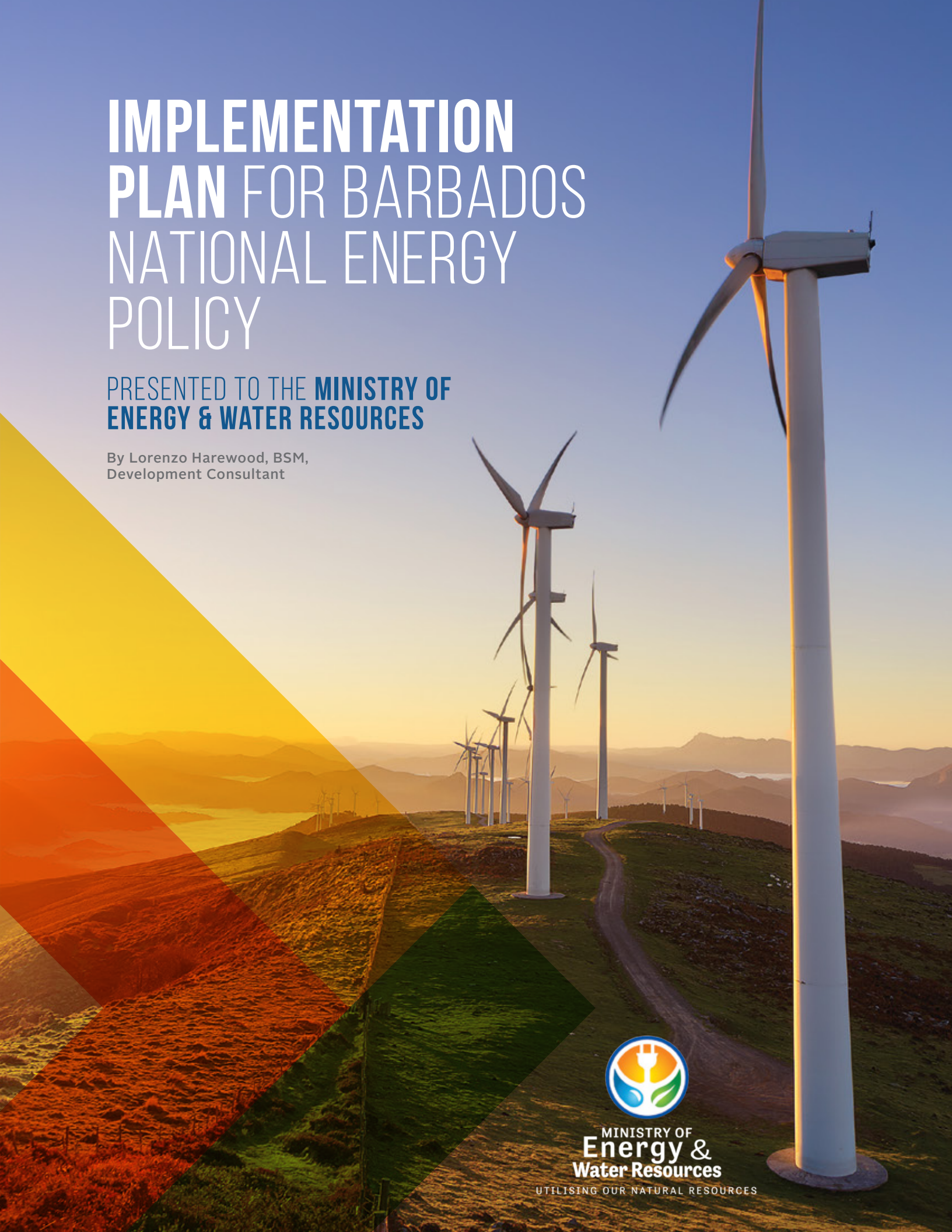
IMPLEMENTATION PLAN FOR BARBADOS NATIONAL ENERGY POLICY

PRESENTED TO THE **MINISTRY OF ENERGY & WATER RESOURCES**

By Lorenzo Harewood, BSM,
Development Consultant



MINISTRY OF
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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACRONYMS & ABBREVIATIONS

AG	Office of the Auditor General
BAPE	Barbados Association of Professional Engineers
BCC	Barbados Community College
BCCI	Barbados Chamber of Commerce & Industry
BCIC	Barbados Cane Industry Corporation
BDF	Barbados Defense Force
BEG	Bio Economy Group
BERT	Barbados Economic Recovery and Transformation Programme
BL&P	Barbados Light & Power Company Ltd.
BNEP	Barbados National Energy Policy
BNOCL	Barbados National Oil Company Ltd.
BREA	Barbados Renewable Energy Association
BSS	Barbados Statistical Service
CAIPO	Corporate Affairs and Intellectual Property Office
CCREEE	Caribbean Center for Renewable Energy & Energy Efficiency
CPC	Chief Parliamentary Counsel
EA	Enabling Activity
EPD	Environmental Protection Department in the Ministry of Environment and National Beautification
EEL	Energy Equivalency Licenses
ESCOs	Energy Service Companies
EV	Electrical Vehicle
FFF	Fossil Fuel Free
FIT	Feed-In-Tariff
FTC	Fair Trading Commission
GEED	Government Electrical & Engineering Department
GWh	Gigawatt hours
IADB	Inter-American Development Bank
IP	Implementation Plan
IPP	Independent Power Producers
IRP	Integrated Resource Planning
MAFS	Ministry of Agriculture & Food Security
MENB	Ministry of Environment & National Beautification
METVT	Ministry of Education, Technology and Vocational Training
MEWR	Ministry of Energy & Water Resources
MFAFT	Ministry of Foreign Affairs & Foreign Trade
MOFEI	Ministry of Finance, Economic Affairs & Investment
MOH	Ministry of Health and Wellness
MOL	Ministry of Labor and Social Partnership Relations
MOU	
MSBEC	Ministry of Small Business, Entrepreneurship and Commerce
MTWM	Ministry of Transport, Works and Maintenance
MWh	Megawatt hours
NCCC	National Climate Change Committee
NGO	Non-Governmental Organisation
NPC	National Petroleum Corporation
PAHO	Pan American Health Organisation
PIU	Public Implementation Unit in the Ministry of Finance, Economic Affairs & Investment
PM	Policy Measures
PMCT	Project Monitoring and Coordination Team
PS	Private Sector
PSC	Project Steering Committee
PSSEP	Public Sector Smart Energy
PSVA	Public Service Vehicles Association
PTF	Project Task Force
RCT	Resource Coordination Team
RE	Renewable Energy
RELR	Renewable Energy Licensing Regime
SJPI	Samuel Jackman Prescod Institute of Technology
SMART	Specific, Measurable, Achievable, Relevant, Time Bound
SSA	Sanitation Service Authority in the Ministry of Environment & National Beautification
TBD	to be determined
TCPD	Town & Country Planning Department
TOR	Terms of Reference
TVET	Technical Vocational Educational Training Council
UWI	University of the West Indies

