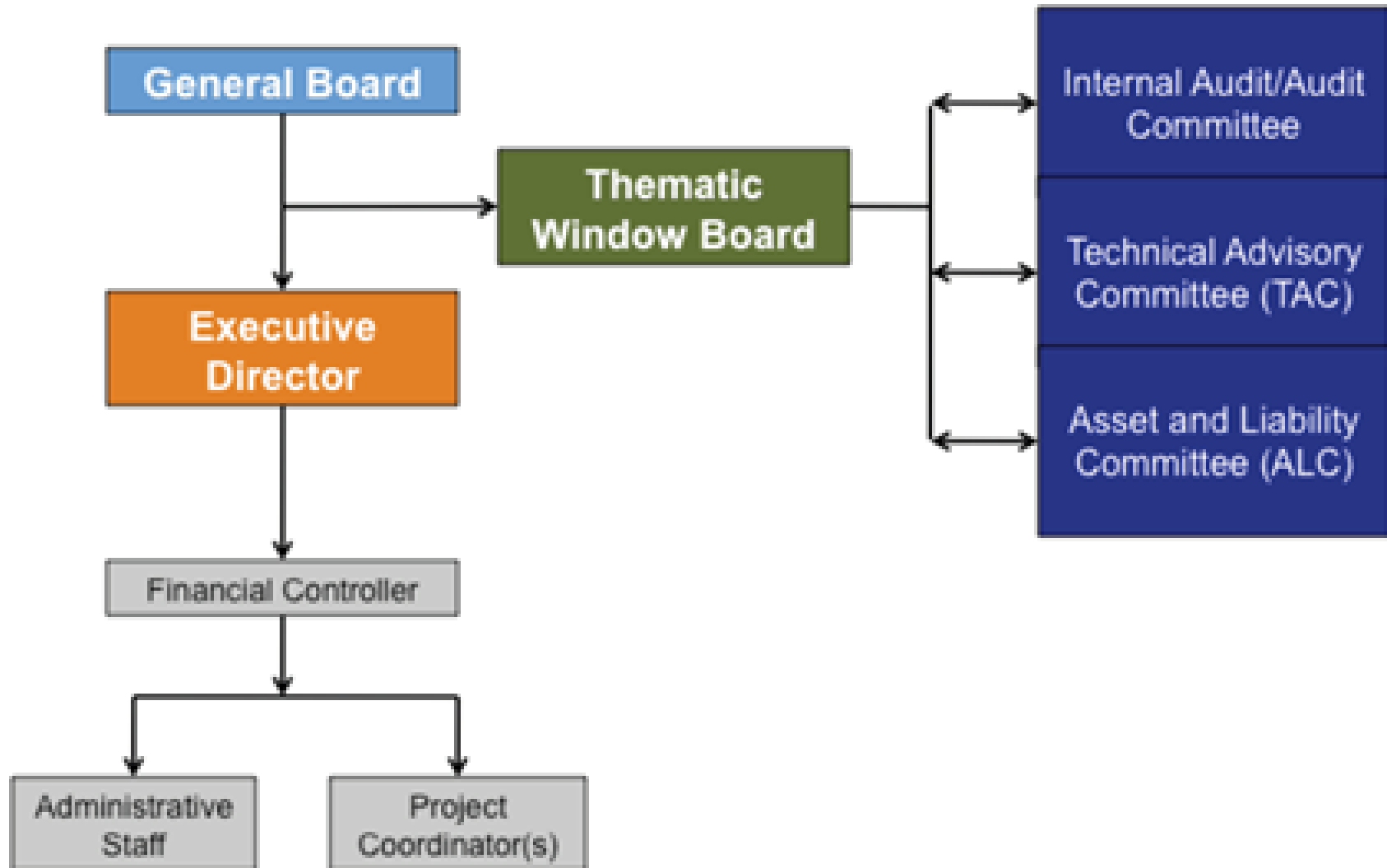
While the aforementioned represent important advances in promoting a transition to low-carbon and climate resilient transport, there is a lack of regulations and standards to incentivize such transport, as noted in section 1.

On government institutions, the Department of Environment (DoE) of the Ministry of Health, Wellness and the Environment is the lead governmental organization for environmental regulation and monitoring and the promotion of sustainable development, as mandated through the EPMA. Other key institutions are the Ministry of Energy, which provides regulatory control to the Antigua Public Utilities Authority (APUA) and the Ministry of Works, which is responsible for the Transport Board, a statutory corporation under the government. Further information on key stakeholders is contained in section 2.

On financing of sustainable development, in 2015 the Sustainable Island Resource Framework (SIRF) Fund[18] was created to attract, centralize and direct internal and external funding towards climate change adaptation and mitigation projects. It was established under Section 84 (3) of the Environmental Protection and Management Act (EPMA) 2015. It establishes a funding framework to be capitalized by domestic and international sources such as development banks and environment funds, and internal sources such as pollution charges, visitors’ fees or carbon credit. The collected funds are then directed to adaptation, mitigation and risk management activities through instruments such as capital investments, small loans at concessional rates and insurances schemes. Currently, the fund is in the process of being operationalized and through the GEF project Sustainable Pathways – Protected Areas and Renewable Energy (SPPARE) thematic windows are being created to pilot three potential revenue streams:

1. SPPARE Component 3: The sale of renewable energy to the Antigua Public Utilities Authority
2. SPPARE Component 2: Entrance fees from Boggy Peak Protected Area (BPPA)
3. SPPARE Component 4: The purchase of carbon offsets using the Boggy Peak forest as a carbon sink

The organizational structure of the Fund and key relationships with various key stakeholders is detailed below.



While the SIRF Fund is in an important step in supporting the financing of climate change mitigation projects, it is not yet structured to directly fund electric mobility. Furthermore, to date there has not been interest from the local private sector financial community to fund electric mobility (see also section 1).

On waste, solid waste is regulated under the Solid Waste Management Act of 1995 (revised in 2005). Due to its antiquity, the act has no specific regulations on the re-use, recycling and final disposal of vehicles (conventional or electric) or electric vehicles. This act also established the National Solid Waste Management Authority (NSWMA) as a Statutory Corporation within the Ministry of Health. The NSWMA has the overall responsibility of managing solid waste generated

within the state of Antigua and Barbuda; this includes waste storage, collection, treatment, and disposal.

To further governmental consideration of how to manage used vehicles and vehicle waste, the Department of Environment commissioned Logios to prepare a report “Environmental impact assessment and solid waste management strategy for decommissioning of vehicles and used batteries”, which was finalized in August 2019. The document describes the environmental legislation currently used in Antigua and Barbuda related to the management and disposal of waste. It also describes the country’s technical capacity to dispose of waste. International best practices policies for waste management are described, with an emphasis on those related specifically to the management of hazardous waste. Successful programs implemented and developed in other countries are described and a list of recommendations is presented. Recommendations are related to the need to strengthen waste management processes (including a defined waste hierarchy); strengthen institutional and governance arrangements of waste management; enhance data capture and management; reassess landfill requirements for vehicles and used tyres; build capacity and strengthen processes for managing hazardous waste; develop a national waste management framework; and develop regulatory requirements related to vehicle part recycling.

Baseline investments

Projects aimed at introducing grid-interactive renewable power and electric mobility are underway or will be undertaken during the project’s lifetime (see Table 3). In addition to reducing the carbon footprint of the grid, these aim to: 1) increase the resilience of strategic government service providers such as hospitals, police, armed forces etc. against extreme weather events and subsequent power outages; and 2) reduce dependence on the fossil fuel power supply from the Antigua Public Utility Authority (APUA). While some initiatives supporting renewable energy are beginning to occur, there has been just one baseline activity to date on electric mobility. This GEF project will aim to build upon these, in particular upon the GEF SPPARE project through the creation of a SIRF fund e-mobility window (component 3), the Italian Electric School Bus Pilot Program in Antigua (component 2), the Grid Interactive Solar PV Systems for Schools (component 2) and the ADFD concessional loan on renewable energy (component 2). Further information on how the project baseline activities in described in section 3.

Table 3. BASELINE PROJECTS AND ACTIVITIES

Project Name	Implementing Agency	Description	Execution Period	Budget, US\$
Italian Electric School Bus Pilot Program in Antigua (EBUS)	Department of Environment (Antigua and Barbuda)	<p>This project, funded by the Government of Italy, purchased two electric school buses to be used in Antigua. The aim of this project is to gather information on the applicability of electric buses in Antigua in preparation for scale-up projects, and to reduce emissions in bus traffic.</p> <p>The project handed over the buses to Antigua and Barbuda Transport Board to be used in the National School Bus System in September 2020 and will go into operation in the same month. The key lesson learned to date was on the need to carefully budget the cost of vehicles, as the initial project budget underestimated the cost of electric buses. This delayed the start of the project and led to a reduction in the project’s scope; the project no longer focuses on policy regulatory aspects of incorporating ele</p>	2017 - Ongoing	US\$ 625,000

		<p>ctric buses into public transport. The project also had to reduce bus features such as wheelchair access.</p> <p>This budget lesson has been taken into account in the development of the budget for this GEF project, with bus costs budgeted based on accurate cost predictions including based on procurements through the EBUS project. The intention is to scale up the EBUS project through the GEF project, which will develop incentivizing policies and regulations and execute more broad-reaching demonstrations. Scale up is also intended through a proposed GCF project (see below), which would provide a loan to reduce capital costs for broad adoption of electric public and school buses.</p>		
GEF Sustainable Pathways – Protected Areas and Renewable Energy (SP PARE)	GEF/UNEP	This GEF project, managed by the Department of Environment, aims to enhance financing and management of protected areas through: i) identification of potential sources of revenue for protected area management; and ii) development of a business plan for the implementation of a financial plan and associated legislation. The project will also establish an environmental management window of the Sustainable Island Resource Framework (SIRF) Fund.	2015 - Ongoing	US\$ 2,639,726
Transformation of the water and government sectors using renewable energy	IRENA/ Abu Dhabi Fund for Development (ADFD)	<p>This 5 MW solar–wind hybrid project is being implemented by the Government of Antigua and Barbuda’s Department of Environment under the SPPARE project as part of a wider scheme to transform the water sector and provide low-emission and climate-resilient energy for critical services in the small island state. The project involves the installation of foldable wind turbines and solar PV panels, with battery backup for electricity storage in the event of extreme weather events. Beneficiary facilities include reverse osmosis desalination plants for clean water provision as well as providing electricity to hospitals, community clinics and emergency response public service buildings.</p> <p>The ADFD provided a concessional loan of USD 15 million under the IRENA/ADFD Project Facility. The funds are used to implement the following sub-projects under the SPPARE Project:</p>	2016 – Ongoing	US\$ 15,000,000

		<p>1. Installation of 4.125 MW of wind turbines at Parham Ridge and Sir Vivian Richards Stadium. The aim of this wind energy sub-project is to reduce the dependence of potable water production on fossil fuels and increase the resilience of this infrastructure. (<i>Vergnet serves as the Implementing Entity</i>).</p> <p>2. Installation of 696 kW of solar PV systems at Mount St. John Medical Centre. The aim is to reduce emissions of the medical center and increase its resilience to grid disruption and failure (<i>Vergnet serves as the Implementing Entity</i>).</p> <p>3. Installation of 288 kW of solar PV and 810 kWh of battery energy storage systems on 9 health clinics, 1 pharmacy and two government buildings. The aim is to reduce emissions and increase the resilience of the infrastructure (<i>GreenTech Solar is serving as the Implementing Entity</i>)</p>		
Grid Interactive Solar PV Systems for Schools (GISS)	Department of Environment (Antigua and Barbuda)	This project installed 127kW of solar PV systems and battery energy storage systems at 19 schools around Antigua. The aim is to increase the resilience of these buildings and reduce their emissions and operating costs.	2017 - Ongoing	US\$ 825,000
NDC Partnership and Climate Action Enhancement Package	Department of Environment (Antigua and Barbuda)	In August of 2019, the Department of Environment (DOE) applied for support under the Partnership's Climate Action Enhancement Package (CAEP) to enhance and fast-track the implementation of the country's NDC. To aid the country in 100% transition to renewable energy, the DOE requested support for the production of a National Greenhouse Gas Reduction Report, and the development of a Framework and action plans for the just transition of the workforce, and the conduct of Technological Needs Assessment. In addition, the CAEP will support Antigua and Barbuda in strengthening its enabling environment to drive the implementation of the NDCs; strengthen monitoring, reporting and verification processes to track the effectiveness of adaptation and mitigation actions; and establish a mandatory insurance scheme for farmers, fishers, residents and businesses to facilitate recovery from extreme climate events. The technical assistance will be provided through NDC Partnership's implementing partners: IRENA, Climate Analytics, OECS Commission, Global Green Growth Institute (GGGI) and the Caribbean Cooperative MB	2019 - Ongoing	US\$ 250,000

		en Growth Institute (GGGI), and the Caribbean Cooperative MRV Hub.		
SIDS Lighthouse Initiative	IRENA	In November 2019, the Government of Antigua and Barbuda requested support from IRENA to undertake a study to outline a roadmap for the transitioning to 100% renewable energy in both the electricity and transport sectors. The support was granted through IRENA's SIDS Lighthouse Initiative which seeks to accelerate uptake of renewables in islands. The Energy Roadmap will serve as a high-level masterplan for the phase out of fossil fuels. It primarily focuses on the energy sector, on ways to decarbonize energy generation and identify electricity requirements for a low-carbon transport sector.	2020-Ongoing	Information not publicly available
Technical assistance from the Climate Technology Centre and Network (CTCN)	Department of Environment (Antigua and Barbuda)	The Climate Technology Centre and Network has provided technical assistance to the Department of Environment on two relevant projects: 1. "Resilience to climate variability in the building sector of Antigua and Barbuda" was complete in 2019. It provided a summary of current building standards and identified interventions needed to increase the resilience of buildings in the country, including decentralized renewable energy generation. 2. Technical assistance has been requested for improving the resilience of the education system to climate change impacts. The study will consider the costs of, inter alia, the implementation of solar PV and battery systems for schools.	2017 - Ongoing	1. Valued at US\$50,000 – 100,000 2. To be determined
Technical assistance from the Global Green Growth Institute (GGGI)	Department of Environment (Antigua and Barbuda)	The Global Green Growth Institute (GGGI) and the Organization of Eastern Caribbean States (OECS) signed a Memorandum of Understanding (MoU) in February 2018, to assist OECS member countries in achieving their NDC targets by strengthening green growth planning and increasing climate finance, especially in the energy sector. In 2019 the GGGI completed a \$100,000 project with the OECS, undertaking a desk review on solar PV/energy resilience insurance mechanisms completed and preparing a report on enhancing resilience in the Caribbean through hurricane-proofing rooftop solar panels was developed and delivered to OECS. ^[19]	2018-Ongoing	\$100,000

		GGGI and the DOE signed an MOU in late November of 2019. The partnership established in this MOU is for the development of projects for the Green Climate Fund, particularly a programme dedicated to the transition to 100% renewable energy in the transport and electricity sectors.		
Renewable energy for schools	Government of India	Through a grant provided by the Government of India, up to 150 kW of solar photovoltaic panels and battery energy storage will be installed on schools through-out the country.	2020-On-going	US\$ 1,000,000
Green Climate Fund (GCF)	Department of Environment (Antigua and Barbuda)	<p>The Department of Environment is developing a concept proposal to scale up the GEF project through a GCF project on electric transport. The project is currently being developed and is yet to be approved. Antigua and Barbuda will submit the project to the GCF in 2021 for consideration of the final GCF Board meeting in 2021.</p> <p>Based on the current concept draft (and noting that this may change), the project would consist of a US\$10 million loan with the objective of supporting the government to scale up the GEF-7 electric mobility project and EBUS project through the procurement of electric buses for public transport and schools. It would also facilitate the decommissioning of 30% of the government fleet's internal combustion engine vehicles and facilitate bulk replacement with electric vehicles, prioritizing vehicles in the emergency and education sectors. The scope is primarily on public transport and governmental fleets. The project is currently designed to consist of a US\$10 million loan, a US\$10 million reimbursable grant and a US\$15 million grant.</p>	TBD	Estimated US\$ 35,000,000

In addition to the above baseline projects, the Department of Environment of the Ministry of Health, Wellness and the Environment is currently exploring with the Green Climate Fund possibilities for scaling up the GEF-7 e-mobility project.

1) Proposed alternative scenario with a description of project components, outcomes, outputs and deliverables

The activities proposed aim to put in motion the transformation of both the power and transport sectors of Antigua and Barbuda, transitioning these from the current scenario of fossil fuel dependence to a future where low-carbon and climate resilient technologies are predominant. The project will focus on strengthening political and public support for the uptake of low-carbon and climate-resilient electric transport and power generation systems. This will be achieved by: reducing technological, financial and modal barriers through technical assistance and investment in pilot projects; building local capacity in related areas; and implementing regulations, policies and standards to secure a sustainable transition into the future and avoid potential environmental contamination.

The project has four components. Component 1 will focus on addressing institutional barriers related to capacity, coordination, consultation and awareness. Component 2 will focus on demonstrating to key stakeholders the technical, economic and social viability of low-carbon and climate resilient electric mobility under local operating conditions. To enable the long-term sustainability of the proposed transition, component 3 will establish the required standards, regulations and policy framework needed for a sustainable scale-up of low carbon electric mobility, along with establishing a long term financial mechanism to facilitate the affordability of electric vehicles by reducing capital requirements. These actions will reduce the cost-differential between electric and conventional vehicles and in-combination with the creation of confidence in the technology through component 2, support market creation for this technology. Finally, component 4 will focus on facilitating the environmental viability of the transition to low carbon electric mobility by generating local capacity on the reuse, recycle and end-of-life vehicle disposal of both electric and conventional vehicles, and establish regulations to enforce the adequate disposal of vehicles.

Component 1: Institutionalization of low-carbon and climate-resilient electric mobility

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This component aims to strengthen national cooperation and coordination, build a knowledge base and capacity, and raise awareness for accelerating the adoption of low-carbon and climate resilient electric mobility in Antigua and Barbuda. A multi-stakeholder strategy will be implemented to ensure that the design, implementation and evaluation of interventions draws on the inputs and interests of all national stakeholders. Capacity will be built by supporting public stakeholders to undertake a comprehensive technical analysis of the possibilities for transforming the island to renewable energy and low-carbon and climate resilient transport. Further capacity will be built by dedicated trainings which draw on the global programme. Based on these outputs, cooperation and coordination will be strengthened, firstly through the development of a national target on electric mobility. A national plan will then be developed for achieving this target, through broad ranging consultations mechanisms aforementioned. Finally, public awareness will be raised to build support for implementing the plan and to inform of the benefits and viability of low-carbon electric mobility in Antigua and Barbuda. The outputs build upon co-financing by the Department of Environment and the NDC partnership such as mapping and engaging stakeholders, developing communication plans, and establishing gaps in the current progress to reduce GHG emissions in relation to the NDC conditional mitigation targets.

Outcome 1: The Antigua and Barbudan government demonstrates enhanced coordination, capacity and commitment on promoting electric mobility-.

Outputs:

· Output 1.1: A multi-stakeholder consultation strategy is implemented and recommendations for a long-term coordination mechanism are delivered to key government actors.

As mentioned in section 1, a key barrier that Antigua and Barbuda faces is a lack of consultation and coordination between national governmental entities and with the private sector and civil society in undertaking actions related to the electricity and transport sectors. This output aims to address this barrier by implementing a multi-stakeholder consultation strategy that facilitates the incorporation of broad public, private and civil society, including gender-sensitive, views into the design, implementation, monitoring and assessment of renewable energy and electric transport interventions. This will also build upon recommendations of previous studies.[19] While it is intended that the strategy sets a basis for continued consultation over the medium- to long-term, as the country works towards its 2030 targets, it will be implemented to have an impact in the short-term, including for facilitating the effective implementation of project interventions. The strategy will be used to support the implementation of project activities throughout all project components (including outputs 1.4, 1.5, 2.2, 2.4, 3.1, 3.2, 3.3, 3.4, 4.2 and 4.3). Recommendations for a long-term coordination mechanism will be developed and delivered to key government actors along with an a public-private strategy and action plan to enable a just transition of the local work force during the transition to electric mobility. The strategy will ensure effective consultation with economically vulnerable groups, such as single-parent women, rural communities, independent bus drivers and groups and associations representing people with reduced mobility and disabilities. It will also ensure all actors have an equal voice. Work under this output will build upon work of the NDC Partnership which through its Climate Action Enhancement Package will undertake stakeholder mapping and develop stakeholder engagement plans related to NDC implementation.

D1.1.1: Stakeholder consultation strategy developed.

D1.1.2: Stakeholder consultation strategy activities implemented (with quarterly tracking reports).

D1.1.3: Report with recommendations for a long-term coordination mechanism.

D1.1.4: Public-private strategy and action plan to enable a just-transition of the local work force.