ACKNOWLEDGEMENTS

Substantial contributions are acknowledged from the wide cross-section of stakeholders, including non-governmental organisations, public and private sector representative from the various thematic areas outlined in the Barbados National Energy Policy (BNEP). This document reflects feedback from a number of partners who will collectively play a vital role in implementing and validating the various milestones outlined in this plan. The inputs provided by the following organisations are appreciated:

- Alliance of Public Transport Operators
- Barbados Cane Industry Corporation
- Barbados Chamber of Commerce and Industry
- Barbados Defense Force
- Barbados Light & Power Co. Ltd.
- Barbados National Oil Company Ltd.
- Barbados National Terminal Company Ltd.
- Barbados Renewable Energy Association
- Barbados Sugar Industries Ltd.
- Coastal Zone Management Unit
- Delegation of the European Union
- Innogen Technologies Inc.
- McEnearney Quality Inc.
- Megapower Ltd.
- Ministry of Energy and Water Resources
- Ministry of Environment and National Beautification
- Ministry of Transport, Works and Maintenance
- Nassco Ltd.
- National Petroleum Corporation
- Pavana Energy Inc.
- Petroleum Dealers Association
- RUBIS Caribbean
- Sanitation Service Authority
- Simpson Motors Ltd.
- Simpson Oil Ltd.
- The Fair Trading Commission
- Transport Board
- United Nations Development Programme for Barbados and the OECS
- Williams Solar

In addition, I wish to recognise the contributions of the associate consultants, Miss Kristin Qui and Mr. Ryan Als, in helping to structure the approach and finalise various aspects of this document.

EXECUTIVE SUMMARY

To assist the Government of Barbados with achieving its 2030 vision of becoming 100% fossil fuel free (FFF) by 2030, the Government of Barbados, with the Ministry of Energy and Water Resources (MEWR), commissioned the development of this implementation plan (IP) to supplement the Barbados National Energy Policy (BNEP).

This IP identifies output-level measures that will accelerate full integration of renewable energy (RE) into Barbados' energy mix.

The first section of the document explains the methodology and approach undertaken to develop the IP. Following the methodology section, is a projection of Barbados' target renewable energy mix in 2030, including calculations for target numbers, details on costs and benefits and spatial requirements for the renewable energy technologies necessary to achieve the 2030 vision. The IP also includes a detailed implementation toolkit, which includes an implementation strategy by year and thematic area listing the required activities to achieve the 100% FFF target by 2030, a results framework, a monitoring and evaluation framework, and potential management arrangements. Key limitations and assumptions of this IP are included toward the end of the document, followed by three appendices. Appendix A lists the activities to be implemented by various entities and stakeholders, Appendix B and C describe the risk register guidelines and threat rating.

The IP approach reflected a multi-sectoral stakeholder process. The methodology consisted of 5 working groups separated by thematic area:

1. Natural Environment and Climate Change;
2. Electricity Supply, Energy Efficiency and Conservation;
3. Oil and Gas Supply;
4. Transport; and
5. Renewable Energy Supply and Storage.

Working group seminars were held from November 2018 to December 2018. During the Renewable Energy Stakeholders meeting, a survey was administered to identify critical factors relating to opportunities and threats to the implementation of the 100% FFF vision. 35 interviews with persons from various organisations helped to flesh out specific activities for implementation to be carried out by those organisations.

The working groups identified some concerns to be addressed in order to achieve the 100% FFF vision and proposed solutions to these concerns. Specifically, these concerns include resource identification and mobilisation, capacity building, communication and change management. For resource identification and mobilisation, the establishment of a Resource Coordination Team (RCT) will serve to identify sources of technical and financial resources and will be responsible for project concept and proposal writing and review and other related activities. This team will be cross-sectoral and comprise of experts from various Government Ministries. A detailed capacity assessment was listed as necessary during the initial stages of implementation in order to identify gaps in the various entities/organisations required to create an enabling environment for achieving the 2030 vision. The capacity assessment will focus on staffing, technology and training. For communication, the working groups identified the need for communication channels that facilitate constant dialogue across the working groups as necessary. This will include an online dialogue platform, quarterly stakeholders meetings with members of all working groups, allowing for updates on progress and inviting comments for consideration. Finally, a framework will be established to assist individuals and organisations in making the change to 100% FFF. The

framework will focus on the principles of awareness, desire, knowledge, ability and reinforcement (ADKAR).