· Output 1.2: A comprehensive assessment of the economic, environmental and social viability of fleet electrification, renewable energy capacity penetration and electrical distribution grid stabilization is produced and disseminated with key government decision-makers.

As noted in section 1, national policy-makers and decision-makers currently lack knowledge on key areas of the deployment of low-carbon electric mobility. Without such knowledge, the country is unable to advance with effective policy development and monitoring. Furthermore, coordination is hampered as key local actors have a lack of clarity as to the implications of such a transition.

To date a few high-level studies have been undertaken which highlighted broad barriers, gaps in the regulatory framework and potential emission reductions of different measures.[20] Although these studies provided important general overviews, none had the required depth required for supporting the development of long-term roadmaps and actions plans, policies, regulations and standards for transitioning to a low-carbon transport sector. Understanding the entire value change of the different power generation technologies is crucial to establish cost effective measures to promote the uptake of clean energy systems. For instance, in terms of renewable energy grid penetration, whilst estimates have been proposed on the potential uptake of the current system, none have established how broad renewable energy systems will be deployed, what is the required grid infrastructure investment, and what would be the plan for old fossil plant decommissioning.

Based on the above, this output will support the development of in-depth techno-economic, social and environmental assessments of fleet electrification, renewable energy generation capacity and electric distribution grid stabilization and capacity. These studies will provide the foundation for the development of the national commitment on low-carbon and climate-resilient electric mobility (Output 1.4), the supporting development plan (Output 1.5), the financial window of the SIRF fund (Output 3.1) and needed policies and regulations (Outputs 3.2, 3.3, 3.4 and 4.3).

The fleet electrification feasibility analysis will evaluate the technoeconomic feasibility of electrification of the different transport fleets and establish the requirements of charging infrastructure and investment rollout for varying scenarios of electric mobility penetration. Whilst the analysis will focus on public bus transport applications, a high-level analysis will be performed to identify other high usage factor fleets that could transition towards electric vehicles (taxis, postal vehicles, hotel and other tourism related shuttles, etc.). It will detail the different international standards, regulations, and communication protocols of charging infrastructure. It will further identify vehicle certification regulations used in different markets to guarantee vehicle safety. Required install capacity in the different parts of the country, as well as potential charging scenarios, will be provided for the grid stability evaluation in order to understand the impact of vehicle charging across the grid and not only as an overall power requirement.

The renewable energy generation capacity analysis will identify the required future installed capacity of renewable power generation for Antigua and Barbuda to meet its NDC greenhouse gas emission mitigation contributions and for varying scenarios of e-mobility penetration. Based on the result presented by D1.2.1 the document will establish the required renewable energy installed capacity to meet the requirement of the future transport fleet. It will also indicate the type of installed capacity, as well as its potential location and grid feed in node connection. An economic analysis for each plant will be undertaken, establishing the required investment rollout on the projected cost of generation. The document will detail how feed-in tariffs and other renewable energy support mechanisms such as private to private power purchases, have been implemented in other countries and give an informed opinion on which scheme(s) would be viable for Antigua and Barbuda. Furthermore, the report will highlight the current cost of renewable and conventional power, detailing the entire value chain of the systems, identifying areas where costs are excessive compared to international standards and provide solutions on how to reduce the current capital cost of renewables as well as the current cost of conventional fossil generation. Based on the above, the analysis will establish the greenhouse gas mitigation effectiveness of vehicle electrification considering the entire country energy system. Results will provide insight into novel business models and financial mechanisms used to maximize the economic outlook of the required investments.

The electricity distribution grid evaluation will evaluate the current state and future requirements of the power distribution grid. A business as usual scenario will be used as a reference condition, over which varying scenarios of low carbon e-mobility penetration will be evaluated. The analysis will focus on the stabilization and resilience of the grid, providing input into how to improve its current reliability and on how to make the system more resilient against climatic disruptions events, such as hurricanes. This will include evaluating the available load shifting capacity of the current grid, establishing an auxiliary capacity market, etc. Based on D1.2.1 and D1.2.2 it will evaluate the impact on the grid of the required vehicle charging infrastructure and renewable energy installed capacity and power generation projects already under development or in the pipeline, establishing additional ancillary capacity for grid frequency control and required grid distribution investment. The analysis will include insight into novel systems such as integrated microgrids with distributed power generation, weather forecasting system optimization to minimize the additional reserve capacity of dispatchable power in a high renewable penetration future, vehicle-to-grid integration, and other ways to stabilize the grid. Results will highlight the current system weaknesses and include an estimate of investment rollout, detailing each investment item and its expected impact on the system. It will also deliver insights into novel business models and financial mechanisms used to maximize the economic outlook of the required investments. Furthermore, it will provide insight into the current regulatory framework that governs the electricity distribution market, identifying outdated, obsolete and missing regulations and standards that will promote further penetration and integration of renewable energy power generation and electric vehicle infrastructure, such as power pricing mechanisms for harnessing the potentially flexibility of electric vehicles to manage variable renewable energy loads.

Baseline data suggests that the integration of a low-carbon and climate-resilient electric mobility in Antigua and Barbuda could have economic implications for economically vulnerable communities, of whom single-parent female headed households predominate. Therefore, the development of these deliverables will draw on the activities of the consultation strategy (output 1.1.) to ensure consultation with all members of the community.

D1.2.1: Fleet electrification feasibility analysis (two annual reports).

D1.2.2: Renewable energy generation capacity study (two annual reports).

D1.2.3: Electricity distribution grid evaluation and evaluation of incorporation and management of renewable energy and electric mobility into the grid. (two annual reports)

D1.2.4: A socio-economic analysis establishing the impact of low-carbon and climate-resilient electric mobility on men and women of economically vulnerable communities (annual preliminary reports to be presented throughout the duration of the project, plus a final report).

· Output 1.3: Services for strengthening the capacity of national stakeholders on technical, financial and regulatory aspects of integrating electric mobility and renewable energy into the electric grid are provided, including through the Global Programme on Electric Mobility.

The lack of capacity of local stakeholders to facilitate the transition to electric and climate resilient mobility is a key barrier, as it affects the development of effective policies and regulations to incentivize the transition. It also affects coordination, as public actors lack capacity to highlight or understand the benefits and viability of low-carbon and climate-resilient mobility. To address this barrier, local workshops and activities will be delivered to build the capacity of local public and private stakeholders. The aim of these is support local stakeholders to develop a clear understanding of the technical, economic, financial and regulatory requirements involved in developing a viable and well-funded national commitment and execution plan for low-carbon and climate-resilient electric mobility. These workshops will be designed based on findings and recommendations attained by the technical assessments detailed in Output 1.2. The local workshops will also be designed taking into account the findings, good practices and lessons learned shared through activities of the support and investment platform for Latin America and the Caribbean. Local actors participating in these regional activities will support the development of the local activities, which will allow for the participation of a broader and deeper group of local actors. Activities will be gender sensitive, taking into consideration the fact that technical positions within the energy and transport sectors in Antigua and Barbuda are predominately comprised of male workers. Activities will be designed to ensure that women are effectively involved. This output will build upon co-financing of the NDC partnership which will develop training and re-training programs to cover specialized areas and to facilitate the just transition of the workforce related to NDC implementation.

D1.3.1: Workshop on transport fleet electrification feasibility (two workshops).

D1.3.2: Workshop on renewable energy generation for grid and off grid applications, incorporating a focus on climate resilience (two workshops).

D1.3.3: Workshop on electricity distribution grid interaction, stability and frequency control, incorporating a focus on climate resilience (two workshops).

D1.3.4: Workshop for first response emergency units on electric vehicle safety and accident intervention (two workshops).

D1.3.5: Participation in activities of the support and investment platform for Latin America and the Caribbean of the Global Programme on Electric Mobility

· Output 1.4: A national commitment on low-carbon and climate-resilient electric mobility is drafted for adoption by the national government.

A significant non-financial barrier to the uptake of clean renewable energy in Antigua and Barbuda is the multiple conflicting strategies and approaches being undertaken by different national decision-makers on transitioning to a low-emission and climate-resilient energy sector. This results in the absence of a clear long-term signal, creating uncertainty for the private sector and delaying the uptake of low-emission technologies. To address this barrier, this output will support high-level public authorities to create and adopt a national commitment on low-carbon and climate-resilient electric mobility, such as a national target for electric mobility percentage of all vehicles by a certain year. Firstly, consultation workshops on a draft commitment will be held, aligned with the multi-stakeholder consultation strategy of output 1.1. This will be followed by a high-level debate on the commitment by key governmental ministries. Finally, a draft of the national commitment will be prepared for adoption by the Prime Minister, taking into consideration the views of the different government authorities and other stakeholders. The preparation of the draft will draw on findings of the products generated under Output 1.2 and will be in line with and build upon already established national environmental commitments, including the updated NDC (estimated to be finalized in 2020).

D1.4.1: Consultation workshops on a national commitment (three workshops).

D1.4.2: High-level debate on national commitment, involving key governmental ministries.

D1.4.3: Draft of national commitment on low-carbon and climate-resilient electric mobility delivered to the Prime Minister for adoption.

· Output 1.5: A national development plan for low-carbon and climate-resilient electric mobility is drafted for adoption by the national government.

One of the key barriers that Antigua and Barbuda faces is the need for improved coordination on the path to achieve a low-carbon and climate resilient electric mobility future. For instance, while it is essential that the country has excess electricity supply to provide system resilience, this excess is currently provided through fossil fuel IPPs. A national transport plan is needed to develop a controlled transition to low-carbon and climate-resilient electric mobility to achieve NDC targets, including by identifying a plan of action for transitioning the electricity generation and supply to an ever-greater share of stable and cost-effective renewable sources. This output will seek to develop a national low-carbon and climate-resilient electric mobility development plan to address this barrier. This plan will identify the key actions required to facilitate the achievement of the national commitment (output 1.4). Taking into consideration the information generated in Output 1.2, the plan will encompass not only the expected deployment rates over time of the vehicle fleets, charging infrastructure, renewable power generation capacity, but also a list of the policies, regulations and other market mechanisms to achieve the national commitment. It will involve elements including promoting a technological shift towards electric vehicles and promoting a modal shift from private cars to either shared mobility or public transport. It will also identify effective means to scale up electric mobility in the specific local conditions of an atomized local transport sector. It will also guide the development of the electric mobility window of the SIRF Fund (output 3.1) and policies and regulations under components 3 and 4. The output will build upon and be aligned with the updated NDC (aimed to be finalized in 2020). It will also build upon and be aligned with the national GHG Reduction Report developed through the support of the NDC Partnership Initiative: Climate Action Enhance Package (CAEP) and the study to outline a roadmap (Energy Roadmap) that is being developed by IRENA under the Small Island Developing States (SIDS) Lighthouses Initiative. On the latter, the study on an outline for the Energy Roadmap will serve a key high-level guiding document for the national development plan to build upon. The development plan will function as a detailed governmental instrument for implementing the roadmap. Consultations on the development plan will be facilitated through output 1.1..

D1.5.1: Identification of key economic, social and technological actions required and action plans to achieve national commitment.

D1.5.2: Required investment rollout to achieve national commitment.

D1.5.3: List of regulatory frameworks required to achieve national commitment.

D1.5.4: Draft of national development plan for low-carbon and climate-resilient electric mobility presented for adoption.

· Output 1.6: Public and private stakeholders' awareness on the benefits of low-carbon and climate-resilient electric mobility enhanced through a communication campaign and the provision of a public information platform.

The general public in Antigua and Barbuda is unaware of the environmental, health and economic impacts of the current fossil-based energy and transport sectors and lacks knowledge and comprehension of the benefits and viability of low-carbon and climate-resilient energy and transport systems. This results in a lack of bottom-up support from civil society for renewable energy and electric mobility. This output aims to address this barrier, building upon recommendations of another country analyses.^[22] While the aforementioned national commitment and the national development plan aim to generate top-down momentum for transitioning to low-carbon and climate-resilient electric mobility, this output focuses on a communication campaign to generate awareness amongst the civil society and generate bottom-up support. This gender-sensitive communication campaign will focus on highlighting the negative impact of emissions generated by the combustion of fossil fuels, the benefits of renewable power generation and electric vehicles; and inform on related national activities. In addition, an online information platform will be created into which all relevant information will be uploaded. This will be managed by the Department of Environment's Project Management Unit (PMU) and allow all stakeholders to access information on the different related renewable energy and electric mobility projects. It will also have a specific section dedicated to gender-equality aspects of these activities. This output will build upon co-financing of the NDC partnership through its Climate Action Enhancement Package in which it will develop a stakeholder engagement and communications plan for NDC implementation. It will also be aligned with the consultation strategy developed under output 1.1.

D1.6.1: Design of communication campaign on low-carbon and climate-resilient electric mobility.

D1.6.2: Communication campaign on low-carbon and climate-resilient electric mobility.

D1.6.3: Creation of a public information platform for electric mobility.

D1.6.4: Deployment of the public information platform for electric mobility.

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Component 2: Short-term barrier removal through low-carbon e-mobility and climate-resilient renewable energy demonstrations

This component will aim to provide evidence to local stakeholders, particularly policy-makers, decision-makers and taxi and bus owners, of the technical, financial and environmental viability of low-carbon electric mobility and climate-resilient renewable energy. The component will address non-financial barriers referred to in section 1 related to a lack of confidence and awareness of local actors as to the viability of low-carbon and climate-resilient electric mobility for 'island' conditions. It will address these barriers through the demonstration of electric vehicles in two high-visibility public fleets: buses and taxis. By supporting the taxi and bus owners to gain confidence in the technology, this component will create interest in such owners to purchase electric vehicles, including through the SIRF Fund (component 3) which will address financial barriers.

In addition to demonstrating the viability of electric vehicles, the project aims to demonstrate electric buses which provide a more effective service than that existing and thus encourage a modal shift towards public transport. The component will also generate data to support policy-making and provide further evidence on the technology viability of clean renewable energy and its connection to an interconnected grid system. It will demonstrate how smart interaction between a renewable power generation plant and the grid and vehicle-charging infrastructure can be used to enhance the economic performance of the overall system and improve grid stability, making it more resilient to climatic events, improving the social benefits of investments, ~~enhance safety~~ and working to demonstrate business models which may lower the cost of electricity. It will also demonstrate the capacity of the existing grid to accommodate renewable energy. This component will build upon co-financing which is demonstrating electric vehicles or renewable energy by the Italian Electric School Bus Pilot Program in Antigua, the Grid Interactive Solar PV Systems for Schools and the ADFD concessional loan on renewable energy.

Outcome 2: Antigua and Barbudan citizens begin to use electric mobility for their public transport needs.

Outputs:

· Output 2.1: The effectiveness of electric vehicle charging infrastructure at the V.C. Bird International Airport to power electric taxis with renewable solar energy is demonstrated to public and private stakeholders.

As mentioned in section 1, in Antigua and Barbuda key public and private stakeholders currently lack awareness on the viability of renewable energy and electric mobility to meet 'island' conditions. There is also a lack of understanding as to how such technologies can be combined to support effective grid management. This output will address these barriers (along-side outputs 2.2, 2.3 and 2.4) by demonstrating a renewable energy powered interactive grid and electric vehicle charging station at the V.C. Bird International Airport. This charging station will support the operation of electric taxis (output 2.2). GEF project funds will finance the purchase and installation of a 50kW solar array in a highly visible area over the airport parking lot or in its vicinity, which will be owned and operated by the Department of Environment during the project with the intent of concessioning the infrastructure to a private operator in the future. The energy generated by the solar array will feed directly into the electric taxis when these are parked waiting for passengers. At other times, the energy will feed into the grid and when the sun is not shining the vehicles will be charged by the grid. The pilot will aim to demonstrate the technical feasibility of incorporating renewable energy sources into the existing grid, as a basis for the scaling-up of grid-connected renewable energy sources on the island.

In addition to the above, the demonstration will benefit from an existing 3 MW solar array close to the airport. The Antigua Public Utilities Authority (APUA) is currently procuring batteries to store curtailed energy from the array (currently almost 50% of generation) and insert it into the grid at times of high demand and low solar radiation. This will reduce the risk of overall system failure in the event of a power line collapse, strengthening the system's climate resilience. It will also highlight how renewable energy sources close to the charging of electric vehicles reduces investment requirements of the grid and maintains its economic and technical performance.

D2.1.1: Technical requirements of the solar array and related infrastructure.

D2.1.2: Technical requirements of taxi charging infrastructure.

D2.1.3: 50kW grid-connected solar array and its installation, based on specifications established in deliverable D2.1.1.

D2.1.4: Electric vehicle charging infrastructure and its installation, based on specifications established in D2.1.2. This will include the purchase of a multi-standard light-duty vehicle charging station capable of charging two vehicles at the same time.

D2.1.5: Solar array and charging infrastructure monitoring protocol and methodology.

D2.1.6: Quarterly operation and performance reports.

D2.1.7: Final report on renewable energy electric vehicle charging infrastructure techno-economic and environmental performance throughout the pilot test.

· Output 2.2: The viability of electric vehicles as part of the airport taxi fleet is demonstrated to public and private stakeholders.

This output aims to remove aforementioned barriers related to a lack of stakeholder awareness of the viability of electric vehicles by exposing the technology to taxi drivers and the general public. Through these demonstrations, a critical mass of taxi drivers, users and local decision-makers will develop an understanding of the economic, social and environmental viability of electric taxis in Antigua and Barbuda. The performance of two electric taxis operating from the V.C. Bird International Airport will be tested over a period of at least one year. The electric vehicles will be purchased by the Department of Environment with GEF project funds and provided to the airport taxi association for their operation for the demonstration period. Provisional licenses will be obtained from the Antigua and Barbuda Transport Board. Drivers will be rotated periodically (every two to three weeks) to build up a large number of users who have experiences with the vehicles. At the beginning and end of the test period each driver will answer questionnaires on their expectations before the test and their thoughts after it. Surveys will also be undertaken to evaluate the impression of the general public on the electric taxi performance and given service (through the consultation strategy, output 1.1). To ensure that all taxi drivers interested in testing the electric vehicles have the chance to do so, an operation schedule will be arranged with the Public Transport Union. The operation schedule will ensure that interested female taxi drivers are included in the demonstration. The demonstration will also test digital payment systems, user connectivity apps and other fleet optimization strategies to maximize the economic performance of the operation. At the end of the project, vehicles will be incorporated into the government vehicle fleet. Through output 3.1, incentives may be considered to encourage those taxi drivers that tested the electric taxis under output 2.2 to purchase electric vehicles.

D2.2.1: Technical requirements of the electric vehicles to be purchased for the pilot test.

D2.2.2: Procurement of two light-duty electric vehicles, based on specifications established in deliverable D2.2.1. This includes preventive maintenance expenses for the duration of the pilot project.

D2.2.3: Vehicle monitoring systems, digital payment systems and user connectivity apps.

D2.2.4: Driver test drive protocol, operation and safety training in consultation with the taxi association.

D2.2.5: Monitoring and evaluation methodology including before and after driver questionnaires.

D2.2.6: Quarterly operation and performance reports.

D2.2.7: Final report on electric taxi techno-economic and environmental performance throughout the pilot test.

· Output 2.3: The effectiveness of a grid-interactive solar array at St John's West bus station, along with charging infrastructure for electric buses, is demonstrated to public and private stakeholders

Building on output 2.1, this output aims to address barriers as to a lack of consumer and policy-maker confidence in renewable energy as a solution to powering electric mobility and managing grid intermittency. The techno-economic feasibility of using a medium-scale solar array dedicated for vehicle charging will be evaluated. For this, GEF project funds will finance the purchase and installing of a 100-kW grid interactive solar array on the roof of the St John's West bus station. This will support the demonstration of low-carbon and climate-resilient electric buses (see section 2.4), with low-operating costs due to central location of the solar array. The central location will also facilitate awareness raising with different local stakeholders of the viability of renewable energy (and electric buses) for responding to local needs. The chargers and solar array will be owned and operated by the Department of Environment during the project with the intent of concessioning the infrastructure to a private operator in the future. The 100-kW array will be able to feed power to the grid or to the bus station to power two electric buses tested in output 2.4. The bus type and required infrastructure to charge them will be established before purchase, ensuring that the charging stations are multi-standard and capable of charging two buses simultaneously. The charging strategy will depend on the selection of the bus route and electric bus technology. Buses will be given priority for charging; however consideration will be given to the viability of the chargers to serve as public-chargers when the buses are not being charged (D.2.3.4). Given that the buses operate primarily during the day when the sun shines the solar array will feed power into the grid. Due to the size of the array and the fact that the bus station is located in the center of St John's, meaning no distribution lines are required to feed power into the city, a focus will be placed on establishing feed-in tariffs for solar power generation to be profitable (D2.3.7). Data collected will be used to simulate the development of business models such as private-to-private purchase agreements.

D2.3.1: Technical requirements of the solar array and required infrastructure.

D2.3.2: Technical requirements of the bus charging infrastructure.

D2.3.3: Procurement of 100kW grid-connected solar array and its installation, based on specifications established in D2.3.1.

D2.3.4: Procurement of electric bus charging infrastructure and its installation, based on specifications established in D2.3.1. (multi-standard heavy-duty vehicle charging station capable of charging two buses at the same time).

D2.3.5: Solar array and charging infrastructure monitoring protocol and methodology.

D2.3.6: Quarterly operation and performance reports.

D2.3.7: Evaluation of business models for economic optimization of solar array and vehicle charging infrastructure.

D2.3.8: Final report on renewable energy/electric vehicle charging infrastructure techno-economic and environmental performance throughout the pilot test.

· Output 2.4: The viability of electric buses as part of the public transport bus fleet is demonstrated to public and private stakeholders.

Similar to output 2.2, this output aims to address barriers on a lack of confidence among the general public, the private sector and decision-makers as to the technical feasibility of incorporating electric buses into Antigua's public bus transport fleet. A difference between output 2.2 and this output is that the bus system is used predominantly by locals, not tourists, and predominant users are women. In this sense, in addition to demonstrating the viability of electric buses, the output aims to encourage modal shift to public transport through the demonstration of an enhanced public transport service (electric buses which are more modern than existing buses (lighting, Wi-Fi, etc.) and on a fixed regular timetable accessible by mobile applications), which demonstrates the benefits of moving away from the existing atomized system.

The performance of two electric buses with similar size to existing buses (approximately 40-seaters) operating from St John's West bus station will be tested over a time period not less than one year. The buses will be purchased using GEF project funds and owned by the Department of Environment as the Executing Agency and provided to the bus association for operation. Provisional licenses will be obtained from the Antigua and Barbuda Transport Board. Efforts will be made to purchase reduced mobility accessible buses to enhance social acceptability and increase the benefits of the provided service. The buses will be operated along a fixed established route with a timetable. This will demonstrate the benefits of a formal transport service in comparison to the atomized public transport service currently in use. As for the taxi pilot, an operation schedule will be arranged with the bus association to assure that all bus drivers interested in testing the electric buses have the chance to do so. It is noted that the bus association will be able to veto a given bus driver from operating the buses based on the drivers track record. At the beginning and end of the test period each driver will answer questionnaires on their expectations before the test and their thoughts after it. Furthermore, the activity will be used to test digital payment systems, user connectivity apps and other fleet optimization strategies to maximize the economic performance of the operation. These will provide up-to-date information on bus location and arrival times, leading to shorter waiting times for users, increasing women's safety in using public transport. Surveys will also be undertaken to evaluate the impression of the general public on the electric buses performance and given service (through the consultation strategy, output 1.1). At the end of the project, the buses will be transferred to the bus association under the condition that the buses continue with the public transport service provided during the demonstration or they provide a service of similar benefits.

D2.4.1: Identification of bus route on which the electric buses will operate, along with the operation schedule (to be developed in consultation with the Bus Association).

D2.4.2: Technical requirements of the electric buses to be purchased for the pilot test, based on the expected operating conditions (D2.4.1) and service requirements (including through consultations in Output 1.1).

D2.4.3: Procurement of two electric buses, based on specifications established in D2.4.2. This includes preventive maintenance expenses for the duration of the pilot project.

D2.4.4: Bus monitoring systems, digital payment systems and user connectivity apps.

D2.4.5: Driver test drive protocol, operation, and safety training.

D2.4.6: Monitoring and evaluation methodology, including before and after driver questionnaires.

D2.4.7: Quarterly operation and performance reports.

D2.4.8: Final report on electric bus techno-economic and environmental performance throughout the pilot test.

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Component 3: Preparing for scale-up and replication of low-carbon electric mobility and climate-resilient renewable energy.

This component will focus on scaling-up low-carbon electric mobility and climate-resilient renewable energy in the medium- to long-term term. To do this, it will aim to reduce financial barriers due to the current higher purchase cost of electric vehicles through the creation of an electric mobility funding window. It will also establish standards, regulations and policy frameworks to further reduce this cost differential and incentivize adoption of electric vehicles. Furthermore, the output will establish data collection mechanisms to support effective policy development and monitoring of efforts in the transport and power generation sectors.

Outcome 3: The Antigua and Barbuda government takes actions towards financing and implementing policy frameworks for low-carbon electric mobility–.

Outputs:

· Output 3.1: An electric mobility funding window under the Sustainable Island Resource Framework (SIRF) Fund is operational to provide financing for public and private consumers.

There is currently a lack of financial mechanisms to cover the incremental costs between electric vehicles and traditional ones and thus incentivize private consumers and public transport operators (buses and taxis) to purchase electric vehicles. This output aims to reduce financial barriers involved in the purchase of electric vehicles by reducing the initial capital cost requirements and attract the participation and investment of the private sector. The SIRF fund is a public instrument for directing resources to finance sustainable development and environmental protection activities, including those related to climate change mitigation and adaptation. Through this output, an electric mobility window will be established under the fund. Through this window, financial products which reduce the incremental cost of electric vehicles will be available to taxi and bus owners and private consumers. The window will serve to create a local financial market for such products by being the first actor in the market. Through this entry, its experiences will help to generate information for facilitating the entry of private financial actors. i.e. With the support of the window, purchasers will draw on their own equity, a loan from local financial institutions, and the support of the SIRF fund to cover the upfront incremental cost differential. The design of the financial window to be developed under the SIRF Fund will undergo a broad consultation process through Output 1.1, as well as build upon the national electric mobility development plan (Output 1.5). The window will be developed in accordance with SIRF guidelines and requirements, including design and specification of criteria and application process for accessing to funds. It will also be developed taking into account the specific conditions of the atomized local transport system. To ensure sustainability beyond project funds, a long-term financial plan will be developed for implementing the national development plan (Output 1.5). The plan will identify incentives and private sector business models for private sector engagement in the plan's implementation. These may also include further incentives to encourage those taxi drivers that tested the electric taxis under output 2.2 to trade in their existing vehicles and purchase electric vehicles. As part of this plan, long-term and sustainable funding streams will be identified to ensure capitalization of the fund beyond the project's duration by other sources of finance, such as development banks and environment funds, and domestic sources such as pollution charges, visitor fees and selling of carbon credits. This output will build upon baseline activities under the GEF SPPARE project which will operationalize the SIRF fund and support the development of an environmental management window which will support financing of renewable energy interventions.

D3.1.1: Electric mobility financial window under the SIRF fund and its operation structure, including gender-sensitive guidelines to access funds, are presented for approval.

D3.1.2: Electric mobility financial window established through the SIRF fund is operational.

D3.1.3: Long-term financial plan for implementing the national development plan for low-carbon and climate-resilient electric mobility (Output 1.5), including through incentives, private sector business models and the sustainable financing of the window.

· Output 3.2: Standards and a policy framework for regulating the importation of electric and conventional vehicles are developed and drafted for adoption by government ministries.

As detailed in section 1, one of the main problems faced by Antigua and Barbuda's transport sector is the high growth rate of the fleet, along with high emission coefficients of the imported vehicles. Furthermore, in view of the technological and modal changes appearing in the global transport sector, together with higher emission standards currently applied by developed countries, leaves countries like Antigua and Barbuda unprotected to dumping of inefficient vehicles. This influx of cheap used vehicles (and existing high costs of electricity) increases the cost incremental between such vehicles and new electric vehicles, leading to increased amounts of high-polluting vehicles in the country. This output aims to address this barrier by supporting the regulation of the importation of all vehicles. Consultation on the draft standards will be facilitated through output 1.1.

D3.2.1: Report on good practices for standards and policy frameworks for regulating the importation of electric and conventional vehicles, including based on review of regional and global best practices.

D3.2.2: Report on options for standards and a policy framework for regulating the importation of electric and conventional vehicles.

D3.2.3: Draft standards and a policy framework for regulating the importation of electric and conventional vehicles presented to relevant ministry for consideration and adoption.

· Output 3.3: Standards and a policy framework for regulating the quality of imported fuel are developed and drafted for adoption by government ministries.

Antigua and Barbuda has no restrictions on the content of sulphur in the fuels it imports. Fuels traded in the region are reported to have more than 2000ppm of sulphur.^[22] The use of high sulphur content fuels, especially in diesel vehicles, has strong correlation with the emission of toxic air pollutants. As developing countries move to low sulphur fuels, the excess availability of high sulphur fuel in the global market may result in a reduction in its price, making it difficult for developing countries, which rely on fuel imports, to transition to low sulphur fuels and sustainable technologies such as electric vehicles. These low-quality fuel imports result in low fuel prices, providing a barrier to reducing the cost incremental between internal combustion engine vehicles and electric ones. The introduction of higher quality and more expensive fuels will not only result in a considerable reduction of local pollutant emissions, but also help reduce the economic gap between conventional and electric vehicles, promoting the uptake of the latter. The economic gap will also be reduced through measures to reduce the cost of electricity, addressed in part by output 4.3 and co-financing (loan of the Abu Dhabi Fund for Development). This output aims to address this issue by supporting local authorities to develop standards and a policy framework for regulating the quality of imported fuel. These regulations will regulate the

quality of fuel imports and ensure through a necessary mechanism, such as a redistribution tax or social impact plan, that resulting higher costs of fuel are not transferred on to the price of public transport, which would affect low-income earners and vulnerable communities that rely on this medium. The draft regulations will be considered through consultations with a broad range of actors through output 1.1.

D3.3.1: Report on good practices for standards and policy frameworks for regulating the quality of fuel imports, including based on review of regional and global best practices.

D3.3.2 Report on options for standards and policy framework for the regulation of quality of fuel imports, including social protection mechanisms, for consultation through 1.1.

D3.3.3: Draft standards and policy framework for regulating of quality of fuel imported into the country, including social protection mechanisms, presented to relevant ministry for consideration and adoption.

· Output 3.4: Regulations for the installation of private and public electric vehicle charging infrastructure are developed and drafted for adoption by government ministries.

Antigua and Barbuda currently has no legislation on the type, characteristics, and installation requirements for the deployment of electric vehicle charging infrastructure in either private or public areas. This lack of legislation generates uncertainty for investors and developers seeking to promote electric mobility. Experience in European countries shows that the availability of charging infrastructure is as important as direct vehicle purchase incentives when promoting the uptake of electric vehicles. Therefore, establishing safety and operational regulations and standards for vehicle charging infrastructure is crucial. The information and knowledge generated in output 1.2 and through the pilots in outputs 2.1 and 2.3 will be used to establish national electric vehicle charging infrastructure standards and regulations. It will detail elements including grid connection requirements, charging infrastructure communication protocols, interoperability requirements, and output current requirements. The draft regulations will be considered through consultations with a broad range of actors through output 1.1.

D3.4.1: Report on good practices for the installation of private and public electric vehicle charging infrastructure, including based on review of regional and global best practices.

D3.4.2: Report on options for standards and policy framework for the installation of private and public electric vehicle charging infrastructure, for consultation as part of 1.1.

D3.4.3: Standards and policy framework for the installation of private and public electric vehicle charging infrastructure presented to relevant ministry for consideration and adoption.

· Output 3.5: A data acquisition and management system for the transport and energy sectors is used by key public organizations.

Antigua and Barbuda lacks data on and mechanisms for data collection for monitoring the operations of its transport and energy sectors. This barrier affects policy and regulatory development of these sectors: with an absence of data and mechanisms for data collection there is a lack of supporting information for the development of effective policies and regulations that promote and incentivize the use of electric vehicles as substitutes for conventional vehicles in the

transport sector. The lack of data also complicates the ability to estimate GHG emission reductions from the electrification of the public transport services. It further restricts government efforts to map transport patterns, identify strategies for reducing the atomization of the existing public transport system, and enhancing the transport system to promote modal shift.

This output seeks to enhance the organization and efficiency of the information and data management of public entities in Antigua and Barbuda for the transport and energy sectors. This output will support the development of a full record of all activities concerning the deployment of electric vehicles and will support the evaluation of progress of their deployment along with the emission abatement achieved, and the destination and disposal of both conventional and electric vehicles. The system will also be used to monitor and record the data generated by the pilots detailed in component 2. The activity involves analyzing the current and future necessities of relevant public entities in terms of data management for these sectors. Based on these and other international practices, a software for data management will be selected for implementation. The implementation of the acquired data management system will be installed in public entities involved in the execution of the pilot projects (Component 2). In selecting and implementing the system, activities will focus on ensuring system sustainability post project and developing a plan for broad roll-out of the system.

D3.5.1: Selection of data management system, based on criteria including system sustainability post project.

D3.5.2: Implementation of data management system.

D3.5.3: Deployment and training on data management system.

D3.5.4: Data management system applied to pilot project monitoring.

Component 4: Long-term environmental sustainability of low-carbon electric mobility.

This component will focus on building capacity and establishing policies, standards and regulations to ensure the long-term environmental sustainability of low-carbon and climate-resilient electric mobility in Antigua and Barbuda. It aims to achieve this by building the capacity of waste companies on the re-use and disposal of conventional and electric vehicles and electric vehicle batteries. It also works to achieve this by establishing standards and a policy framework for regulating the disposal of electric and conventional vehicles. Finally, it aims to establish standards and policy framework for regulating emissions from the power generation sector, as well as for integrating renewable energy into the grid, setting a level playing field for the mass uptake of grid-connected renewable energy.

Outcome 4: The Antigua and Barbuda government takes action towards implementing policy frameworks and building capacity to ensure the long-term sustainability of electric mobility.

Outputs:

- Output 4.1: Waste companies are trained in reusing, recycling and disposing used vehicles (both conventional and electric) and electric vehicle batteries.

As noted in section 1, Antigua and Barbuda does not currently have sufficient individuals trained in reusing, recycling and disposing used vehicles (both conventional and electric) and electric vehicle batteries, leading to political challenges to uptake of electric vehicles. Training and building local capacity in the management of hazardous and non-hazardous waste is essential for ensuring a long-term environmentally sustainable transition to a low-emission transport sector.[23] This output will support key stakeholders to enhance their capacity by facilitating training on the reuse, recycle and disposal of vehicle components, both conventional and electric. These stakeholders will include non-governmental organizations (NGOs), private recycling companies and government entities that are involved in the reuse, recycle and disposal chain of different types of waste, auto-related companies, and renewable energy installation companies. This output will also build upon output 4.2 to support such actors to identify and develop business models to harness opportunities for reusing vehicle components through local and export markets and for local vehicle disposal. Activities will be established with the National Solid Waste Management Authority and in coordination with support provided through the support and investment platform for Latin America and the Caribbean of the Global Programme on Electric Mobility. The training course will incorporate gender considerations, as elaborated further in chapter 3 on gender.

D4.1.1: Gender-sensitive training course on reusing, recycling and disposing of used vehicles, with modules on each of the key disposal areas:

- o General aspects of end-of-life vehicle disposal (conventional and electric);
- o Vehicle spent battery management and battery reuse;
- o Hazardous waste management;
- o Lithium ion recycling technology;
- o Identifying and developing business models for reuse and disposal of vehicles and their components in local, regional and international markets; and
- o Catalyzing finance for such business models.

· Output 4.2: Standards and a policy framework for regulating the disposal of electric and conventional vehicles are developed and drafted for adoption by government ministries.

As mentioned in section 1, due to its antiquity, the Antigua and Barbuda Solid Waste Management Act of 1995 (revised in 2005), does not have specific regulations related to the reuse, recycling and final disposal of vehicles (conventional or electric) or electric batteries. This results in a significant challenge related to the disposal of used vehicles, with many such vehicles scattered around the country. This issue will only be exacerbated by the introduction of electric vehicles, which further have a different chemical composition and different components to those of conventional ones. At current, due to the small size of the country's economy, there is a lack of local or export market for recycling vehicle components and their disposal. To ensure the long-term environmental sustainability of the uptake of electric mobility in Antigua and Barbuda, this output will support the development of standards and a policy framework for regulating the end-of-life disposal of both conventional and electric vehicles. This will include incentives to develop local and connect to regional markets for vehicle recycling and disposal. This is required firstly to enhance the long-term environmental sustainability of the end-of-life of vehicles in Antigua and Barbuda in general. Secondly, standards are required for all vehicles to ensure that there is a level playing field for electric vehicles with conventional ones, avoiding

additional costs being added to the cost of electric vehicles to cover for end-of-life management. If regulation were enforced for the disposal of electric vehicles but not conventional vehicles it would hinder the deployment of the new technology, as importers and car owners would not want to deal with the added responsibilities and costs of owning an electric vehicle. Consultation on the draft standards will be facilitated through output 1.1 . and will build upon previous studies in the area, such as the “Environmental impact assessment and solid waste management strategy for decommissioning of vehicles and used batteries” prepared by LOGIOS for the Department of Environment, which was finalized in August 2019.

D4.2.1: Report on good practices for standards and policy framework for the regulation of end-of-life vehicle disposal for electric and conventional vehicles, including based on review of regional and global best practices and building upon existing studies. [25]

D4.2.2: Report on options for standards and policy framework for vehicle end-of-life disposal.

D4.2.3: Draft standards and policy framework for the regulation of end-of-life vehicle disposal for electric and conventional vehicles presented to relevant ministry for consideration and adoption.

· Output 4.3: Standards and a policy framework for regulating emissions from the power generation sector, as well as for integrating renewable energy into the grid, are developed and drafted for adoption by government ministries.

As mentioned in sections 1 and 2, Antigua and Barbuda has a lack of standards for regulating emissions of its thermal power plants and transmission lines, resulting in a lack of incentive for investments in new energy technologies. This has resulted in the use of old, inexpensive, and unreliable systems. Although the country plans to reduce distribution inefficiencies and through its NDC aims to install a considerable amount of renewable power generation capacity, it is crucial to ensure that the deployment of electric vehicle fleets is complemented with the roll-out of renewable electricity generation to ensure that GHG reductions are achieved. To alter this baseline scenario, the output aims to introduce standards for regulating emissions from the power generation sector, providing incentives for the introduction of renewable energy over traditional fossil fuel technologies. Establishing standards will play a key role in setting a level playing field for the mass uptake of grid-connected renewable energy, including to provide excess capacity to ensure system resilience. The output will draw on work under output 1.2 and the demonstrations under outputs 2.1 and 2.2. Consultation on the draft standards will be facilitated through output 1.1.

D4.3.1: Report on good practices for standards and policy frameworks for regulating emissions in the power generation sector, as well as on integrating renewable energy into the grid, including based on review of regional and global best practices.

D4.3.2: Report on options for standards and policy framework for regulating emissions in the power generation sector and renewable energy grid integration.

D4.3.3: Draft standards and policy framework for the regulation of emissions in the power generation sector and renewable energy grid integration presented to relevant ministry for adoption.

4) Alignment with GEF Focal Area and/or Impact Program strategies

This programme is aligned with Objective 1 of the Climate Change Focal Area to “Promote innovation and technology transfer for sustainable energy breakthroughs”, through CCM 1-2 - Promote innovation and technology transfer for sustainable energy breakthroughs for electric drive technologies and electric mobility.

5) Incremental/additional cost reasoning and expected contributions from the baseline, the GEFTF, LDCF, SCCF, and co-financing

The project aims to promote low-emission public and private transportation systems in Antigua and Barbuda that are resilient to the projected impacts of climate change. The grant funds provided by the GEF and complemented by co-funding aim at de-risking electric vehicles and associated supply equipment technology. They also aim to support the integration of low-emission transportation systems with renewable power generation and attract non-grant funding from financial institutions for scaling up.

The GEF-financing’s incremental effects will assist Antigua and Barbuda to overcome the higher initial costs of fuel efficient and low emissions options. The enabling policy environment created will strengthen institutional capacity and increase public awareness and participation, elements that are instrumental in encouraging the shift towards sustainable low-emission public transport systems as a preferred choice for mobility. Coupled with the use of renewable energy, the project will contribute to improving energy efficiency and reducing CO₂ emissions, air pollution and energy dependence in the country. Furthermore, funds will be used to articulate the creation of standards, regulations and policies to enable a sustainable transport sector environment. These include vehicle import standards, end of life vehicle disposal standards and regulations, fuel import quality standards, electric vehicle charging infrastructure standards, renewable energy grid integration standards and power generation emissions standards.

In addition, the support from the global electric mobility programme (including networking with the other two projects in the Caribbean region - Santa Lucia and Jamaica - and with the rest of the Latin American and the Caribbean region through a regional platform) is expected to maximize the impact of the incremental financing provided by GEFTF, including through the optimization of capacity building and knowledge management activities, and provision of tools for business and financial modelling.

6) Global environmental benefits (GEFTF) and/or adaptation benefits (LDCF/SCCF)

The impact of the proposed project in terms of GHG emission mitigation has been estimated by the UNEP Air Quality and Mobility (AQM) Unit using its GHG emission reduction calculation model. Details of the model are provided in Annex M.