The IP includes energy targets for 2030 based on various estimates and assumptions. Over the next 5 years, 2019 to 2023, 295 MW of renewable energy is one possible scenario could be potentially be commissioned, consisting of a minimum of 160 MW of solar photovoltaics and a minimum of 120 MW of wind. This scenario also identifies 80 MW of energy storage. The scheduled implementation of technologies will result in 688 GWh of electricity from renewable energy sources in the first 5 years of implementation. The estimated cost of achieving 100% renewable energy by 2030 is about $4 billion, while the estimated economic benefit from the sector on an annual basis is projected to average around $3.9 billion per year over the ten year implementation period, which can be attributed to a release of resources used to import fossil fuels. It was found that greater local investment might result in greater local benefits, whereas greater foreign investment means less benefits being retained locally.

Spatial requirements for each of the renewable energy technologies vary by technology. The IP finds that solar photovoltaic facilities will need a minimum of 317 acres while wind technology will need 50 acres. The estimated total spatial requirement for renewable energy generation facilities is 758 acres. Land requirements for biomass are based on requirements for feedstock. The IP estimates between 25 000 to 28 000 acres necessary for biomass feedstock (sugar cane and king grass) and food.

The implementation toolkit in this IP consists of:

a) A list of Policy Measures;
b) Implementation activities by year and thematic area;
c) Results Frameworks;
d) Monitoring and Evaluation Framework;
e) Risk Analysis; and
f) Project Management Arrangements.

Monitoring and evaluation of the IP will include a project inception workshop to determine roles, ownership, responsibilities, reporting, communication, decision-making structures, staffing and other key factors and requirements for successful start of the project. Several reports and logs, along with an annual project review and annual review report, will assist in monitoring of implementation. A mid-term review and final evaluation will focus on delivery of project results.

A detailed risk register included in the IP reflects the concerns expressed in the working group sessions, as well as from the individual interviews with key stakeholders. These threats to implementation will guide the Project Implementation Team accordingly along with relevant remedial actions aimed at minimising and/or avoiding the occurrence of identified threats.

In terms of management of implementation, a Project Management Team (PMCT) and Project Task Force (PTF) will be established. The PMCT will support the delivery of the outputs. The responsibilities of the PMCT include day-to-day management and coordination of the project and its respective activities, e.g. Monitoring and Evaluation, Procurement, Administrative Support, Technical Support and Finance and Awareness and Communication within the IP.

The PTF, or Project Board will consist of representatives from various Government Ministries, including MEWR, Ministry of Finance, Economic Affairs and Investment, the National Climate Change Committee (NCCC), the Barbados Chamber of Commerce and a representative from a relevant Non-Governmental Organisation. Page 48 of the IP includes a visual of the reporting structure for the various teams.

It is important to note key assumptions and considerations related to the development of the IP. The first assumption is that supervision of this implementation plan will be done by the PMCT. Second, it is assumed that the thematic working groups outlined in the IP will continue to meet

and provide oversight to the activities and that other stakeholders will be integrated into the IP as necessary. It is also expected that stakeholders will formally take ownership of various activities and can therefore be considered responsible for particular activities. The fourth assumption is that public communication of developments regarding progress and milestone achievements will occur and fifth, a resource mobilisation team will be established to identify financial and technical resources for the activities outlined in this IP.

In terms of considerations/limitations, the first is that the narrow timeline for consultation in development of this IP resulted in the prioritisation of thematic areas based on input from a range of relevant documents. For this reason, some thematic areas are disproportionately represented. However, the IP will advance working group engagements to incorporate other critical sectors throughout the project cycle. Second, although the working group sessions were well attended and representative of the core drivers of the IP, input from other critical stakeholders will be needed to fully align activities to the existing operations of relevant institutions.

Recognising these limitations, the IP is designed as a 'working document' with sufficient flexibility and adaptability to rapidly incorporate inputs at any given time, without compromising the overall quality of the outputs identified.

INTRODUCTION

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The purpose of the IP is to identify the necessary activities that will accelerate the paradigm shift across various sectors, towards the realisation of full integration of renewable energy (RE) into the energy mix of Barbados. The IP therefore promotes functional cooperation primarily amongst government agencies, private sector entities and non-governmental organisations (NGOs) in an effort to ensure the most relevant participatory framework throughout the identification process and submission of key activities in the 100% FFF initiative.

To that extent, the IP recognises the importance of the government institutions in facilitating regulatory, legislative and other policy-related measures to streamline existing processes and effectively adapt to the changing local and international realities in the renewable energy sector.

In order to address long-term sustainability throughout the transition, the private sector has to be afforded opportunities to maximise on the economic benefits aligned to various technologies and aspects of renewable energy (i.e. generation, distribution and storage). The role of the private sector therefore develops within a model of economic sustainability, that further enables the transfers of capital and technology necessary to ensure that Barbados is in touch with developments in the international RE sector.

NGOs have a key role to play in the rollout and overall success of the IP. The NGOs will ensure that the activities are executed in a manner that encompasses various developmental considerations such as gender mainstreaming and environmental and engineering safeguards. Awareness, Communication and Knowledge Management are also vital areas in which NGOs can assist. The overarching focus of NGOs will be on the alignment of the outputs and outcomes of the IP, relative to generally accepted standards and targets such as the United Nations Sustainable Development Goals.

In the area of developing renewable energy sources, Barbados must achieve ambitious targets that will contribute to an increase in the reliability of the energy supply, reduce negative impacts on the environment, economic growth and the development of jobs and employment. As a result, the Government of Barbados has embarked on an agenda of becoming 100% Fossil Fuel Free (FFF) by 2030, while taking into consideration a number of exogenous constraints beyond the parameters of its regulatory and developmental jurisdiction. Worth noting within these constraints are considerations for the availability and costs of various renewable energy (RE) technologies, both of which are driven by external aggregate factors of demand, supply and rate of technological advancement. In line with the 2030 vision, the Government of Barbados, through the Ministry of Energy and Water Resources, has commissioned the development of this Implementation Plan (IP) to supplement the Barbados National Energy Policy (BNEP).