The model estimates business as usual fleet projections into the future based on historic fleet growth rates and country current population and expected growth as well as trends of GDP per capita. The baseline model assumes that alternative technologies to conventional vehicles are non-relevant till 2028 and 2032 for private cars and light duty commercial vehicles respectively. After this, it is assumed that sales of electric vehicles in the different sectors grow marginally to

account for 3% of vehicle sales by 2050. In the case of buses, the benchmark scenario assumes that no electric buses are operational till 2050. Today, the carbon intensity of Antigua and Barbuda's electricity grid is of approximately 1.05 kgCO₂ per kWh, throughout the benchmark scenario of the evaluation period it is assumed that is gradually improved to 0.67 kgCO₂ per kWh by 2050. This improvement is based on a reduction of the distribution grid transmission inefficiencies and the completion of 30% of all renewable and low carbon power generation projects currently under evaluation.

As a consequence of the alternative proposed scenario, it is considered that a progressive introduction of additional electric vehicles will start as early as 2025 and will continue to increase till 2050, a year by which electric vehicle sales will account for 30% of all vehicles sold. Furthermore, given the importance and significance placed on the deployment of renewable energy throughout the project and additional efforts made by the country, the grid carbon intensity is expected to be progressively reduced from its current values (1.05 kgCO₂ per kWh) to 0.37 kgCo₂ per kWh. This will improve considerably the environmental performance of electric vehicles. Finally, the GHG emissions and energy savings of actions oriented to discourage the use of private passenger cars and shift to sustainable and electric public transport are assessed. This is accounted for by increasing the public transport occupancy factor.

In terms of direct emission reductions enabled by the project these are estimated based on the operation of the two electric buses and two electric taxis purchased for the pilot demonstrations. The capacity of the renewable energy solar panels installed by the project will produce excess energy than that that required by the pilot project vehicles, consequently, although sometimes the vehicle will draw power from the grid, the net renewable energy production will be in excess of that required by the vehicles. It can be, therefore, assumed that the pilot project electric vehicles will be operating on 100% renewable energy generated by the solar panels installed as part of the pilot demonstrations. On the other hand, the 30 electric taxis expected to be purchased through the SIRF fund electric mobility window are assumed to be operated with grid electricity which will draw on both renewable and non-renewable sources.

Based on the above, a causality factor of 60% is used to quantify the amount of the benefits obtained as a result of the project execution and its influences. The project GHG emission reductions and energy saving impacts are summarized in Table 2.

Table 4. Emission and energy consumption reductions expected to be achieved by the project.

GHG reductions and energy savings estimation for Antigua and Barbuda	
Project information	
<ul style="list-style-type: none"> · Project duration: 4 years. Starting in 11/2020 and ending in 10/2024. · Time frame for indirect effects: 15 years. Starting in 2021 and ending in 2036. (Effects produced by policy developed during the project and coming scale-up projects). · Causality factor: 60% 	
Total project emissions reductions, t CO₂	434,194
Total direct emission mitigation from demonstration projects, t CO₂	218,698
Total indirect emission mitigation, t CO₂	215,496
Total project energy savings, MJ	3,320,359,686
Total direct energy savings from demonstration projects, MJ	593,987,119
Total indirect energy savings, MJ	2,726,372,567

7) Innovativeness, sustainability and potential for scaling up

Innovativeness:

The project deliverables provide technical, financial management, regulatory and social innovations:

Technical: Electric mobility is still incipient in Antigua and Barbuda, with only a handful of vehicles and limited knowledge and awareness among stakeholders and users. The project will not only introduce electric vehicles into the country but also their charging infrastructure and build expertise regarding the incorporation and interaction of renewable energy sources with transport systems and the electric grid as a means to improve the overall system reliability and its climate resilience.

Business innovativeness. The project will provide demonstration-based financial and business models to facilitate the transition of car dealers and users towards low-emission vehicle technologies. Whilst pilot projects will provide insight into the operation of electric vehicles under the local operating conditions, the financial instrument created through the project will allow for users to bridge the cost between the cost of conventional and electric vehicles. In this new context, higher capital costs are expected to be balanced by lower operational costs, opening new opportunities (e.g. leasing could be a more interesting option than ownership for public and private fleets, the business model for car dealers would be less dependent on maintenance services and will consider the inclusion of new services, such as car-sharing based mobility services, fleet management services or battery leasing). Furthermore, pilot projects seek to enable the use of modern connectivity and digital payment platforms, all of which open new business development opportunities.

Environmental. In terms of environmental innovativeness, the project at hand opens several opportunities. The introduction of policy and regulatory frameworks in areas such as vehicle emission, quality of fuel, end of life vehicle disposal and energy sector emissions and renewable energy integration set the groundwork for transitions towards a sustainable future both in the energy and transport sectors. Furthermore, the project provides a unique opportunity to modernize the

waste management sector, to be eventually expanded to other products, such as electronic appliances. If successful, it will provide guidance to other countries heavily dependent on imports of manufactured products and to integrate small island countries in the global re-use and recycling chains associated to the expansion of e-mobility.

Social. The project will look to improve the public transport system of Antigua by introducing electric vehicles into the system but also improve its quality and coverage, and the mobility conditions and safety of vulnerable groups and women. Furthermore, the pilot projects will incorporate reduced mobility accessible buses to introduce this service into the public transport system.

Governance. The project will require strong cooperation from government departments in charge of transportation, energy, climate change, and waste management, and opened to the participation of private stakeholders and the civil society. This is innovative in the Antigua and Barbuda's context, particularly in what refers to the transportation sector, and will provide an opportunity to strengthen synergies within the government.

Environmental Sustainability:

From a greenhouse gas emission-mitigation perspective, the environmental sustainability of the project is strongly related to the ability of Antigua and Barbuda to increase the share of renewables in the power generation sector, together with its ability to create a growing market for electric vehicles and to promote sustainable passenger mobility options. As mentioned in section 2, Antigua and Barbuda's energy system is highly carbon intensive, with renewable energy generation representing a small share of total electricity production. However, the country has considerable potential for incorporating new renewable energy sources into its power matrix, has taken several policy and regulatory steps towards the support of clean electricity and is working on numerous projects aimed at the introduction of grid-interactive, renewable power. In that framework, the expansion of the electric vehicle fleet will result in more substantial GHG emission reductions. Furthermore, policies developed throughout the project related to vehicle emission standards and fuel quality will help reduce the emission of local pollutants along with disincentive the import of old obsolete highly emitting used vehicles. The project also supports establishing more sustainable passenger mobility practices such as passenger connectivity apps and bus schedules to strengthen the public transport sector, so that it can provide higher quality services and entice citizens to use it rather than private cars. This would reduce the number of cars on the road and their associated GHG emissions.

From a solid waste management perspective, the project actively contributes to the correction of the currently unsustainable patterns in end of life vehicle disposal management, so that the expansion of electric vehicles is undertaken within a context in which they do not become the source of additional environmental hazards. The project undertakes an integrated approach, targeting all vehicles and not only electric vehicles, as otherwise this would create an additional barrier to the latter compared to conventional vehicles. Accordingly, the project activities within component 4 are also effective in addressing these environmental risks, as discussed in the risk management section.

Sustainability of market development after the project:

Several project deliverables are expected to ensure the sustainability of project outcomes:

The creation of a national commitment on low-carbon and climate-resilient electric mobility and a national development plan for low-carbon and climate-resilient electric mobility, will provide both a roadmap for government authorities and a clear signal and incentive for private stakeholders to invest and support the market development.

Investment in e-mobility will be facilitated by the creation of a financial window in the SIRF fund that will help close the current upfront cost gap electric and conventional vehicles, de-risking of the technology through capacity building and demonstrations as well as by the new financial models developed by the project. Furthermore, a long-term plan for the sustainable financing of this window will work to ensure long-term financial sustainability of actions to achieve the project's objective.

The multi-stakeholder consultation strategy established by the project will help steer the implementation of the e-mobility strategy, including expansion of EV in different submarkets such as tourism.

Establishing a public-private strategy and action plan to enable a just transition of the local work force during the transition to electromobility.

The government of Antigua and Barbuda is expected to respond and consolidate the new market opportunities opened by the project, such as infrastructure charging, incorporation of renewable energy into the grid or electric vehicle leasing concepts based on energy provision.

Networking of private and public stakeholders will be continued after project conclusion with the provision of a long-term consultation strategy and the national development plan for low-carbon and climate-resilient electric mobility to facilitate the continuation of the cooperation of all project partners.

Demonstrations and the development of business models will empower the more dynamic car dealers and importers in the island to include a growing number of electric vehicles in their commercial offer, facilitating access to the technology to users better positioned to benefit of electric vehicles (high annual mileage, foreseeable daily mobility needs, or medium-to-large size fleets).

Policy reforms related to vehicle emission standards and fuel quality will disincentive the import of old obsolete highly contaminant used vehicles allowing for clean tech vehicles to be more competitive especially in the best suited service niches.

Policy reforms related to electric vehicle charging infrastructure along with that related to the emission profile and renewable energy integration of the power generation sector will provide a framework for public and private investments into these areas.

Potential for scaling-up:

The Department of Environment, Ministry of Health, Wellness and the Environment, is already exploring how to scale-up the GEF-7 e-mobility project once it has proven successful through a complementary approach with other climate finance delivery channels, including the Green Climate Fund (GCF).

The Department of Environment is currently in the process of developing a project concept for a GCF project. The concept is a work in progress, with discussions ongoing within the country and with the GCF secretariat. Antigua and Barbuda will submit the project to the GCF in 2021 for consideration of the final GCF Board meeting in 2021. Based on the current concept draft (and noting that this may change), the project would consist of a US\$10 million loan with the objective of supporting the government to scale up the GEF-7 electric mobility project and EBUS project through the procurement of electric buses for public transport and schools. The loan would support the broad replacement of the existing internal combustion engine bus fleet with electric buses. It would also facilitate the decommissioning of 30% of the government fleet's internal combustion engine vehicles and facilitate bulk replacement with electric vehicles, prioritizing vehicles in the emergency and education sectors. The GCF project would build upon the regulatory and policy provisions implemented through the GEF project and draw on the early stage technology introduction through the GEF project pilots. The scope is primarily on public transport and governmental fleets. The project is currently designed to consist of a US\$10 million loan, a US\$10 million reimbursable grant and a US\$15 million grant.

The potential for scaling up of e-mobility after project completion is different from the various subsectors:

- Managers of public and private car and van fleets can be expected to become keenly interested in including electric vehicles into their fleets, due to barrier removal provided by the project (easy availability of electric vehicles in the island, incentives, technological de-risking, capacity building) and the availability of financing tools competitive with those of conventional cars. Considering the experience in other countries, the government exemplary role in the electrification of its fleet and the project activities, this potential is very high.

- Tourism is a very important sector of Antigua and Barbuda's economy. Currently many hotel and cruise corporations are pushing for more investment by their satellite companies in sustainable practices. Through the expertise and regulatory frameworks created throughout the project it is possible that hotels and cruise companies will start to invest in clean tech transport fleets and renewable power generation to meet their corporate mandates.

- The community of taxi and bus operators is identified as priority for the project. The project focuses in creating the enabling conditions for electrification in these sectors. The prospects for the project to succeed in establishing these enabling conditions are high, considering the general dissatisfaction with current services and the government's commitment.

· Similarly, the project's approach to public transport focuses on creating the enabling conditions that will make it more attractive to users (increasing demand at the expense of private car use). To become technologically attractive, e-mobility requires that services in at least some public transport routes be previously provided by regular buses instead of the current crew or combi vans. This is also a prerequisite to improve the quality of service, as experienced in many countries, but has a strong impact in the companies and workers in the subsector. The project will provide support to the government in order to undertake the required public transport reform, but this effort will need to be followed by governmental decisions after project completion in order to open the public transport subsector to electrification.

· The project will support reforms in vehicle authorization legislation in order to avoid the importation of inefficient vehicles, particularly second-hand cars and SUVs. This will increasingly reduce the cost-differential between conventional and electric vehicles. Furthermore, the established communication campaigns will encourage consumers to choose energy-efficient vehicles, and those car dealers and importers more engaged with electric vehicles will outreach to individual consumers, in order to expand their potential market.

· The financial schemes developed by the project will facilitate the implementation of sound financial incentives to targeted consumers, including less affluent ones.

· The data collected throughout the pilot projects will allow the development of business models to support existing companies (car dealers, maintenance workshops, waste management companies, public transport and taxi operators) and new entrepreneurs to competitively operate in this emerging market and benefit from its associated business opportunities.

As a consequence of the global e-mobility program and its regional platform, Caribbean countries may also strengthen their cooperation on sustainable mobility and EVs, eventually implementing market integration initiatives in the CARICOM framework to provide a more attractive market to global EV manufacturers.

[1] CO2EMISSIONS FROM FUEL COMBUSTION Highlights (2019 edition), IEA 2019.

[2] IEA Mobility Model, 2017.

[3] The World Bank Group, CO2 emissions (kt) – Antigua and Barbuda (2014).

[4] National Energy Balance 2010-2012.

[5] Antigua and Barbuda's First Biennial update Report, Government of Antigua and Barbuda 2020.

[6] *Antigua and Barbuda. Renewables Readiness Assessment*, IRENA, 2015. Page 23: "...widespread ignorance of renewables in the general public, as highlighted by stakeholders and participants at the expert workshop. The public is neither fully informed nor well engaged with renewables and sustainability."

[7] *Barriers to identification and implementation of energy efficiency mechanisms and enhancing renewable energy technologies in the Caribbean*, ECLAC and GIZ, 2016.

[8] https://ab.gov.ag/pdf/budget/2016_Budget_Summary.pdf. "One of the Bank's major issues is the lack of available funds for lending which is the Bank's main purpose. The lack of funds is due to the Bank's current liquidity position which has deteriorated to a state which requires bailout or bankruptcy."

[9] UNEP, *Diesel Fuel Sulphur Levels: Latin America and Caribbean Region*, 2017.

[10] *Antigua and Barbuda. Renewables Readiness Assessment*, IRENA, 2015.

[11] J. Gomez, Study on the Integration of Renewable Energy in Antigua, 2015.

[12] *Antigua and Barbuda. Renewables Readiness Assessment*, IRENA, 2015.

[13] NREL, Antigua & Barbuda - Initial assumptions and BAU for INDC Mitigation Target Analysis, Clean Energy Solutions Center, 2015.

[14] Electric vehicle transitioning scoping & technical feasibility study. Prepared by LOGIOS For the Department of Environment in the Ministry of Health and the Environment of Antigua & Barbuda. November 2019.

[15] <https://cfccuonline.com/loans-products/>.

[16] Antigua and Barbuda's First Biennial update Report, Government of Antigua and Barbuda 2020.

[17] Government of Antigua and Barbuda – Medium-term development strategy 2016 to 2020.

[18] <https://www.environment.gov.ag/sirf>

[19] GGGI. Context. Available at: <https://gggi.org/country/caribbean/>

[20] *Antigua and Barbuda. Renewables Readiness Assessment*, IRENA, 2015. Recommendation 3: "Undertake a comprehensive public awareness and engagement programme aimed at all levels of society. This would educate people about the costs and benefits of renewables, promote awareness and understanding of the influence of personal behaviour on energy efficiency and sustainability outcomes, and engage consumers in the daily business of sustainability."

[21] For instance: "Environmental impact assessment and solid waste management strategy for the decommissioning of vehicles and used batteries." Prepared by LOGIOS For the Department of Environment in the Ministry of Health and the Environment of Antigua and Barbuda. July 2019.

[22] *Antigua and Barbuda. Renewables Readiness Assessment*, IRENA, 2015. Recommendation 3: "Undertake a comprehensive public awareness and engagement programme aimed at all levels of society. This would educate people about the costs and benefits of renewables, promote awareness and understanding of the influence of personal behaviour on energy efficiency and sustainability outcomes, and engage consumers in the daily business of sustainability."

[23] UNEP, *Diesel Fuel Sulphur Levels: Latin America and Caribbean Region*, 2017.

[23] Environmental impact assessment and solid waste management strategy for the decommissioning of vehicles and used batteries. Prepared by LOGIOS For the Department of Environment in the Ministry of Health and the Environment of Antigua & Barbuda. July 2019

[25] Such as the aforementioned Logios environmental impact assessment and solid waste management strategy for the decommissioning of vehicles and used batteries.

1b. Project Map and Coordinates

Please provide geo-referenced information and map where the project interventions will take place.

Antigua and Barbuda are a twin-island state located in the eastern arc of the Leeward Islands of the Lesser Antilles. The demonstration project will take place on the island of Antigua.





Figure 9. MAP OF ANTIGUA AND BARBUDA

Demonstration sites	<i>Latitude</i>	<i>Longitude</i>
V.C. Bird International Airport	17.117439	-61.845144
St John's West bus station	17.141002	-61.790563

1c. Child Project?

If this is a child project under a program, describe how the components contribute to the overall program impact.

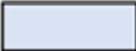
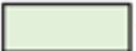
The current project is hosted under the “Global Programme to Support Countries with the Shift to Electric Mobility”, led by UNEP.

The Global Programme to Support Countries with the Shift to Electric Mobility was submitted (June 2019 GEF Council) with child projects in Antigua and Barbuda, Armenia, Burundi, Chile, Costa Rica, India, Cote d'Ivoire, Jamaica, Madagascar, Maldives, Peru; Seychelles, Sierra Leone, Saint Lucia, Togo, Ukraine, Uzbekistan, as well as a global child project. For each child project, a concept note was prepared including national background, policy status, baseline scenario and description of individual national components.

The Global Programme is divided into 4 components:

- Component 1: Global thematic working groups and knowledge materials
- Component 2: Support and Investment Platforms
- Component 3: Country project implementation
- Component 4: Tracking progress, monitoring and dissemination

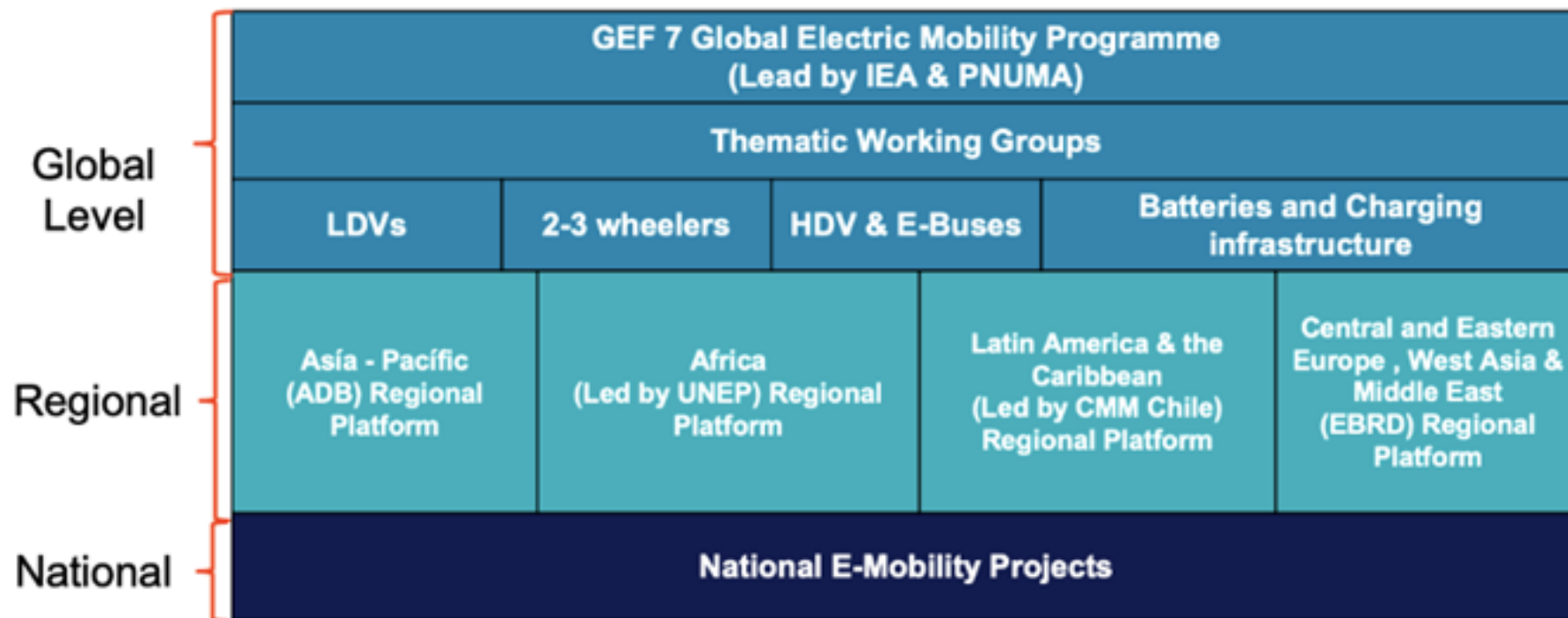
The Global Programme has put in place the monitoring framework below to track progress both globally and at the level of the country child projects. 10 indicators have been designed for this purpose: 4 relying on global level information (highlighted in blue) and 6 relying on country level information (highlighted in green).