The activities in this IP have evolved from key provisions in the BNEP, such as the overarching vision, associated goals, objectives and policy measures. The IP advances the BNEP framework by identifying activities, risks and measurable results. These features collectively define the enabling environment in the short-term (first 5 years) that would allow for the long-term realisation of becoming 100% FFF in Barbados, within the given resource and time constraints.

During the development of the IP, support from key stakeholders in the public, provided the necessary platform for initial targeted inputs. These stakeholders, throughout the consultation process, highlighted many determining factors that were crucial for success in the 100% FFF initiative. Key among these were:

- **Government commitment to transitioning to RE –** The Government of Barbados has established the transition to RE as an item high on its priority list and "Mission Critical" agenda. This therefore allows for minimal or no disruption in seeking cooperation with relevant government agencies.
- **Exposure to external market volatility -** Unpredictability of developments in external energy markets and subsequent impacts on fossil fuel prices.
- **Prevailing economic conditions (foreign exchange)** – A significant portion (approximately 5%) of Barbados revenue is utilised for importing fossil fuels. This consumption presents an inverse relationship to the overall levels of foreign exchange reserves.
- **Geographical location –** At 13.1939° N, 59.5432° W, Barbados can take advantage of 'prime' levels (exposure and duration) of RE such as solar. There are also some geographical advantages with respect to other types of RE; i.e. wind and wave energy.
- **Environmental and health benefits –** The transition to RE will allow decreases in the overall levels of CO_2 and other greenhouse gas emissions in Barbados. This development will add value to the sustainability and/or restoration of many aspects of the natural environment and may reduce the incidence of some health related matters.
- **International Agenda –** This endeavour of 100% FFF will signal that Barbados is establishing a serious and leading agenda not only regionally but also across the world, for other countries to observe and follow.
- **Tourism –** The international agenda will result in Barbados being able to exploit and capitalise on another niche markets in the international tourism sector (e.g. Eco-Tourism). This in turn may positively affect foreign exchange revenue generation.

To assist in the overall management of critical activities, the IP has developed and incorporated an Implementation Toolkit, which is intended to add value to the pace of implementation and the quality of intended outputs.

METHODOLOGY & APPROACH

METHODOLOGY & APPROACH

The IP reflects a multi-sectoral engagement process, consistent with the approach used to create the Barbados National Energy Policy (2017-2030). The IP recognised the need for critical input from a wide variety of key stakeholders, as well as the various tools utilised in the collection, analysis and incorporation of information that validated the activities and timelines proposed. These tools were:Working Groups - Stakeholders categorised into five (5) main working groups, along with three (3) crosscutting thematic areas as depicted in Figure 1. Working Group seminars were held as follows:

Survey – A survey was conducted during the Renewable Energy Stakeholders meeting, hosted by the Ministry of Energy and Water Resources on Wednesday, November 28 at the Sir Lloyd Erskine Sandiford Center. On the survey, respondents identified critical factors relating to opportunities and threats to the implementation of the 100% FFF vision. 12 respondents at the meeting also indicated a suitable time and date to conduct follow-up interviews.

Interviews – 35 individual interviews were conducted with various organisations, identified as responsible parties, over the period November 21, 2018 - December 5, 2018 for discussions on specific activities.

Streetlighting signing ceremony

INDIVIDUAL THEMATIC AREA	CROSS-CUTTING THEMATIC AREA				
Oil and Gas Supply	Human Resources Institution: Capacity and Development	Water, Agriculture and Food Security	Tourism	Industrial Sector, Waste Management	Health and Safety
Renewable Energy Supply					
Electricity Supply					
Transportation					
Renewable Energy Supply and Storage					