Global E-mobility Programme Monitoring Framework			
	 Global level monitoring	 Country level monitoring	
Component 1 Global thematic working groups and knowledge materials	Component 2 Support and Investment Platforms	Component 3 Country project implementation (Child Projects)	Component 4 Tracking progress, monitoring and dissemination
Outcome 1 Knowledge products are generated to support policy making and investment decision-making through four global thematic working groups	Outcome 2 Conditions are created for market expansion and investment in electric mobility through support and investment platforms	Outcome 3 Conditions are created at country and city level for the introduction of electric mobility demonstration projects, and wider up take of electric mobility	Outcome 4 Projects and electric mobility markets are tracked, and key developments, best practices and other lessons learned are shared to promote wider uptake of electric mobility
Indicator 1.1 # of knowledge products developed by the four thematic working groups and used by the Support and Investment platforms in their training and outreach activities	Indicator 2.1 # of countries using services and knowledge products offered by the Support and Investment Platform	Indicator 3.1 # of countries with an improved institutional framework and a strategy to promote the uptake of low-carbon electric mobility	Indicator 4.1 # of countries generating and sharing best practices and other lessons learned on low-carbon electric mobility with the global programme
	Indicator 2.2 # of US\$ leveraged to scale-up low-carbon electric mobility through the support and investment platforms	Indicator 3.2 # of countries with nationally generated evidence of the technical, financial and/or environmental benefits of low-carbon electric mobility	Indicator 4.2 # of e-mobility knowledge products refined based on evidence coming from the country projects
		Indicator 3.3 # of countries that have improved preparedness to accelerate market transformation towards low-carbon electric mobility	Indicator 4.3 # of non-e-mobility programme countries committing to actively promote the uptake of low-carbon e-mobility
		Indicator 3.4 # of countries with measures in place to ensure the long-term environmental sustainability of low-carbon electric mobility	

The global project will report against this framework on an annual basis, using (1) the global level data from the Global Thematic Working Groups and from the Support and Investment Platforms, and (2) country level data provided by each country project during their annual Project Implementation Review (PIR) process.

For this purpose and whenever applicable, the global level indicators highlighted in green are translated into a country-level indicator in the Project Results Framework located in Annex A of the present CEO Endorsement Document. During project implementation, the Project Executing Agency (Antigua and Barbuda Department of Environment) will be requested to report against the indicators of the country Project Results Framework (Annex A) on an annual basis, during the PIR process.

At the global level, a steering committee integrated by the International Energy Agency (IEA) and the United Nations Environment Programme will coordinate and monitor the implementation and the outputs of the GEF 7 Electric Mobility Programme. On technical gaps, four thematic working groups at the global level will support the rapid introduction of electric mobility in GEF recipient countries. These working groups will generate universal knowledge products that contain best practices, factsheets, interactive tools and guidance, as well as experiences from countries that have advanced their e-mobility market. The working groups will be integrated by representatives from the global programme regional platforms, GEF-7 countries, IEA, vehicle manufacturers, utilities, researchers and the civil society. The governance structure is presented in the figure below. For Latin America and the Caribbean, the regional platform will be led by Centro Mario Molina Chile.



Governance structure between the global programme, the national e-mobility projects, and the regional platform

The coordination between the global program, the steering committee, the thematic working groups, and the national projects will be facilitated by the regional platform. The role of the regional platform is to provide customized technical assistance to ensure the success of the country projects. Moreover, knowledge products developed by the working groups will be adapted and disseminated by the regional platform according to the regional and national context, specific needs and languages.

The LAC regional platform will interact with and support participating countries in the region to link with each other through the following activities:

- The creation of a community of practice for the GEF 7 regional countries;

- Facilitation of knowledge transfer between countries, and regions, especially those with common characteristics like SIDS;
- The creation of thematic groups in light-duty vehicles (LDVs), 2-3 wheelers, and buses at regional level;
- A marketplace between countries, technology providers and financial institutions;
- Help desk for technical assistance to GEF 7 LAC countries;
- Personalized assistance from international experts in electric mobility; and
- Generation of training sessions and workshops.

The national child projects will generate a learning curve on electric mobility that can be transferred to other countries within and outside of the region through the global programme. As a first contact point, the regional platform will facilitate the flow of learnt lessons from child projects, such as: data and demonstration results, working business models, operational know-how, working financial instruments, and working policies and regulations. At the global level, the scenarios proposed to share country knowledge and experiences on electric mobility are the thematic working groups, while at the regional level the countries will participate in the community of practice, the thematic regional groups, the marketplace, trainings and workshops.

2. Stakeholders

Select the stakeholders that have participated in consultations during the project identification phase:

Civil Society Organizations Yes

Indigenous Peoples and Local Communities

Private Sector Entities Yes

If none of the above, please explain why:

Please provide the Stakeholder Engagement Plan or equivalent assessment.

Please refer to the report: "Summary of stakeholder consultation meetings and validation workshop", for information on the engagement of stakeholders during the development of the CEO Endorsement document and associated annexes.

This stakeholder engagement plan builds upon the interviews and workshops conducted during project preparation. The project will aim at maintaining fluid and two-way dialogue with the relevant national and local government institutions and agencies, the private sector, and civil society for national activities, as well as with local and international NGOs, the international community and other participating countries at the global programme level.

Public consultation will follow relevant national guidelines and the GEF Guidelines,^[1] which require that all GEF-funded projects meet best international practice and specifically the requirements for stakeholder engagement and public consultations. The project stakeholder engagement activities will be robust, and disclosure on information will be made in order to promote better awareness and understanding of its strategies, policies and operations. During disclosure, the project will: (1) Identify people or communities that are or could be affected by the project as well as other interested parties; (2) ensure that such stakeholders are appropriately engaged on environmental and social issues that could potentially affect them, through a process of information disclosure and meaningful consultation; and (3) maintain a constructive relationship with stakeholders on an on-going basis through meaningful engagement during project implementation. The stakeholder consultations will be an on-going process taking place during the project life and will ensure that stakeholders are informed about environmental and social consequences of the project implementation and ensure the opportunity for feedback.

Identification of stakeholders for engagement and methods of communication

In order to ensure inclusive participation and consultation, the following stakeholders have been identified for consultation. The list includes the identified social groups that are associated with the project in different ways: those directly or indirectly engaged in the outcomes of project implementation; those directly or indirectly participating in the project, and those with a capacity to influence and decide on project implementation and outcomes.

List of stakeholders

During its planning stage, the project has organized one design workshop in October 2019 and a final validation workshop in February 2020. Interviews with key stakeholders identified have taken place in order to identify their concerns and priorities and to integrate their know-how. As a result, the project is taking appropriate responsive measures throughout its lifespan to consolidate and maintain the wide current support built up during the planning stage. As a result of the project design activities, the interests and concerns of the key stakeholder groups have been identified and are presented in the table below.

In addition, provide a summary on how stakeholders will be consulted in project execution, the means and timing of engagement, how information will be disseminated, and an explanation of any resource requirements throughout the project/program cycle to ensure proper and meaningful stakeholder engagement.

Table 5. Project stakeholders

Stakeholder main group	Stakeholder name	Existing activities with potential to be leveraged	Content engagement, contributions to the project (identified by Component)
Government	Department of Environment	GEF focal point and project executing agency.	Lead partner for development and detailed design of the project. C1, C2, C3, C4
Government	Antigua and Barbuda Transport Board	The maintenance of government vehicles is the responsibility of the Transport Board (Ministry of Works). Although the aim of this project is to encourage private uptake of EVs. The vehicles procured under this project will be operated by the Transport Board, which is a statutory corporation under the government.	C1 provide support for workshops and technical studies. C2, the transport board is responsible for the bus station where the solar array will be installed. C3 provide advice and support on policy and standards.
Statutory public corporation	Antigua Public Utilities Authority (APUA) and Independent Power Producers	Antigua Public Utilities Authority provides power, water and telecommunications service to the country.	C1 provide information regarding the current grid and power generation information. C2 provide connectivity of the installed PV systems to the grid. C4 Actively involved in the development of standards detailed in O 4.3
Private sector	Bus Association	The bus association represents bus drivers that run the	C1 providing information for technical studies. C2 They will oversee operating the pilot electric

		public bus transport system	c buses. C3 bus drivers could access the SIRF fund to buy an electric bus.
Private sector	Taxi Association	The airport taxi association represents taxi drivers that run the airport taxi system	C1 providing information for technical studies. C2 They will oversee operating the pilot electric taxis. C3 taxi drivers could access the SIRF fund to buy an electric taxi.
Private sector	Public transport union	The union represents all transport associations	This entity will be engaged on matters requiring the input of all transport entities.
Civil Society Groups	Zero Waste (NGO) Women Against Rape SPARK Initiative The GUARD Centre (for training) A&B Association for Persons with Disabilities	All these civil groups have valuable information regarding the needs and deficiencies of the transport system in the country as well as the waste management status. Their consultation is a key aspect of O1.1	Support consumer survey, consultations and focus group discussions with women and social groups.
Academia	University of the West Indies (Five Islands Campus, Antigua), Antigua state college	These universities provide undergraduate technical education to locals and will be an important part of the long-term transition to electric mobility	C1 provide support for workshops and technical studies. C2 help with electric vehicle monitoring and evaluation. C3 and C4 provide advice and support on policy and standards.
Government	Development Control Authority	Provides and enforces regulations and standards related for construction and development.	C3, provide support for establishing standards and regulations for electric vehicle charging infrastructure and large-scale renewable power installations.
Government	National Solid Waste Management Authority	The NSWMA is in charge of vehicle disposal and all other waste in the country.	C4 provide advice and support on policy and standards. As well as help identify recycling companies that would benefit from battery reuse and recycle training programmes

Government	Antigua and Barbuda Airport Authority	Airport Authority is in charge of airport assets such as the parking lots.	C2, airport authority will have to approve the construction of the airport solar array and the installation of the vehicle charging infrastructure.
Private Sector	West Indies Oil Company	WIOC is the company responsible for fuel imports and distribution in the island.	The involvement of WIO will be crucial in boarding outputs in C3 and C4 as the latter.
Private Sector	Car dealers: Company. Ltd. Megapower Ltd Harney Motors Ltd Antigua Motors Ltd Hadeed Motors Ltd Caribbean Premium Motors Ltd	Car dealers are authorized vehicle importers	C2, Car dealers currently operating in the island will provide the required vehicles for the pilot projects. C3, electric vehicles purchased through the SIRF fund will be purchased from the established island car dealers. Also, discussions related to regulating the importation of electric and conventional vehicles, electric vehicle charging infrastructure, as well as those related to fuel quality will involve car dealers. C4 discussions related to end of life vehicle and battery disposal will also involve car dealers.
Private sector	Renewable energy companies: Greentech Solar (Cayman Islands) Megapower Carisun Action Jack Amory Joseph- individual Jace Irish- Individual	Renewable energy installation companies currently provide the isles with equipment and knowhow related to the installation of solar array and wind turbines.	C2, Renewable energy installation companies currently operating in the island will provide the required solar arrays and equipment for the pilot projects. C4, Discussions related to standards and policy framework for regulating emissions from the power generation sector, as well as for integrating renewable energy into the distribution matrix.
Government	Customs and Excise Division	The customs and excise division is in charge of allowing goods into the country and applying or exempting specific taxes on the different goods.	C2, the importation of the equipment and vehicles required to run all pilot projects must be approved by customs. C3, fuel and vehicle importation standards will

		ds.	have to be enforced by customs.
Government	Directorate of Gender Affairs under the Ministry of Social Transformation and Human Resource Development	Work to support gender equality and incorporation of gender considerations into governmental work and beyond.	C2, support the design and development of gender-sensitive demonstrations C3, C4 support the design and implementation of a gender-sensitive financial window and policies (Consultations undertaken through output 1.1)
Non-governmental organizations	NDC Partnership, International Renewable Energy Agency (IRENA), Climate Analytics, Organization of Eastern Caribbean States (OECS) and the Global Green Growth Institute (GGGI)	NDC Partnership's Climate Action Enhancement Package (CAEP), which is supporting Antigua and Barbuda to enhance and fast-track the implementation of the country's NDC.	C1, support the elaboration and implementation of the multi-stakeholder consultation strategy (output 1.1); support the building of capacity (output 1.3); support the elaboration of the national development plan for low-carbon and climate-resilient electric mobility (output 1.5); support the elaboration and implementation of the communication campaign (output 1.6).
Private sector local financial institutions	Antigua Commercial Bank (ACB), Community First Co-operative Credit Union Ltd, Harney Motors, Hadeed Motors	Currently provide loans to individuals purchasing taxis.	C3, support the purchasing of electric vehicle taxis through the SIRF Fund electric mobility window, by providing loans (investment mobilized) to support individuals to purchase electric vehicles in combination with support from the SIRF Fund.

Given that the scale up of low-carbon and climate-resilient electric mobility requires efforts from different government bodies, ministries and the involvement of different private sectors, companies and community sectors, Output 1.1 focuses on the implementation of a multi-stakeholder consultation strategy, with strong focus on engaging economically vulnerable groups, such as single-parent women, rural communities and independent bus drivers. The strategy will allow all actors to have an equal voice and express their concerns and uncertainties as well as engage in the different proposed activities throughout the project. It will seek to address barriers mentioned in section 1 especially with regards to raising awareness, creating buy-in, increasing coordination, and ensuring the development and implementation of socially acceptable solutions.

Select what role civil society will play in the project:

Consulted only; No

Member of Advisory Body; Contractor;

Co-financier;

Member of project steering committee or equivalent decision-making body;

Executor or co-executor;

Other (Please explain) Yes

Civil society will participate in workshops and training programs developed by the project.

3. Gender Equality and Women's Empowerment

Provide the gender analysis or equivalent socio-economic assesment.

Gender analysis:

Baseline data on electric mobility in Antigua and Barbuda suggests that the low uptake of the technology is directly related to the considerable incremental costs of electric vehicles compared to conventional ones as well as significant knowledge gaps among the population regarding the technology. These increased costs pose a potential risk to marginalise groups within economically vulnerable communities, particularly female headed households, and have the potential to expose them to higher transportation costs.

This is true also for public transport systems where the increased purchase cost of electric vehicles may trickle down to consumers in the form of increased transport fares. The public transport system is predominately used by women and children for work, school and other business, leaving this group especially vulnerable to any potential fluctuation in the cost of public transport. Without appropriate mitigation measures, the introduction of electric vehicles can have significant implications for single-parent women headed households and children, as well as rural communities who are already subjected to higher bus fares

There is also the potential impact on employment for low-level employees within the public transport like bus drivers, a large majority of whom are men with limited formal education and training skills and thus limited opportunities for employment in other fields should the incremental costs begin to impact the economic performance of their business.

In terms of potential professional growth and business opportunities arising from the deployment of low carbon and climate resilient electric mobility in the country, technical positions within the energy and transport sectors in Antigua and Barbuda are comprised of predominately male workers, with women, in general, relegated to administrative roles and limited opportunities for professional growth. Without careful consideration, the project may not provide a forum for active female participation and risk perpetuating the gender polarization of these sectors.

1. Legal Requirements

The following laws, policies and international conventions encapsulated in the table below are applicable to the Department of Environment (DOE)'s commitment to gender equality and transformation and this project.

Table 6. Gender Action Plan Legal requirements.

LEGISLATION	DESCRIPTION AND RELEVANCE TO THE PROJECT
National Legislation	
Constitution of Antigua and Barbuda, 1981	<p>The Antigua and Barbuda Constitution prohibits discrimination on the grounds of sex, which refers specifically to the biological differences that determine an individual as male or female. Article 14 (3) states, "In this section, the expression "discriminatory" means affording different treatment to different persons attributable wholly or mainly to their respective descriptions by race, place of origin, political opinions or affiliations, color, creed, or sex whereby persons of one such description are subjected to disabilities or restrictions to which persons of another such description are not made subject or are accorded privileges or advantages that are not accorded to persons of another such description"</p> <p>This therefore requires that all aspects of the project should include equal opportunities for men and women to be involved in the project as well as benefit from the impact of the project</p>
National Policies	
National Youth Policy, 2007	<p>The National Youth Policy identifies factors that are critical to youth empowerment and identifies eight key focus areas; including strengthening social environments, education and training, employment and sustainable livelihoods, health, participation and empowerment, care and protection, crime, violence and rehabilitation and gender equality and gender relations.</p> <p>This project directly impacts 4 of the 8 focus areas listed within the National Youth Policy: promoting education and training, employment and sustainable livelihoods, youth participation and empowerment and gender relations</p>
Internal Policies	
Department of Environment Gender Policy	<p>The Department of Environment (DOE) Gender Policy formalizes the DOE's commitment to mainstreaming gender nationally and achieving gender sensitivity in all areas. This involves the active and equal involvement of men and women in environmental management and implementation and understanding and mitigating against risks associated with the differentiated vulnerabilities of men and women to climate change events.</p> <p>As such, the DOE's Gender policy sets out the principles on which the approach to</p>

	environmental social safeguards and gender review by the DoE is based and the gender safeguards and requirements that are applicable to each project.
Multilateral Agreements, Treaties and Conventions	
Sustainable Development Goals	<p>In September 2015, the General Assembly adopted the 2030 Agenda for Sustainable Development that includes 17 Sustainable Development Goals (SDGs). The project will contribute to the following SDGs:</p> <p>SDG 3: Good Health and Well-being</p> <p>SDG 4: Quality education;</p> <p>SDG 5: Gender equality;</p> <p>SDG 7: Affordable and clean energy;</p> <p>SDG 9: Industry, innovation and infrastructure;</p> <p>GOAL 11: Sustainable Cities and Communities</p> <p>GOAL 13: Climate Action</p>
United Nations Framework Convention on Climate Change (UNFCCC), 1992	<p>The UNFCCC, which entered into force in 1994, provides a framework for intergovernmental efforts addressing climate change and its effects. Member States of the UN meet and share data on greenhouse gas emissions, national policies and best practices, with the goal of developing and implementing strategies for tackling emissions and providing financial and technical assistance for developing countries. The UNFCCC aims for gender balance in bodies established pursuant to the Convention and the Kyoto Protocol, to improve women's participation and inform more effective climate change policy that addresses the needs of women and men equally. The UNFCCC called for the national adaptation plan (NAP) process to be gender-sensitive and calls on the Green Climate Fund (GCF) to promote environmental, social, economic, and development co-benefits and take a gender-sensitive approach.</p> <p>Each country formulates its Intended Nationally Determined Contributions (INDC) to the UNFCCC. By 2030, Antigua and Barbuda's climate action targets include establishing efficiency standards for the importation of all vehicles and appliances as well enhancing the established enabling legal, policy and institutional environment for a low carbon emission development pathway to achieve poverty reduction and sustainable development</p>
Convention on the Elimination of all Forms of Discrimination Against Women (CEDAW)	CEDAW is the principal instrument utilized by the UN to protect the rights of women and eliminate all forms of discrimination against them. Adopted by the United N

<p>men (CEDAW)</p>	<p>and eliminate all forms of discrimination against them. Adopted by the United Nations General Assembly (UNGA) in 1979, CEDAW was ratified by the Government of Antigua and Barbuda in 1989 and its Optional Protocol signed in 1996. This convention mandates states to ensure that women equally represented their governments and international organizations; have equal rights to bank loans, mortgages and other forms of financial credit; (i) participate in and benefit from rural development; (ii) participate in development planning at all levels; (iii) obtain training, education, and extension services; (iv) have access to agricultural credit and loans, marketing facilities and appropriate technology; and (v) are treated equally in land, agrarian reform, and land resettlement schemes.</p>
<p>Beijing Declaration and Platform for Action from the Fourth World Conference on Women</p>	<p>This landmark Declaration and plan of action called for actively involving women in environmental decision making at all levels, integrating gender concerns and perspectives in policies and programs for sustainable development, and strengthening or establishing mechanisms at the national, regional and international levels to assess the impact of development and environmental policies on women.</p>
<p>Commission on the Status of Women (CSW)</p>	<p><i>The 52nd session of the Commission on the Status of Women (2008) identified gender perspectives on climate change as its key emerging issue.</i> The CSW, which is convened annually at United Nations Headquarters in New York, urged Member States to integrate gender into the design, implementation, monitoring and evaluation and reporting of national environmental policies; as well as to strengthen mechanisms and provide adequate resources to ensure women's full and equal participation in decision making at all levels on environmental issues, with particular emphasis on strategies related to climate change and the lives of women and girls.</p>
<p>United Nations Conference on Sustainable Development (Rio+20) outcome document</p>	<p>Rio+20 affirms that green economy policies in the context of sustainable development and poverty eradication should enhance the welfare of women, mobilize their full potential and ensure the equal contribution of both women and men. <i>"The Future We Want" was adopted in Rio de Janeiro in June 2012.</i> It resolves to unlock the potential of women as drivers of sustainable development, including through the repeal of discriminatory laws and the removal of formal barriers. It also commits to actively promote the collection, analysis and use of gender sensitive indicators and sex-disaggregated data.</p>
<p>UNFCCC Gender Action Plan</p>	<p>The UNFCCC Gender Action Plan aims to increase the participation of women in all UNFCCC processes. It also seeks to increase awareness of and support for the development and effective implementation of gender-responsive climate policy at the regional, national and local levels.</p> <p>The purpose of this gender assessment is to provide the context of gender</p>

2. Stakeholder Consultation and Research

The following gender analysis and gender action plan is based on:

1. A comprehensive review of the above laws and commitments and the following studies:

- i) Antigua and Barbuda (2015). Labour Force Survey Report, Antigua and Barbuda.
- ii) Kairi Consultants Ltd. and the Antigua and Barbuda National Assessment Team (2007), "*Living Conditions in Antigua and Barbuda: Poverty in a Services Economy in Transition*," Submitted to the Caribbean Development Bank;
- iii) Ministry of Finance and Economy (2014). 2011 Census of Population and Housing. Report. St. Johns.
- iv) Rawwida Baksh and Associates (2014), "*Country Gender Assessment Antigua and Barbuda (Vol 1)*," Submitted to the Caribbean Development Bank;

2. Stakeholder consultations with the Gender Officer of the Department of Environment, the Antigua and Barbuda Association of Persons with Disabilities, and other stakeholders, including the bus and taxi associations, during the periods 6-7 October 2019 and 10-14 February 2020.

3. Gender Analysis

This analysis identifies and describes gender differences and gender differentiated impacts and risks.

Gender differences

Based on the 2011 population and housing data, women account for 52% of the total population and 68.5% of the Antigua and Barbuda labour force. While the leadership of women is noted within the public sector, technical and management positions of women are generally concentrated within sectors such as education and finance while men are over-represented in fields such as construction, energy and transport, key implementing sectors for the proposed project. Women who participate in these fields overwhelmingly occupy administrative positions which offer less income and access to opportunities and upward mobility.

Based on the 2015 Antigua and Barbuda Labor Survey, women in the labor force were on average noted as better educated than their male counterparts. Just under two thirds (65.6%) of all labor force participants with a university degree were women while the majority (56.5%) of labor force participants with at most a primary education were men. This is especially evident in employment fields such as construction and transport where expertise is learnt through experience rather than formal education or training.

Gender differentiated impacts and risks

i. Safety and health

While occupying limited technical and managerial positions in fields like transportation, women, particularly female-headed households and children, rely overwhelmingly on the public transport sector for work, school and other activities. As such, they have increased exposure to unsafe environments, as public transport bus stops are often poorly lit and services can be sporadic (especially in off-peak times), leading to enhanced exposure to possibilities of sexual harassment, sexual violence and theft. In addition, they are exposed to the localized pollution and noise caused by the public fleet. This can be seen in Figure 2, where the highest areas of congestion are found in St. John's city and All Saints: both heavily urbanized with surrounding slum areas which are occupied predominately by single-parent female headed households.

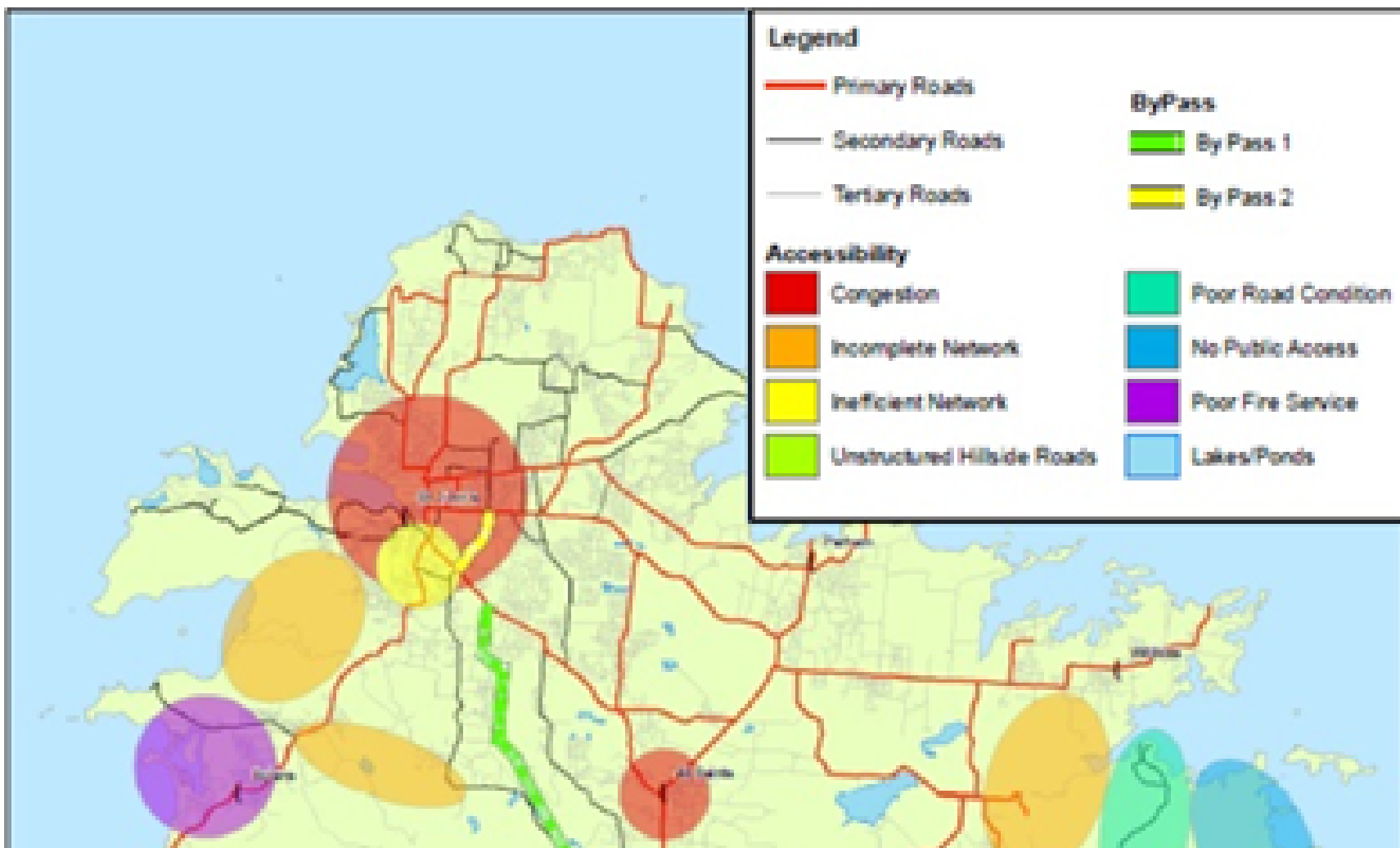




Figure 10. TRANSPORT CONGESTION ZONES OF ANTIGUA

ii. Economic and education

As the primary users of public transport, women are also vulnerable to potential fluctuations in the costs and organization of such transport. The incremental costs of electric vehicles compared to conventional vehicles can be passed to customers in the form of increased transport fares and thus disadvantage female headed households who are the primary users. It can also potentially impact employment for low-level employees within the public transport like bus drivers, a large majority of whom are men with limited formal education and training skills and thus limited opportunities for employment in other fields, should the incremental costs begin to impact private bus and taxi businesses.

Specialty in using and maintaining EVs may also impact on economic opportunities, especially in the mechanical field. EVs require less frequent mechanical maintenance than conventional vehicles, leading to reduced employment opportunities for persons like mechanics, predominately male and with limited formal training. As both public and private sectors begin to increasingly place a higher value on formal educational training, the academic limitations of these men place them at a high risk of unemployment and limited access to income outside of vehicular maintenance. This impact is not expected to be felt during the implementation of the aforementioned project due to the small demonstration of EVs which the project will introduce. However, by starting the advent of EVs on the Antigua and Barbuda market, this project will contribute to a transition which could potentially result in loss in employment and access to income opportunities for the men in this field.

iii. Participation

Further, due to their limited role within technical positions of energy and transport, solely open procurement and advertisements for training opportunities are unlikely to bring female participation in the implementation of the project. Thus, without careful consideration, the project may not provide a forum for active female participation and risk perpetuating the gender polarization of these sectors.

Opportunities

The project has several opportunities to address existing gender inequalities and support enhanced gender equality through the introduction of gender-sensitive electric mobility interventions:

- v) The introduction of electric buses and taxis within the public fleet is expected to contribute to reduced pollution in highly urbanized areas where congestion is high and thus provide health benefits for women and children who use public transportation as well as occupants in the surrounding slum areas.
- vi) The project will support enhanced public transport services associated with the introduction of electric buses, including through new, air-conditioned and brightly lit buses and online payment schemes that will also reduce waiting times. It will also introduce bus monitoring systems, digital payment systems and user connectivity apps (D.2.4.4) that will provide up-to-date information on bus location and arrival times, leading to shorter waiting times for females. All of these interventions may increase women's safety in using public transport.
- vii) By involving women effectively in project design and implementation, and ensuring that interventions are gender sensitive, the project may support the introduction of increased economic opportunities for women in the transport and electricity sectors and support a just-transition of the workforce from existing high-emission technologies.

4. Gender Action Plan

This gender action plan describes the gender responsive measures that will be implemented as part of the project to address the gender differences, mitigate identified impacts and risks, and harness opportunities to promote the empowerment of women.

For a wholistic approach in project implementation, it was decided to adopt the approach of incorporating gender considerations in relevant project outputs and activities rather than including isolated gender driven activities throughout different components.

In considering the above, the project's multi-stakeholder consultation strategy (output 1.1) will be developed and implemented in a way which facilitates the inclusion of public and private stakeholders involved in the deployment of the technology, with a particular focus on engaging economically vulnerable communities, such as single-parent women, rural communities, independent bus drivers and trade unions. The process to develop the strategy will ensure all actors have an equal voice and express their concerns and uncertainties as well as engage effectively in the different activities of the project.

To promote the professional growth of women in male-dominated fields such as energy and transport and deliver training to the predominately male staff, the Department of Environment, through its portfolio of renewable energy projects, has developed and implements activities as part of gender-responsive training programmes. These aim at successfully engaging men, whilst identifying clear guidelines for including women in training activities, thus enabling opportunities for the latter to professionally develop within the sectors. With regards to the project, all activities related to capacity building (Outputs 1.3 and 4.1), will synergize with activities already established by the Department and will:

- Be designed as gender responsive training programmes which take into consideration the different learning methods of men and women.
- Employ a targeted approach for facilitating the participation of women in technical fields within the energy and transport sectors and the training opportunities. This will include partnering with women's organizations to reach out to females with relevant technical training.

Limited female participation in science, technology, engineering and mathematic fields is partly driven by cultural perceptions and gender stereotypes which tend to encourage women into administrative roles. Through its communication campaign (Output 1.6), in addition to promoting its activities, the project will implement a gender-sensitive campaign promoting women to engage in technical fields.

Furthermore, in acknowledging the male-dominated nature of the energy and transport sectors, it is unlikely women will benefit from the procurement and business opportunities related to providing electric vehicles, charging infrastructure, renewable energy systems, equipment for building infrastructure, etc. In addition to the capacity building gender responsive programs detailed above, the Department of Environment has also geared activities aimed at reducing the gender gap in technical business sectors. As such, all activities related to the procurement of technology in Component 2 will synergize with existing gender activities and projects in developing procurement systems which incentive private businesses to have a gender diverse technical field.

In terms of Outputs 2.2 and 2.4 which seek to engage taxi and bus drivers, respectively, to test the electric vehicle technology, the project will ensure that female drivers are included in the demonstration. Output 2.4 in particular, will look to demonstrate the technical feasibility of incorporating electric buses into Antigua's public bus transport fleet. A significant difference between outputs 2.2 and 2.4, is that the public bus system is primarily used by locals, predominately women and children, while taxis are primarily used by tourists. This makes economic constraints in the bus system considerably stronger than the taxis used by high income tourists. As mentioned above an increase in the bus fare will have an impact on the net income of low-income families, such as single-parent women headed households. The demonstrations will thus be designed in way that ensures that the partial electrification of Antigua's public bus transport will not result in an increase of the bus fare, whilst providing the same or even an improved service, in addition to the environmental benefits obtained.

The financial window to be developed under the Sustainable Island Resource Framework (SIRF) Fund will benefit from the consultation strategy (Output 1.1), as well as the financial requirements of the national development plan (Output 1.5). The consultation strategy will include input from key vulnerable communities such as single-parent women and children and business owners, particularly small and informal business, to include not just car dealerships and businesses in the public transport bus fleet, but also mechanics, renewable energy technicians, trade and workers unions amongst others.

Gender actions and indicators are summarized on Table 4.

Table 7. Gender actions and indicators

PROJECT ACTIVITY	GENDER ACTION	INDICATOR	TARGET
Component 1			
Output 1.1.	Consultations which will guide the completion of the multi stakeholder consultation strategy and coordination mechanism must include representation and input from key stakeholders including women, trade and workers unions, Civil Society Organizations (CSO) representing vulnerable communities and private business owners including small business owners of public bus fleets, the taxi association, bus-drivers as well as local mechanics	<p>Number of female attendees at consultations</p> <p>No of representation of key vulnerable communities (including organizations representing vulnerable communities and men and women)</p> <p>Number of women and vulnerable communities provide positive responses to consultations through an identified evaluation system</p>	<p>50% female and male representation in consultations</p> <p>30% representation of vulnerable communities</p> <p>Coordination Mechanism includes highlighted inputs and recommendations from vulnerable groups including women and other vulnerable communities</p>
Output 1.2	The assessment of fleet electrification will include an analysis of the financial and social impact of transition for communities, particularly the most vulnerable the cost for the workforce, both formal and informal as well as potential opportunities to replace losses from the transition.	Report is gender-sensitive and sensitive to a just transition.	<p>Consultation Report including concerns from key vulnerable communities including women as well as men in the transport and vehicular maintenance field</p> <p>A socio-economic analysis establishing the impact of low-carbon and climate-resilient electric mobility on men and women of economically vulner</p>

			<p>able communities based on consultation report</p> <p>Assessment of the formal and informal workforce and the differential impact on men and women in the workforce due to the proposed transition based on consultation report</p>
Output 1.3	<ul style="list-style-type: none"> Design a gender responsive training programme which will take into consideration the different learning methods when reaching men and women and thus developing their skill set in integrating electric mobility and RE into the electric grid A targeted approach in reaching women in technical fields within the energy sector and including them in the training opportunities. This will include partnering with women's organizations in reaching females with the relevant technical training 	<p>Number of women participating in capacity building workshops</p> <p>Number of women and men provide positive responses to training workshops through an identified evaluation system</p>	<p>30% share of women in capacity-building trainings</p> <p>70% of women and men provide positive responses to training workshops</p>
Output 1.5	<p>Based on the completed assessment under Output 1.2, the national development plan (deliverable D1.5.4) for ensuring electric mobility will:</p> <ul style="list-style-type: none"> Ensure continuous engagement with key individuals and groups in forming the development plan 	<p>Number of consultations with vulnerable communities including women on development plan</p> <p>Number of women and vulnerable communities provide positive responses to consultations through an identified</p>	<p>50% female and male representation in consultations</p> <p>30% representation of vulnerable communities</p> <p>National development plan is gender-sensitive and highlight</p>

	<ul style="list-style-type: none"> · Draw upon a socio-economic analysis demonstrating the impact of low-carbon and climate-resilient electric mobility on men and women and providing recommendations for the cost effective and social benefit of E-mobility (D1.2.4) · Include a strategy for the just transitioning of the formal and informal workforce in Antigua and Barbuda. 	<p>... through an enhanced evaluation system</p>	<p>gender-sensitive and highlights inputs and recommendations from vulnerable groups including women and other vulnerable communities, and set targets for differential access to financing for men and women</p> <p>Strategy for the just transitioning of the workforce which includes inputs and recommendations from vulnerable groups including women and other vulnerable communities</p>
Output 1.6	A gender responsive communication campaign which highlight the benefits for vulnerable communities and women as well promote women in technical fields within these sectors through imagery	Number of television/radio/social media/newspaper posts showcasing women in technical fields and promoting gender diversity	All media postings by the project
Component 2			
Output 2.2	<ul style="list-style-type: none"> · Ensuring that female taxi drivers are included in the demonstration · Developing a procurement system which incentivizes private businesses to have a gender diverse technical field 	Number of females represented in the demonstration	Minimum 25% of drivers participating in the demonstration are females
Output 2.4	<ul style="list-style-type: none"> · Ensuring that female bus drivers are included in the demonstration · Developing a procurement system which incentivizes private businesses to have a gender diverse technical field 	Number of females represented in the demonstration	Minimum 25% of drivers participating in the demonstration are females

	vate businesses to have a gen der diverse technical field	
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Tracking of the gender action plan, including indicators, will be undertaken by the project's Chief Technical Advisor, with the support of the Department of Environment's Gender Officer (through in-kind co-financing).

Does the project expect to include any gender-responsive measures to address gender gaps or promote gender equality and women empowerment?

Yes

Closing gender gaps in access to and control over natural resources;

Improving women's participation and decision making Yes

Generating socio-economic benefits or services or women Yes

Does the project's results framework or logical framework include gender-sensitive indicators?

Yes

4. Private sector engagement

Elaborate on the private sector's engagement in the project, if any.

Private sector involvement is crucial for the success of the project, and a list of key private sector actors is contained in Table 5 above. Car dealers and renewable energy providers will participate in components 2, 3 and 4. The private sector will also engage in the stakeholder consultation strategy implemented in Output 1.1. Overall, the project will engage the private sector in a variety of ways:

- As project beneficiary: project activities will increase demand for electric vehicles, vehicle charging infrastructure and renewable energy systems in Antigua and Barbuda. Dealers and importers will be engaged to provide these goods as well as their maintenance services. Furthermore, these stakeholders will benefit from additional supporting actions from the project, such as the development of business models and financial schemes, which will encourage them to develop their own market strategies.
- Renewable energy installation companies will benefit from the procurement of the solar arrays required for outputs 2.1 and 2.2 and will be able to access the information produced by the different studies delivered throughout the project. This will give them a broader picture of the limits and opportunities for the sector in the future.
- The bus and taxi associations are direct beneficiaries of the project given that these will be able to test the technology under local operating conditions at no cost. These private sector actors will engage directly in the demonstrations to identify potential business opportunities without the risk of technical uncertainty. Furthermore, they will also benefit from project activities in order to gain access to the benefits provided by electric vehicles within a more favorable legal and financial framework.
- The incorporation and testing of digital payment systems along with user connectivity apps, amongst others, will allow for future business opportunity for platform developers but also for public transport users.

Some private stakeholders will be particularly active as their involvement in some of the project activities is crucial for the long-term sustainability of a low carbon climate resilient future. For example, the West Indie Oil company is responsible for all fuel imports into the country. The company is currently evaluating a transition from oil company to an energy company. This transition would include, amongst other things, the incorporation of renewable energy power generation assets and electric vehicle charging infrastructure into their portfolio. Furthermore, the expansion of the company's activities would enable a more productive discussion regarding the quality of fuel imported into the isles as well as that of establishing an emission standard for the power generation sector.

The private sector is also targeted by most of the capacity-building activities included in the project:

- Capacity building activities within component 1 are targeting decision makers and professionals in the public and private sector, and will focus on technical, financial, and regulatory aspects of integrating electric mobility and renewable energy into the electric, and their growth prospects.
- Capacity building activities within component 4 will facilitate the involvement of private companies in the management of EVs at their end of life, opening new business opportunities in this sector.

5. Risks to Achieving Project Objectives

Elaborate on indicated risks, including climate change, potential social and environmental risks that might prevent the project objectives from being achieved, and, if possible, the proposed measures that address these risks at the time of project implementation. (table format acceptable):

(i) How will the project's objectives or outputs be affected by climate risks over the period 2020 to 2050, and have the impact of these risks been addressed adequately?

Each year Antigua and Barbuda is negatively affected by extreme weather events such as hurricanes. There is a risk of high impact climatic events such as a hurricane disrupting power generation and electricity diffusion, damaging electric vehicles and destroying road and power infrastructure. This leads to a loss of income as hotels close and taxi and bus services are consequently reduced. In accordance with IPCC reports, it is estimated that with global warming these extreme events will increase in frequency and severity between 2020 and 2050. The project aims to mitigate these risks through multiple measures. The focus of the project is on building resilience into the design of all project activities and outputs, through an objective of achieving low-carbon and climate resilient electric mobility. In particular the RE systems will be made resilient by:

- (i) Removing the panels before a category 4 or 5 hurricane. This will be built into the maintenance and asset management agreements
- (ii) Installing grid-interactive renewable energy systems at vehicle charging locations. These grid-interactive systems located at the charging locations will ensure that in the event of a grid blackout, electric vehicles will still be able to be charged. In addition, the grid-interactive systems will ensure resilience of the installed solar panels and charging stations (e.g. protecting them from grid instability).

Standards and a policy framework for regulating the disposal of vehicles (output 4.2) will be designed to ensure that extreme weather events and sea-level rises do not lead to increased contamination. It is not perceived that an increase in the sea level will impact the project beyond this output.