Figure 1 - Main Working Groups of Implementation Plan

OVERARCHING IMPLEMENTATION STRATEGY

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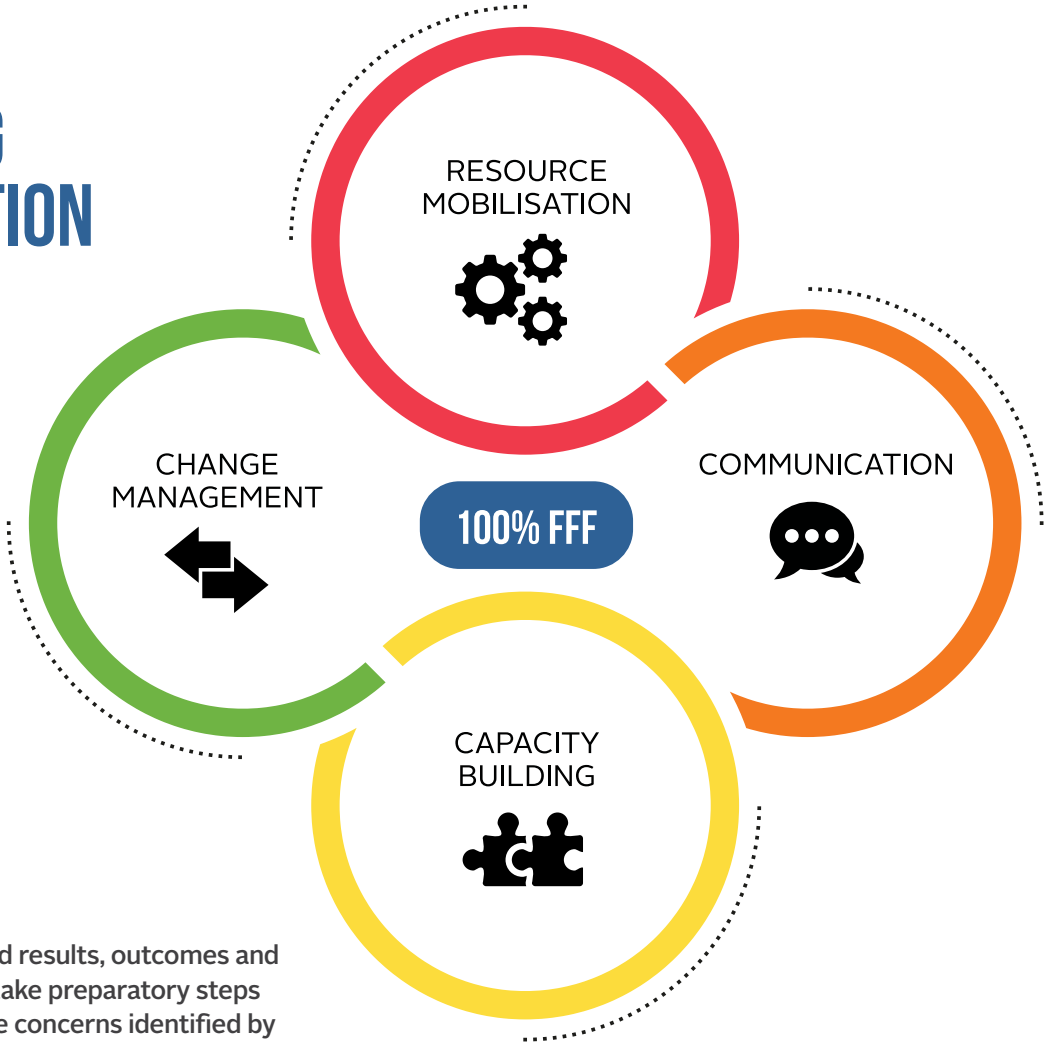


In order to achieve the intended results, outcomes and goal of the IP, it is essential to take preparatory steps that immediately address some concerns identified by stakeholders. These concerns are:

Resource Identification and Mobilisation

Resourcing the many activities within the IP will be a decisive factor in its overall success, as preliminary estimates suggest that BBD $4 billion will be required to achieve the 2030 vision. It is therefore important to develop a structured and adaptable framework to map all possible sources of technical and financial resources available to the executing agencies involved. This exercise will be undertaken by a Resource Coordination Team that will assist in:

1. RE Project Concept and Proposal Writing and Review (Technical and Administrative) as needed
2. Providing implementation support where applicable

The RCT will comprise a cross section of relevant entities that regularly interact with funding agencies in the area of Energy, Environment, Climate Change and Disaster Risk Reduction. These may include, but not be limited to:

- The Ministry of Energy and Water Resources
- The Ministry of Foreign Affairs and Foreign Trade
- The Ministry of Environment and National Beautification
- The Ministry of Finance, Economic Affairs and Investment
- A representation of local entities participating in the financial sector and international development space

The RCT will meet at least every quarter.

Capacity Building

Implementation efforts will initially focus on identifying capacity gaps in key organisations that have essential roles in creating an enabling environment for the IP to progress at a reasonable rate. These institutions include Town and Country Planning Department, Fair Trading Commission, Barbados Renewable Energy Association, Environmental Protection Department, Barbados National Oil Company Ltd., Barbados National Standards Institute, Government Electrical Engineering Department, Department of Energy, Sanitation Services Authority and the Ministry of Finance, Economic Affairs and Investment. A detailed capacity assessment will focus on addressing the following questions:

- **Staffing –** Do these organisations possess the quantity and quality skillset needed to facilitate their roles in delivering results outlined in the IP?
- **Technology –** Do these organisations possess the requisite hardware and software apparatus, which will allow for uninterrupted service provision to various activities outlined in the IP?
- **Training –** What are key capacity building engagements that will allow these organisations reach or surpass an acceptable standard of delivery and continuously be aware of modern developments in their field of operations, in alignment to the activities outlined in the IP?

To advance this effort, ongoing initiatives such as the Public Sector Smart Energy Programme (PSSEP) will be utilised. PSSEP will be undertaking a cross-sectorial capacity assessment, which will help to identify critical gaps in the readiness and adaptability of public and private sector institutions to the paradigm shift. In addition, PSSEP will action the findings and address some of the capacity gaps directly, through the provision of training, equipment and other related and relevant resources.

Communication

The creation and maintenance of forums for constant dialogue is essential for success of the IP. Communication channels, which utilise the guidance and technical expertise of the established working groups, will allow for timely adaptation to any relevant developments in both the external and internal stakeholder environment. A quarterly stakeholder's consultation, consisting of all members of established working groups, will communicate project progress and invite comments for further consideration. Communication on implementation progress, aided by the creation of a reliable online digital platform, will highlight the status of implementation of various activities, targets (outputs) and justifications for any shortfalls. This platform, although dedicated primarily to communicating progress, adds to the overall of accountability of responsible parties.

Change Management

As the evolution to 100% FFF implicates a rapid transition in a relatively short period, it is important to adopt an approach that supports individuals, teams and organisations in making the change. Therefore, a series of change management engagements to promote an ADKAR framework, where ADKAR reflects the principles of awareness, desire, knowledge, ability and reinforcement is needed to capitalise on sustainable support from all stakeholders. These are all critical areas to change management.

It is important to adopt an approach that supports individuals, teams and organisations in making the change.