(ii) Has the sensitivity to climate change, and its impacts, been assessed?

Antigua and Barbuda has high sensitivity to climate change and its impacts. It experiences severe weather events annually due to hurricanes. It is also susceptible to sea level rise.

(iii) Have resilience practices and measures to address projected climate risks and impacts been considered? How will these be dealt with?

As noted in the response to (i), the project has a central focus on building resiliency.

(iv) What technical and institutional capacity, and information, will be needed to address climate risks and resilience enhancement measures?

The technical design of the solar panel and vehicle charging installations will need to be in accordance with the latest building codes, to ensure resilience to extreme weather events (primarily extreme wind speeds). Regulations for charging stations (output 3.4) will also need to be in accordance with such codes. Information on extreme weather events and wind speeds is currently available and will not need to be obtained through the project. Operators of and institutions

operating the solar panel and vehicle charging installations will need capacity to understand how to operate the grid interactive systems during and after extreme weather events, especially in the event of grid blackouts.

Table 8. Project risk analysis

Risk description	Main categories	Risk level rating - probability	Risk level rating - impact	Risk Mitigation Strategy and Safeguards	By Whom / When?
<p>Uncertainty around the duration and evolution of the current COVID-19 outbreak and its impact on the country's economic outlook and public sector priorities.</p>	<p>Social, Environmental, Political and Financial</p>	<p>Medium</p>	<p>Medium</p>	<p>The Department of Environment (DOE), as the project executing agency, has recognized the risks to staff and resultant risks to project outputs such as workshops, construction, and others. It also recognizes the risk to the supply chain and how it may affect procurement for this project, in addition to the risk of drivers' unwillingness to purchase new vehicles due to financial constraints. In this context, at the beginning of project execution, the project timeline and dates of execution of all project activities will be re-evaluated taking into consideration any on-going risks due to COVID-19.</p> <p>In addition, internally the DOE will add staff and cross-train staff so that if a staff member contracts COVID-19 and is on leave during their recovery the project can continue.</p>	<p>Department of Environment (DOE) / throughout the project</p>

				Project vehicle pilots are estimated to commence in late 2021 / early 2022. If social distancing measures are in place, they will not affect taxi usage. For buses, if required the pilot will be initiated later in the project (in its third or fourth year) as required to ensure maximum potential of the pilot and mitigate risks due to COVID-19.	
The high cost of electric vehicles and high cost of grid electricity could result in an increase of the public transport bus fare, affecting vulnerable communities.	Social	Low	High	Pilot projects will help clarify the economic performance of electric buses and establish financing/grants mechanisms via de SIRF fund and others to help reduce the impact of the incremental cost of the technology. Also, the inclusion of renewable energy systems through Outputs 2.1 and 2.3 as well as studies in Output 1.3 will aim to reduce the cost of electricity.	Department of Environment (DOE) /throughout the project
Political opposition to the uptake of EVs, renewable energy and development and approval of more stringent environmental regulations in the transport, energy and waste management sectors.	Political	Medium	Medium	Component 1 strongly tackles this risk by seeking the establishment of an electric mobility national commitment followed by an electric mobility national development plan focused on achieving such commitment. These will be supported by capacity building activities and technical studies. Finally, a communication campaign focused on the benefits of electromobility	DOE and the Government Cabinet/ongoing

				will be launched to provide bottom-up support to the deployment of electric vehicles.	
The inclusion of electric buses through the pilot project could generate resistance from the bus association, as it could result in lower revenue for drivers.	Political	Low	Medium	The design on the electric bus pilot programme (selected routes schedule tariff, etc.) will be discussed with the Bus Association to ensure the project success and approval from local operators.	Department of Environment (DOE) /throughout the project
Risk of high impact climatic event such as a hurricane could disrupt power generation, damage electric vehicles, destroy infrastructure, etc.	Climate	Medium	High	Installation of renewable energy systems at vehicle charging locations aim to reduce risk of power shortage for pilot project operations, Also, operating the electric vehicles in high priority routes will ensure that these are operational as soon as possible.	Department of Environment (DOE) /throughout the project
Higher electricity use by electric vehicles might lead to higher emissions, e.g. from the diesel and oil power generators	Environmental	Low	Medium	Renewable energy sources will be integrated into the approach. GEF funds will be used to install solar power to supply clean electricity for electric vehicles.	Department of Environment (DOE) /throughout the project
Materials from electric vehicles (EVs) (e.g. from batteries) might generate e	Environmental	Low	Medium	The project tackles the potential environmental hazard created by the irresponsible disposal of vehicles in component 4 establishing standard	DOE and National Solid Waste Management Authority/ during project implementat

Environmental pollution				standards and regulations for end of life vehicle disposal.	ion
Promoting the use of EVs without restricting the number of overall vehicles will result in more traffic, energy consumption, strain on transport infrastructure and thus GHG emissions	Environmental	Low	Medium	The project will enable discussions around policy and regulations to reduce the introduction of conventional vehicles and will include renewable energy systems through its demonstration stages to reduce the carbon footprint of the introduced EVs. The project will also promote electric buses which provide a better service than existing buses (cleaner, more modern, etc.) just creating incentives for increased public transport usage.	DOE/throughout the project
The country's grid is unstable and not resilient affecting the performance of the project pilots	Technical	Low	Low	The demonstration projects will not be reliant on the grid and will also aim to show how the use of EV grid integration can be used to stabilize the grid and improve the usage of currently curtailed renewable energy systems.	DOE in consultation with experts/ during the technical scoping of the demonstration projects
The high cost of EVs and high cost of grid electricity can reduce the uptake of the technology	Financial	Medium	Medium	Pilot projects will help clarify the economic performance of electric buses and establish financing mechanisms via the SIRF fund and others to help reduce the impact of the incremental cost of the technology. Also, the inclusion of renewable energy systems through Outputs 2.1 and 2.3 as well as studies in Output 1.3 help reduce the cost of	SIRF Fund / during project implementation

				electricity, and promote their uptake.	
High air conditioning energy requirements, and vehicle operating conditions will reduce the range of electric vehicles	Technical	Low	Low	Technical assessment of routes and operating conditions will be included in the procurement process of the vehicles.	DOE in collaboration with Bus Association/ during procurement stage
Current lack of electric vehicle availability	Capacity	Low	Medium	The vehicle importers have been included in the project from its inception, including during project consultation. Furthermore, they will be engaged in activities related to C1 (stakeholder engagement strategy), C2 (supply of vehicles), C3 (regulation of imported vehicles) and C4 (regulating of disposal of vehicles).	DOE and Vehicle importers / from project inception onwards
Lack of technical support on the maintenance and deployment of vehicles and infrastructure	Capacity	Low	Low	The preventive maintenance costs of all vehicles purchased will be included in the procurement process of the vehicles in order to ensure the availability of specialized mechanics and spare parts. Furthermore, corrective maintenance expenses have been included in the budget in case of an incident. In addition, capacity building trainings will focus on supporting local actors to build technical capacity.	DOE, vehicle importers, and contracted experts / during the technical scoping of the demonstration projects

<p>Access to affordable credit by potential electric taxi purchasers may reduce scale-up potential of project</p>	<p>Financial</p>	<p>Medium</p>	<p>Medium</p>	<p>Through output 3.1 the project directly aims to address such risk by reducing the risk to local financial institutions to lend to potential electric taxi purchasers. It aims to achieve this by initially covering the upfront incremental cost of electric vehicles, with the rest of the cost covered through purchaser equity and local financial institution loans. This experience of local financial institutions in lending to individuals for the purchasing of electric vehicles, at rates similar to loans for internal combustion engines, will help to drive down perceived lending risk, provide such institutions with concrete experience in the electric vehicle market, and help to address the credit access risk. Furthermore, through deliverable 3.1.3 the long-term financial plan for implementing the national development plan for low-carbon and climate-resilient electric mobility (Output 1.5), including through incentives, private sector business models and the sustainable financing of the window, aims to identify measures for addressing the credit access risk.</p>	<p>Department of Environment, SRF Fund Board</p>
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6. Institutional Arrangement and Coordination

Describe the institutional arrangement for project implementation. Elaborate on the planned coordination with other relevant GEF-financed projects and other initiatives.

· Institutional arrangements:

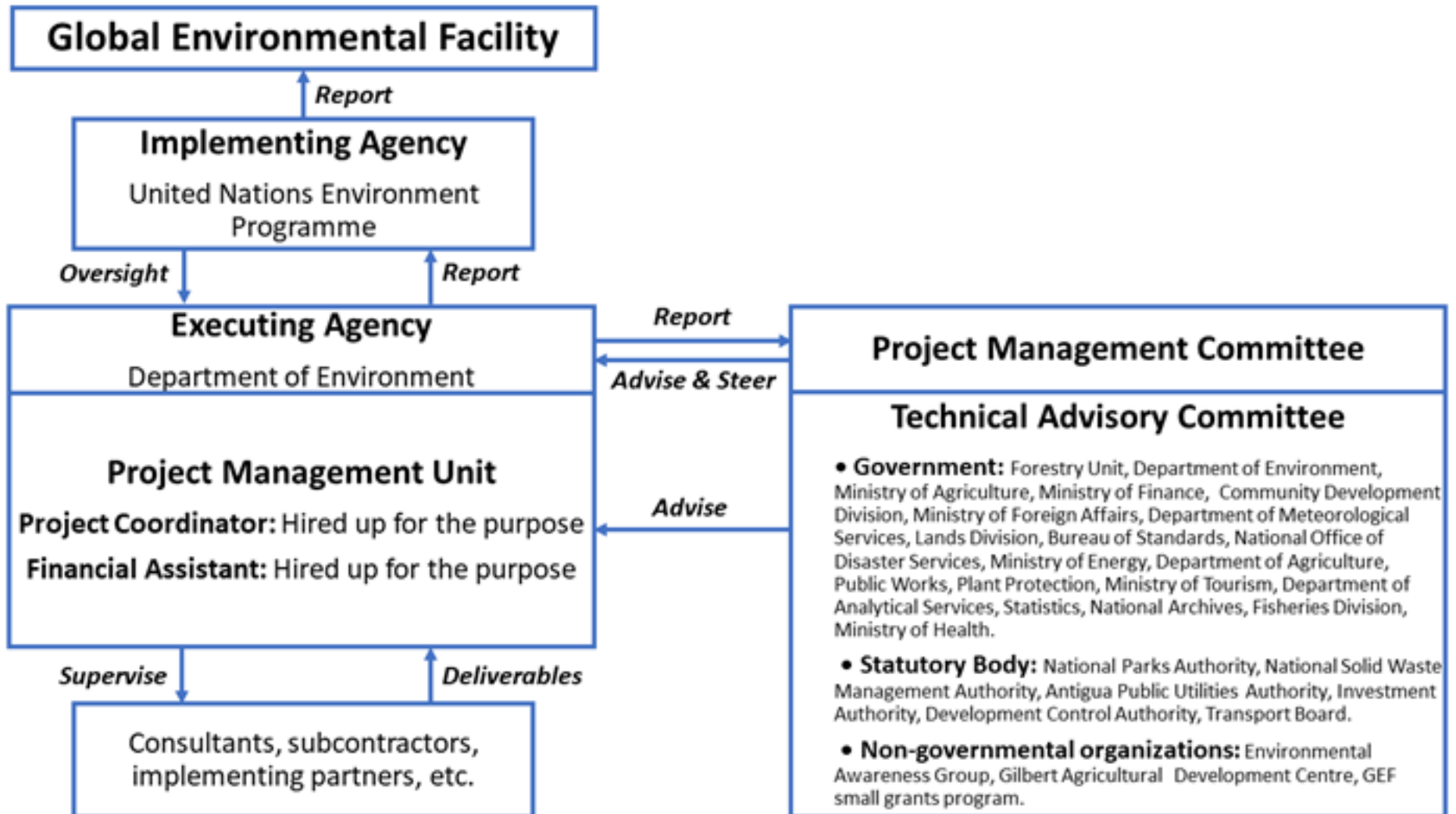


Figure 11. Project organogram

UNEP is the GEF Implementing Agency and the Department of Environment (DOE) will be the Executing Agency of this project. The DOE is also the executing agency for all other GEF climate change projects in the country, therefore DOE will ensure that there is constant coordination of the activities and focus on the synergies that can be created among initiatives. Moreover, since DOE participates in international and regional platforms there is potential to share lessons learned in this project with other developing countries. The project will be executed in line with established Government of Antigua and Barbuda procedures and the DOE will take overall responsibility for execution of the project and for project success. It will establish the necessary planning and management mechanisms to oversee project inputs, activities and outputs.

The project's organogram may be seen in Figure 2 above. Refer to Annex K for further details on the roles and responsibilities of the Implementing and Executing Agencies. The main project bodies are the following (refer to Annex K for more details):

The **Project Management Unit (PMU)** is the management framework within the DOE, whose core structure consists of a Project coordinator (PC) and component coordinators with specialized expertise hired to work on specific components. The PMU is designed to achieve efficiency and coordination in the management of funding from a variety of donors, the governments and non-governmental organizations (NGOs). The PMU also ensures that there is effective coordination and efficiency when there are project activities that are similar and inter-dependent on each other for execution. Antigua and Barbuda is a small island developing state where access to well-trained technical capacity is a key risk. The PMU is a mitigation measure to minimize this risk.

The **Technical Advisory Committee (TAC)**, mandated by a government cabinet decision, is a mechanism that enhances coordination between key ministries and stakeholders. The TAC meets monthly and includes representatives from 17 key government agencies, 3 non-governmental organizations and one private sector coalition. The committee provides sustained technical guidance, policy recommendations and support for areas within their expertise to achieve policy coherence among country objectives and not just project-by-project.

The **Project Management Committee (PMC)** is a high-level cross-sectorial committee comprising of lead policy makers and heads of departments. It consists of the Permanent Secretary of the Ministry of Housing, Lands and Urban Renewal; Permanent Secretary and Principle Assistant Secretary of Ministry of Health, Wellness and the Environment; Principle Assistant Secretary of the Ministry of Agriculture, Fisheries and Barbuda Affairs; Permanent Secretary of the Ministry of Legal Affairs, Public Safety and Labor; representative from the Ministry of Finance and Corporate Governance; Focal Point for the United Nations Development Programme; and the Chief Environment Officer and a secretary. The function of the PMC is to focus mainly on procurement, institutional arrangements and financial management of the project. The selection of consultancies and companies is the responsibility of the PMC.

· Coordination with other initiatives:

As seen in Annex I-2, there are several on-going projects that will provide support in the form of co-financing to the proposed activities. These are related to the deployment of renewable energy capacity, communication of impacts and benefits of low carbon technologies and vehicle end of life responsible disposal. Furthermore, other GEF projects already being executed in the isles although not used as co-financing, are also related to the project at hand and therefore coordination with these is essential to guarantee that projects do not overlap. Antigua and Barbuda's ongoing GEF projects are shown on Table 9A.

Table 9A. Antigua and Barbuda's ongoing GEF projects

Initiative	Timeframe	Focus Area
Monitoring and assessment of MEA implementation and environmental trends in Antigua and Barbuda (with UNDP)	Under Implementation: (2018 – 2022)	Multi-Focal Areas CCCD-1
The Path to 2020 – Antigua and Barbuda (with UNEP)	Under Implementation: (2019 – 2023)	Biodiversity
Preventing COSTS of Invasive Alien Species (IAS) in Barbados and the OECS Countries (with UNEP)	Under Implementation: (2018 – 2021)	Biodiversity
Biennial Update Report (BUR)	Under implementation: (2017 – 2019)	Climate Change
Sustainable Pathways – Protected Areas and Renewable Energy (SPPARE) (with UNEP)	Under implementation: (2015 – 2021)	Biodiversity, Climate Change

In terms of GEF initiatives, these projects are coordinated as per the institutional arrangements created for the management of environmental projects in Antigua and Barbuda (as per the institutional arrangements in the previous section), thus ensuring national coordination amongst all related projects.

The Department of Environment will lead coordination between the GEF-7 project and other national initiatives, as it is the focal point for all multilateral environmental agreement conventions and funding related to climate finance. The DOE is also the co-nationally designated authority for the GCF, together with the Ministry of Finance, and this arrangement allows for the country to coordinate financing for climate change projects including the GEF-7 e-mobility project.

The country is of the view that to ensure maximum impact and to build and sustain capacity, priority projects for the GCF and Adaptation Fund (AF) submission must build upon GEF projects. This scaling up and coordination is possible since the DOE is the Direct Access entity or the Executing entity for all of these projects. To date the GEF SCCF project Building Climate Resilience through Innovation Financing Mechanism Climate Change Adaptation was scaled up to the AF and the GCF project FP061. The GEF SPPARE project has been scaled up through the Abu Dhabi Fund for Development project phase 2 and proposed GCF energy projects under development. The SCCF project was also scaled up by AF project approved in 2017 and the GCF Build project FP133 approved by B26 in August 2020. The GEF Sustainable Low-Emissions Island Mobility projects is expected to be scaled up by the GCF energy projects in the GCF country program for Antigua and Barbuda (see baseline and scaling-up sections of this document).

The following table 9B describes technical coordination between the GEF-7 project and other relevant initiatives underway nationally. The Department of Environment is the national executing agency for these, ensuring coherence and coordination between these initiatives. In addition to the below, the National Solid Waste Management Authority (NSWMA) initiative on end of life vehicle disposal is of great interest to the project at hand and coordination will be undertaken through Antigua and Barbuda's Technical Advisory Committee, of which both the DOE and the NSWMA are members.

Table 9B. Coordination with other relevant national projects

Project	National executing agency	Coordination
Italian Electric School Bus Pilot Program in Antigua (EBUS)	Department of Environment	<p>To date, coordination has ensured that lessons learned from the EBUS project have been taken into account in the development of the budget for the GEF project, with bus costs budgeted based on accurate cost predictions including based on procurements through the EBUS project.</p> <p>On technical coordination, the DoE will coordinate to ensure that EBUS activities are aligned with the development of incentivizing policies and regulations under the GEF project. Similarly, it will ensure that further lessons learned are incorporated into the design and execution of GEF-7 activities.</p>
IRENA/ Abu Dhabi Fund for Development (ADFD) -Transformation of the water and government sectors using renewable energy	Department of Environment	The DoE will coordinate to ensure that the installation of solar PV and battery energy storage through the ADFD at the airport are technically compatible with the PV grid-interactive charging stations installed by the GEF project.
Government of India – PV to schools	Department of Environment	The DoE will ensure technical coordination between the installation of solar PV in both projects, for instance, to ensure that procurements can draw on lessons learned of each.
Grid Interactive Solar PV Systems for Schools (GISS)	Department of Environment	The DoE will ensure technical coordination between the installation of solar PV in both projects, for instance, to ensure that procurements can draw on lessons learned of each.
GEF Sustainable Pathways – Protected Areas and Renewable Energy (SPPARE)	Department of Environment	The DoE will ensure coordination to draw on lessons learned in the establishment of the SIRF funding financing window under the SPPARE project, avoiding duplication and building synergies and complementarities with the window developed under the GEF-7 project.
NDC Partnership and Climate Action Enhancement Package	Department of Environment	The DoE is leading work to update the country's NDC and will coordinate efforts to ensure that work under the GEF project (for instance the national commitment and development plan) are aligned with and build upon the updated NDC, once completed and submitted to the UNFCCC.
Technical assistance from the Global Green Growth Institute (GGGI)	Department of Environment	The DoE will ensure that the GEF project builds upon GGGI work to support the development of GCF projects (see also the baseline section on the proposed GCF project).

The project will coordinate with the global programme by engaging in the LAC regional platform's activities. In particular, country representatives will participate in

the regional platform-led community of practice. This will include participating in LAC platform task teams on LDVs, 2&3 wheelers, buses, batteries and charging infrastructure, participating in meetings of the LAC platform and participating in marketplace meetings on technology and finance. The country will coordinate with other child projects in the region, and in particular with the Caribbean sub-region, through the help desk and the community of practice, in particular the task teams and platform meetings. Engagement through the platform will ensure effective two-way coordination, with country representatives sharing project updates, raising challenges and sharing good practices with platform representatives. Platform representatives will share good global practices, identify solutions to challenges raised. and ensure regional coordination and alignment.

7. Consistency with National Priorities

Describe the consistency of the project with national strategies and plans or reports and assessments under relevant conventions from below:

NAPAs, NAPs, ASGM NAPs, MIAs, NBSAPs, NCs, TNAs, NCSAs, NIPs, PRSPs, NPFE, BURs, INDCs, etc.

Overall, the project is aligned with key government initiatives and priorities:

Biennial Update Report and National Communications: This project is aligned with the national priorities and needs explained in the Third National Communication (TNC) to the United Nations Framework Convention on Climate Change (UNFCCC) submitted in 2015. The latter outlines the country's commitments to addressing the impacts of climate change in the country and provides details on *inter alia*: i) the socio-economic and environmental situation in the country; ii) emissions statistics and mitigation targets; and iii) vulnerability, impacts of climate change and proposed adaptation measures.