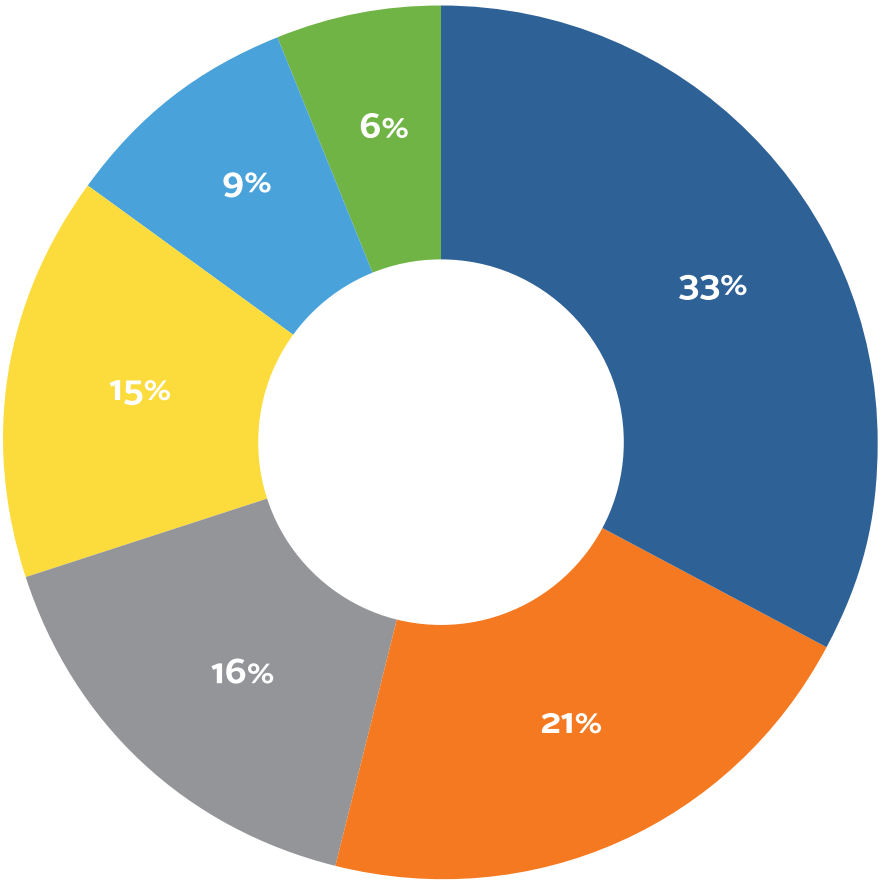
ENERGY TARGETS

ENERGY TARGETS

The Government of Barbados stated its commitment to transition the island to 100% renewable energy by 2030. In order to achieve this target by the stated period, there needs to be a clear energy mix that can be implemented at feasible investment and operation costs. The planned energy mix will also include technologies that can operate under the following constraints over the planning period of 2030:

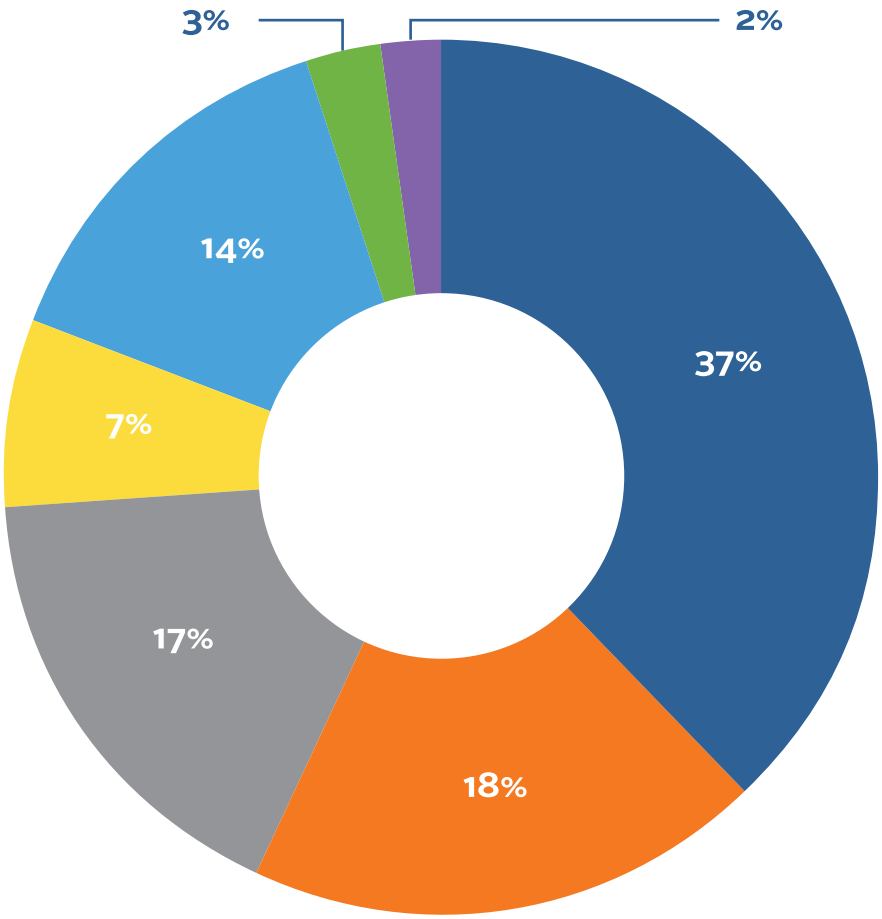
- The target demand for energy
- The spatial requirements for generation
- Emission of CO_2 for energy produced and consumed
- Capital and operation expenditure to
- commission and operate IP

Electricity is heavily consumed by all the major economic sectors. The consumption of these sectors is depicted and listed as follows for the base year 2015:



2015 Electricity Consumption by Sector

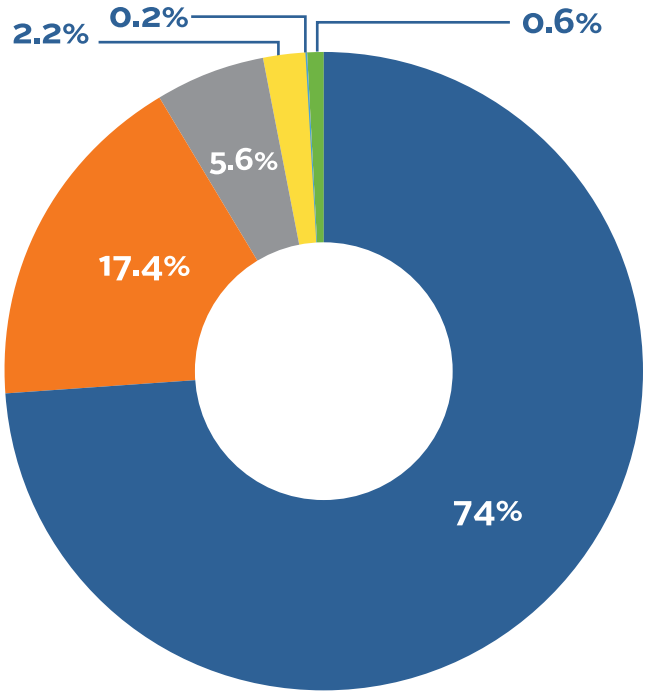
- Households – 33%
- Commercial – 21%
- Public Sector – 16%
- Hotels – 15%
- Industrial – 9%
- Other – 6%



The demand for energy during the base year is depicted and listed as follows:

2015 Energy Demand

- Heavy Fuel Oil – 37%
- Diesel – 18%
- Gasoline – 17%
- Kerosene – 7%
- Electricity – 14%
- Bagasse – 3%
- LPG – 2%



2015 Energy Production

- Heavy Fuel Oil – 74%
- Kerosene – 17.4%
- Bagasse – 5.6%
- Diesel – 2.2%
- Natural gas – 0.2%
- Solar – 0.6%

In 2018 electricity production from solar stood at 4.6%.

Energy Source	Installed Capacity (MW)
Solar (centralised)	205
Solar (distributed)	105
Wind onshore	150
Wind offshore	150
Biomass & Waste-To-Energy	15
Energy storage (centralised)	132
Energy storage (distributed)	68
Total (Excluding Storage)	625

Table 1A – Energy Mix 2030 Scenario

The current demand for electricity is recorded to be 944 Gwh per for the period 2017. Given the above, the estimated demand used to determine the above mix was 1400 Gwh (See Table 1A).

It is important to note that the energy mix will also be constrained by technology. Hence, the fishing industry and the cruise industry will be impacted, as many of these vessels utilise diesel and heavy fuel oil. The challenge here is that over the planning horizon and the initial implementation period the technology may most likely not allow for the complete removal of fossil fuel, but may allow the reduction of the carbon emissions via fuel switching to natural gas. Additionally, it is foreseeable that the airline industry will also most likely continue to use aviation fuel over the planning horizon (i.e. 10 years).

With regards to energy savings, it has been acknowledged that emphasis must be placed on a strategic investment in renewable infrastructure, in order to capitalise on annual energy savings of $400 – $800 million[1].

	1	2	3	4	5	Total
PV	32	32	32	32	32	160
Wind				120		120
Bio-Energy					15	15
Total forecasted renewable energy requirement (MW)						295
Energy Storage (MW)		20	20	20	20	80

Table 2A - Schedule of Installation of Renewable Energy Over the Next 5 Years (MW)

[1] Barbados Light and Power Company Ltd. (2019). Delivering 100% Renewable Energy by 2030 [Draft White Paper].

During the first five years of the implementation period of 2019 to 2023, 295 MW of renewable energy and 80 MW of energy storage is forecasted to be commissioned. Solar photovoltaics will require a minimum of 160 MW to be installed while a minimum of 120 MW of wind will need to be installed to achieve the target of 100% renewable energy by 2030.

The 295 MW in the first 5 years will represent 46% of the total capacity energy mix. The baseload technologies which accounts for 15 MW of the total capacity, given their nature, will require more planning and construction time and consequently are scheduled to be commissioned in year 5 of the implementation period. The scheduling of the energy mix is impacted by the technical limits of the electrical grid, the environment impact assessment, construction and installation time needed. Additionally, the regulatory and permitting processes will have to be accelerated by a significant margin. It must be noted that Waste-to-Energy is not scheduled within the first 5 years of implementation, as the planning and construction time required would place this technology in year 6 of the schedule.

The successful implementation of the technologies identified in Table 2A will result in 688 GWh of electricity being produced from renewable energy sources as is observed in Table 3A.

	1	2	3	4	5	Total
PV	52.48	52.48	52.48	52.48	52.48	262.4
Wind	0	0	0	315.6	0	315.6
Bio-Energy	0	0	0	0	109.65	109.65
Total	52.48	52.48	52.48	368.08	162.13	687.65

Table 3A - Schedule Electricity Production (Gwh) From Renewable Energy Over the Next 5 Years

The investment required by the renewable energy sector to advance the agenda of 100% renewable energy by the year 2030 is estimated to be about $4 billion. The majority of the resources expected to be expended are $875 million and $270 million, in years 4 and 5 respectively as the larger projects are scheduled to be completed in these two periods (See Table 4A). Of course, the rate of investment will be impacted by the enabling environment that is required to be established within the renewable sector. For instance, a clear and stable price is the foundation on which the sector will rest.