Nationally Determined Contributions (NDC): The project is aligned with Antigua and Barbuda's priorities communicated in its NDC, submitted to the UNFCCC in 2015, which outlines the country's commitments to GHG mitigation (Article 2) and adaptation (Article 4), in response to climate change and the effects thereof. Through the NDC, adaptation and mitigation targets are put forward with some being conditional on international support. Unconditional targets that the country has committed to include, enhancing the enabling legal, policy and institutional environment for a low carbon development pathway. The conditional and unconditional targets specified in the NDC are outlined in Table 10 below. This project aligns with conditional mitigation targets on energy and mobility established by the 2015 NDC, in particular with the "Establish efficiency standards for imported vehicles and appliance" target set for the year 2020. It will seek the development of standards and regulations for the importation of conventional and electric vehicles altogether with quality standards for the importation of fuels. Furthermore, it will develop standards and policies for the regulation emissions from the power generation sector, as well as regarding the integration of renewable energy into the grid.

United Nations MultiCountry Sustainable Development Framework in the Caribbean (UNDAF): The project is aligned with Jamaica's sustainable development framework, as contained in the United Nations multi-country document. In particular, the project is aligned with the framework area: A sustainable and resilient Caribbean; outcome: policies and programmes for climate change adaptation, disaster risk reduction and universal access to clean and sustainable energy in place.

Table 10. targets specified in the 2015 ndc of antigua and barbuda11

Target	Target Year
Conditional Adaptation Targets	
Increase desalination capacity by 50% above 2015 levels	2025
Improve and prepare all buildings for extreme climate events	2030
Use off-grid renewable sources to meet 100% of electricity demand in essential services sectors	2030
Protect all waterways to reduce flooding and health impacts	2030
Make an affordable insurance scheme available to farmers, fishers, business owners and private home owners, to mitigate the losses resulting from climate impacts	2030
Conditional Mitigation Targets	
Establish efficiency standards for imported vehicles and appliances	2020
Finalize technical studies with the intention to construct, and put into operation, a waste-to-energy (WTE) plant by 2025	2020
Achieve an energy matrix of 50 MW of electricity from renewable sources both on and off-grid in public and private sectors	2030
Protect the remaining wetland and watershed areas to enhance their use as carbon sinks	2030
Unconditional Targets	
Enhance the established enabling legal, policy and institutional environment for low carbon emission development pathway to achieve poverty reduction and sustainable development	No target date set in the NDC
Update the Building Code to meet the projected impacts of climate change	2020

8. Knowledge Management

Elaborate the "Knowledge Management Approach" for the project, including a budget, key deliverables and a timeline, and explain how it will contribute to the project's overall impact.

The project will generate several streams of information which need to be managed. The consultation strategy (Output 1.1) will produce quarterly reports based on the interviews and meetings it holds with the different stakeholders. Studies and capacity-building activities will also produce valuable information that needs to be managed to maximize diffusion and stakeholder uptake. Finally, the component 2 pilot projects will generate performance indicators, lessons learned and identify barriers, valuable information that will allow decision makers and the project steering committee to take action to maximize the project's impact.

Knowledge management will be achieved through two key project outputs:

Output 1.6. The communication campaign will be designed specifically to highlight the benefits of low carbon electric mobility will actively incorporate information and results of the different project activities. Whilst the latter will be designed by a publicity company hired for this purpose, content will be managed by the PMU. Furthermore, Output 1.6 includes the creation of an online public information platform where all details related to low carbon electric mobility initiatives will be uploaded. This will allow private stakeholders and potential future investors to understand the current state of things, learn from ongoing and past projects and identify opportunities.

Output 3.5. Whilst Output 1.6 is intended to engage and keep the general public informed on the results and motivations of the project at hand, Output 3.5 is intended to provide government institutions with an agile and organized data management system. Antigua and Barbuda, as for most countries in the region, lacks a government data management system. This makes acquiring information from different government entities a costly and timely process. Furthermore, data is often incomplete or nonexistent. This is often not because it was not collected or does not exist, but because it was recorded in personal computers or in independent spreadsheets which are not shared. This makes establishing reference lines, problem diagnoses and monitoring of implementation measure indicators an inefficient and thus unproductive process. Based on the above Output 3.5 will incorporate a government data management system that will allow for all data produced throughout the project by the different government institutions to be stored and managed. To do this a consultant will be hired to establish the minimum requirements needed by the system given the current and future necessities of relevant public entities. Based on these and best international practices a software for data management will be selected for implementation. The implementation of the acquired data management system will start in public entities involved in the execution of the pilot projects (Component 2) and then to other relevant entities.

Finally, the project is part of the global GEF-UNEP Programme on Electric Vehicles. It will actively participate in the global programme's global and regional activities through its component 1, for example by participating and contributing to the knowledge exchange in the regional knowledge and investment platforms and the relevant global working groups, as well as by providing insights and knowledge.

9. Monitoring and Evaluation

Describe the budgeted M and E plan

Monitoring and Evaluation (M&E) activities and related costs are presented in the costed M&E Plan (Annex J) and are fully integrated in the overall project budget. The project will comply with UNEP standard monitoring, reporting and evaluation procedures. Reporting requirements and templates are an integral part of the legal instrument to be signed by the Executing Agency and the Implementing Agency.

The project M&E plan is consistent with the GEF Monitoring and Evaluation policy. The Project Results Framework presented in Annex A includes SMART indicators for each expected outcome as well as end-of-project targets. These indicators along with the key deliverables and benchmarks included in Annex L will be the main tools for assessing project implementation progress and whether project results are being achieved. The means of verification to track the indicators are summarized in Annex A.

The M&E plan will be reviewed and revised as necessary during the project Inception Workshop (IW) to ensure project stakeholders understand their roles and responsibilities vis-à-vis project monitoring and evaluation. Indicators and their means of verification may also be fine-tuned at the inception workshop. General project monitoring is the responsibility of the Project Management Unit (PMU) but other project partners could have responsibilities in collecting specific information to track the indicators. It is the responsibility of the Project Manager to inform UNEP of any delays or difficulties faced during implementation so that the appropriate support or corrective measures can be adopted in a timely fashion.

The Project Management Committee (PMC) will receive periodic reports on progress and will make recommendations to UNEP concerning the need to revise any aspects of the Results Framework or the M&E Plan. Project oversight to ensure that the project meets UNEP and GEF policies and procedures is the responsibility of the UNEP Task Manager. The UNEP Task Manager will also review the quality of draft project outputs, provide feedback to the project partners, and establish peer review procedures to ensure adequate quality of scientific and technical outputs and publications.

Project supervision will take an adaptive management approach. The UNEP Task Manager will develop a project Supervision Plan at the inception of the project, which will be communicated to the Project Management Unit and the project partners during the Inception Workshop. The emphasis of the Task Manager's supervision will be on outcome monitoring but without neglecting project financial management and implementation monitoring.

Progress vis-à-vis delivering the agreed project global environmental benefits will be assessed with the PMC at agreed intervals. Project risks and assumptions will be regularly monitored both by the Project Management Unit, the project partners and UNEP. Risk assessment and rating is an integral part of the Project Implementation Review (PIR). The PIR will be completed by the Project Coordinator and ratings will be provided by Task Manager. The quality of project monitoring and evaluation will also be reviewed and rated as part of the PIR. The Task Manager will have the responsibility of verifying the PIR and submitting it to the GEF. Key financial parameters will be monitored quarterly to ensure cost-effective use of financial resources.

Since this is a Full-Size Project (FSP), resources are set aside for a Mid-Term Review (MTR) or Mid-Term Evaluation (MTE). The Task Manager will decide when the MTR/MTE shall be initiated. The purpose of the Mid-Term Review (MTR) or Mid-Term Evaluation (MTE) is to provide an independent assessment of project performance at mid-term, to analyze whether the project is on track, what problems and challenges the project is encountering, and which corrective actions are required so that the project can achieve its intended outcomes by project completion in the most efficient and sustainable way. The review will include all parameters recommended by the GEF Evaluation Office for Terminal Evaluations and will verify information gathered through the GEF tracking tools, as relevant. The review will be carried out using a participatory approach whereby parties that may benefit or be affected by the project will be consulted. Such parties were identified during the stakeholder analysis (see section 2. above). Members of the PMC could be interviewed as part of the MTR/MTE process and the PMU will develop a management response to the evaluation recommendations along with an implementation plan. It is the responsibility of the Task Manager to monitor whether the agreed recommendations are being implemented.

In-line with UNEP's Evaluation Policy and the GEF's Monitoring and Evaluation Policy the project will be subject to a Terminal Evaluation (TE) commissioned by the UNEP Evaluation Office (EOU) at the end of project implementation. The EOU will be responsible for the Terminal Evaluation and will liaise with the Task Manager and Executing Agency's Project Management Unit throughout the process. The TE will provide an independent assessment of project performance (in terms of relevance, effectiveness and efficiency), and determine the likelihood of impact and sustainability. It will have two primary purposes: (i) to provide evidence of results to meet accountability requirements, and (ii) to promote learning, feedback, and knowledge sharing through results and lessons learned among UNEP, the GEF, executing partners and other stakeholders.

The TE will be initiated no earlier than 6 months prior to the operational completion of project activities and, if a follow-on phase of the project is envisaged, should be completed prior to completion of the project and the submission of the follow-on proposal.

The draft TE report will be sent by the Evaluation Office to project stakeholders for comments. Formal comments on the report will be shared by the EOU in an open and transparent manner. The project performance will be assessed against standard evaluation criteria using a six-point rating scheme. The final determination of project ratings will be made by the EOU when the report is finalized and further reviewed by the GEF Independent Evaluation Office upon submission. The evaluation report will be publicly disclosed and will be followed by a recommendation compliance process. A review of the quality of the evaluation report will be done by EOU and submitted along with the report to the GEF Evaluation Office not later than 6 months after the completion of the evaluation.

The GEF Core Indicator Worksheet is attached as Annex F. It will be updated at mid-term and at the end of the project and will be made available to the GEF Secretariat along with the project PIR report. As mentioned above, the MTR/MTE and TE will verify the information of the tracking tool. The direct costs of reviews and evaluations will be charged against the project evaluation budget. A summary of M&E activities envisaged is provided in Annex J. The GEF contribution for this project's M&E activities is US\$ 75.000.

10. Benefits

Describe the socioeconomic benefits to be delivered by the project at the national and local levels, as appropriate. How do these benefits translate in supporting the achievement of global environment benefits (GEF Trust Fund) or adaptation benefits (LDCF/SCCF)?

In terms of direct benefits for the local population, reducing the sulphur content of fuel imports will significantly reduce the particulate matter emission of the entire transport fleet, improving quality of air in urban areas and thus reducing the impact on human health. Furthermore, introducing electric vehicles into the public transport system will improve the quality of the service in terms of comfort by reducing noise and vibrations. Furthermore, given that the acquired electric vehicles will run on a specific schedule along a specific route, in addition to the use of connectivity apps to connect operators with passengers, the project will promote a modal shift from the use of private transport to the public transport system, which would in turn result in an improvement of traffic conditions throughout the island. Given that the current public transport system is not accessible to people with reduced mobility, the incorporation of electric buses with wheelchair accessibility will allow people with reduced mobility to use the new service.

As is expected when incorporating a new technology into a given system, this will result in a new ecosystem for business which enables opportunities but could also affect current employment areas. The project will put in place activities to ensure that the work force transition is just (Output 1.1, 1.2, and 1.3), and does not result in the loss of employment of current workers of both the energy and transport sectors. Also, given the strong gender focus of the project and the experience of the DOE personnel in the area, the project aims to result in new employment opportunities for women. This will be done by ensuring that companies involved in the procurement, installation or sale of systems, infrastructure and equipment related to low carbon electric mobility include gender diverse initiatives into their operating structure.

In terms of economic benefits, as mentioned in section 2, Antigua and Barbuda currently annually spend around 14% of its GDP on fuel imports annually. Although the incorporation of low carbon electric mobility will also require importation, thus capital expenditures, on renewable energy assets, electric vehicles and charging infrastructure, once enabled, the transition will make the country less dependent of global oil prices. This should reduce investment uncertainties, which should in turn result in a more favorable investment environment reducing interest rates and short term expected returns, making long term investments more attractive. Furthermore, the transition to electric mobility will create a new market for the power generation and electricity distribution sectors making investments in the latter more attractive, thus, improving the reliability and reliance of the overall system.

11. Environmental and Social Safeguard (ESS) Risks

Provide information on the identified environmental and social risks and potential impacts associated with the project/program based on your organization's ESS systems and procedures

Overall Project/Program Risk Classification*

PIF

CEO Endorsement/Approval MTR

TE

Medium/Moderate

Measures to address identified risks and impacts

Elaborate on the types and risk classifications/ratings of any identified environmental and social risks and impacts (considering the GEF ESS Minimum Standards) and any measures undertaken as well as planned management measures to address these risks during implementation.

The project should identify the marginalized and vulnerable groups and see the project’s potential influence (positive or negative) to and from the project. Their active engagement by identifying their specific needs and roles should be captured.

Establish and inform widely a project-level grievance or complaint redressing channel and also disseminate the UNEP Stakeholder Redress Mechanism including the project concern form to relevant stakeholders. All these efforts will contribute to ensuring transparency of the project

Supporting Documents

Upload available ESS supporting documents.

Title	Module	Submitted
EM A&B_ESERN	CEO Endorsement ESS	

ANNEX A: PROJECT RESULTS FRAMEWORK (either copy and paste here the framework from the Agency document, or provide reference to the page in the project document where the framework could be found).

Project Objective	Objective level Indicators	Baseline	Mid-Point Target (if applicable)	End of project Target	Means of Verification	Assumptions & Risks	UNEP MTS reference
Promote low carbon and climate resilient public and private transportation systems in Antigua and Barbuda.	Indicator A: Tons of direct GHG emissions avoided during project.	Baseline A: 0 tons avoided	Mid-point target A: 20 tons avoided	End-of-project target A: 200 tons avoided	Monitoring of mileage and energy consumption of electric vehicles deployed in demonstration projects	Pilot project vehicles are operational by month 18 of the project, but only start commercial operation the last trimester of the second year (Month 21) and remain operational till the end of the project	UNEP MTS 2018-2021 Climate Change Objective: Countries increasingly transition to low-emission economic development and enhance their adaptation and resilience to climate change
	Indicator B: Number of direct project beneficiaries (women and men)	Baseline B: 0 beneficiaries	Mid-point target B: 200 women and 200 men	End-of-project target B: 1850 women and 1820 men	Bus association and taxi association trip records and workshop and consultation strategy records	Pilot project vehicles are operational by month 18 of the project, but only start commercial operation the last trimester of the second year (Month 21) and remain operational till the end of the project	

Project Outcomes	Outcome level Indicators	Baseline	Mid-Point Target (if applicable)	End of project Target	Means of Verification	Assumptions & Risks	MTS Expected Accomplishment
Outcome 1 The Antigua and Barbuda government demonstrates enhanced coordination	Indicator 1: A multi-stakeholder strategy, national commitment and development plan are delivered to the Government for adoption	Baseline 1: 0	Mid-point target 1: Draft strategy, commitment and plan finalized for interministerial consultation	End-of-project target 1: Draft strategy, commitment and plan delivered to the government for adoption	Government records	Political support of ministries to coordinate on electric mobility	Expected Accomplishment (b): Countries increasingly adopt and/or implement low greenhouse gas emission development strategies and invest in clean technologies

<p>ation, capacity and commitment for promoting electric mobility</p>							
<p>Outcome 2</p> <p>Antigua and Barbudan citizens begin to use electric mobility for their public transport needs</p>	<p>Indicator 2:</p> <p>Number of Antigua and Barbudan citizens using electric mobility for their public transport</p>	<p>Baseline 2:</p> <p>0</p>	<p>Mid-point target 2:</p> <p>175 women and 175 men</p>	<p>End-of-project target 2:</p> <p>1775 women and 1745 men</p>	<p>Electric public bus and taxi records.</p>	<p>Electric buses and taxis are effectively incorporated into public transport fleets.</p>	<p>Expected Accomplishment (b):</p> <p>Countries increasingly adopt and/or implement low greenhouse gas emission development strategies and invest in clean technologies</p>
<p>Outcome 3</p> <p>The Antigua and Barbuda government takes actions towards financing and implementing policy frameworks for low-carbon electric mobility</p>	<p>Indicator 3:</p> <p>Electric vehicles purchased with support of SIRF fund electric mobility window and enabling framework</p>	<p>Baseline 3:</p> <p>0</p>	<p>Mid-point target 3:</p> <p>N/A</p>	<p>End-of-project target 3:</p> <p>10 electric vehicles</p>	<p>SIRF Fund records</p>	<p>Political support for operationalization of SIRF Fund.</p>	<p>Expected Accomplishment (b):</p> <p>Countries increasingly adopt and/or implement low greenhouse gas emission development strategies and invest in clean technologies</p>
<p>Outcome 4</p> <p>The Antigua and Barbuda</p>	<p>Indicator 4:</p> <p>Draft policies and standards for ensuring the long-term environmental sustainability of</p>	<p>Baseline 4:</p> <p>0</p>	<p>Mid-point target 4:</p> <p>Report on options for standards and policy frameworks delivered to the gove</p>	<p>End-of-project target 4:</p> <p>Draft policies and standards delivered to the g</p>	<p>Government records</p>	<p>Political support of government to advance work on policies in this area</p>	<p>Expected Accomplishment (b):</p> <p>Countries increasingly adopt and/or implement low greenhouse</p>

a government takes action towards implementing policy frameworks and building capacity to ensure the long-term sustainability of electric mobility	electric mobility are delivered to the government for adoption		government for consideration	government for adoption			electric gas emission development strategies and invest in clean technologies
	Indicator 5: Number of individuals trained in the reusing, recycling and disposing used vehicles (both conventional and electric) and electric vehicle batteries	Baseline 5: 0	Mid-point target 5: 25 women and 25 men	End-of-project target 5: 75 women and 75 men	Government records	Interest of national stakeholders to participate in trainings and build capacity	Expected Accomplishment (b): Countries increasingly adopt and/or implement low greenhouse gas emission development strategies and invest in clean technologies

ANNEX B: RESPONSES TO PROJECT REVIEWS (from GEF Secretariat and GEF Agencies, and Responses to Comments from Council at work program inclusion and the Convention Secretariat and STAP at PIF).

Please refer to the separate pdf files uploaded to the GEF portal:

- Annex B.1 – Responses to GEF secretariat reviews on the PFD;
- Annex B.2 – Responses to GEF secretariat reviews on the PFD addendum;
- Annex B.3 – Responses to STAP comments;
- Annex B.4 – Responses to GEF Council comments.

ANNEX C: Status of Utilization of Project Preparation Grant (PPG). (Provide detailed funding amount of the PPG activities financing status in the table below:

PPG Grant Approved at PIF: US\$			
<i>Project Preparation Activities Implemented</i>	<i>GETF/LDCF/SCCF Amount (US\$)</i>		
	<i>Budgeted Amount</i>	<i>Amount Spent to date</i>	<i>Amount Committed</i>
Project consultant (baseline analysis, project design, preparation of the document)	7,453	7,453	0
UNEP Air Quality and Mobility Unit (developing methodology for calculating GHG emission reductions, calculation of GHG emission reductions, technical review of document)	5,000	5,000	0
Consultant Travel	7,547	7,547	0
Total	20,000	20,000	0

ANNEX D: CALENDAR OF EXPECTED REFLOWS (if non-grant instrument is used)

Provide a calendar of expected reflows to the GEF/LDCF/SCCF/CBIT Trust Funds or to your Agency (and/or revolving fund that will be set up)

Not applicable.

ANNEX E: Project Map(s) and Coordinates

Please attach the geographical location of the project area, if possible.

Antigua and Barbuda are a twin-island state located in the eastern arc of the Leeward Islands of the Lesser Antilles. The demonstration project will take place on the island of Antigua.

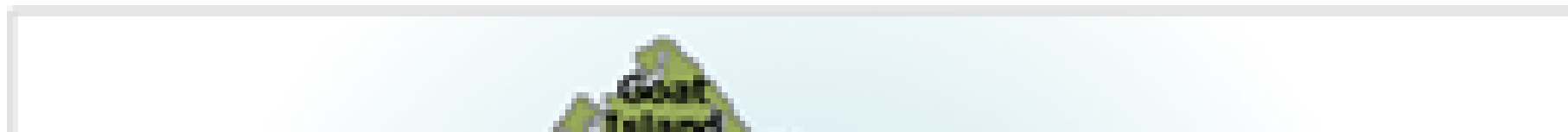






Figure 12. MAP OF ANTIGUA AND BARBUDA

Demonstration sites	<i>Latitude</i>	<i>Longitude</i>
V.C. Bird International Airport	17.117439	-61.845144
St John's West bus station	17.141002	-61.790563

ANNEX F: Project Budget Table

Please attach a project budget table.