The economic benefit that is anticipated to accrue from the sector on an annual basis is projected to average around $3.9 billion per year over the ten (10) year implementation period. This benefit is expected to be derived from the release of resources that would have been used on imported energy, as Barbados will no longer be incurring an economic loss of 70 cents on every dollar to consume fossil fuel. Additionally, the support to the renewable energy sector in terms of financial services, installation, construction, plant operation, and professional services are other sources of economic activity anticipated to emerge. However, this is dependent on the level of local investment that will become involved in the sector. There will also be an opportunity for Barbadians to become exporters of energy once the cost of batteries become economically feasible, as energy will becomes more portable. Hence, with greater local investment will come greater benefits being retained in Barbados, while a heavy infiltration of foreign investment will result in an inverse outcome; less benefit being retained locally.

	1	2	3	4	5	Total
PV	$160.00	$160.00	$160.00	$160.00	$160.00	$800.00
Wind	$-	$-	$-	$715.48	$-	$715.48
Biomas	$-	$-	$-	$-	$110.25	$110.25
Sub-Total						$1,625.73
Energy Storage (MW)		$162.60	$162.60	$162.60	$162.60	$650.40
Total	$160.00	$322.60	$322.60	$1,038.08	$432.85	$2,276.13

Table 4A - Schedule of Investment In Renewable Over the Next 5 Years ($M)

The spatial requirements for electricity generation vary between the different technologies. For example, the spatial footprint for ground mounted solar photovoltaics can range between 2 to 4 acres per megawatt depending on the configuration of the system. In the case of roof mounted system, the availability of space will be impacted by how much of the roof is south facing, shaded and size of the roof. Solar photovoltaic has a large spatial footprint and consequently there are not too many complimentary economic activities that can operate once a solar farm is installed. Wind technology has a lower spatial footprint for electricity generation relative to solar photovoltaics and can co-exist with other economic activities such as agriculture.

During the first five years of implementation, solar photovoltaic generation facilities will need a minimum of 317 acres of space while wind technology will need 50 acres of space (See Table 5A). It is estimated that the sector will require approximately a minimum of 367 acres of space during the first five (5) years of implementation. The total spatial requirement for renewable energy is estimated to be 758 acres of space by 2030. Baseload technologies' spatial requirements for generation can be considered low, relative to the requirement for wind and solar technologies. The bulk of the land requirement for biomass (sugar cane and king grass) relates to the feedstock. The amount of land that will be used to produce the feedstock is estimated to be between 25 000 to 28 000 acres. In the case of bio-methane, farm waste, manure, food waste, and gasses are expected to be the principle feedstocks. The production of feedstock for energy can be rotated with food crops in very much the cycle as that of sugar cane. Hence, biomass offers significant synergies with agriculture and can be seen as an opportunity for income stabilisation.

	1	2	3	4	5	Total
PV	63.36	63.36	63.36	63.36	63.36	316.80
Wind	0	0	0	33	0	33
Bio-Energy	0	0	0	0	0.92	0.92
Total	63.36	63.36	63.36	96.36	64.28	350.72
NB: It is assumed that wind developments are set back by the international distance rules i.e. impact distance from the base of the Turbine						

Table 5A - Spatial Requirements for Electricity Generation (Acres)

IMPLEMENTATION TOOLKIT

IMPLEMENTATION TOOLKIT

The implementation toolkit provides essential and results-oriented support to the project management team (PMCT) in its regular oversight of the IP, by highlighting specialized areas from which it can ascertain progress and make timely decisions. The toolkit consists of:

a. List of Policy Measures - provides a comprehensive list of all Tier 3 derivatives (Policy Measures) from which the PMCT and/or Quality Assurance can reference completed, ongoing or forthcoming activities.

b. Implementation activities by year and thematic area - provides an annualized schedule of activities across thematic areas using Gantt charts.

c. Results Frameworks - identifies the intended results, outputs annual deliverables in the form of SMART indicators.

d. Monitoring and Evaluation Framework - outlines the key components and tools for providing periodic inspections of progress.

e. Risk Analysis - identifies risks to implementation and appropriate response. Components of the risk register include risk number, category of risk (financial, political, reputational etc.), Risk name, Risk description, probability of occurrence, consequences, Severity (probability times consequence) and response category (transfer, mitigate, share, accept).

f. Project Management Arrangements - defines the relationship between key project proponents and identifies reporting lines and scope of oversight accordingly.

List of Policy Measures

All aspects of the IP, its thematic work plans and responsible parties, are guided by the overarching policy measures outlined in the BNEP. These are:

Oil and Gas Supply

1. Establish regularly held investor conferences to inform potential developers about the rules and requirements needed to undertake activities in the Oil and Gas sector.

2. Increase the cultivation of data relating to the geological and geophysical conditions in the offshore Oil and Gas sector to aid the government in setting license fees and determining levels of royalties.

3. Develop a licensing system with clear criteria on the ranking of various factors critical to the decision on bids. This system should be made available widely to potential bidders as well as the public.

4. Formulate clear legislation governing environmental management in offshore Oil and Gas activities, with provisions for removal of licenses if stipulations are not met.

5. Develop a capacity-building programme locally to prepare the workforce for employment in the emerging Oil and Gas offshore sector.

6. Create an enabling environment that will empower local businesses to participate effectively in the supply of goods and services to the offshore Oil and Gas sector.

7. Offer fiscal incentives for developers, which are tied to factors such as the expected internal rate of return.

8. Establish a wealth management programme to ensure that revenues from the offshore Oil and Gas sector are used effectively.

9. Develop an unambiguous system for determining whether a future gas find should be used for export or included as part of the domestic market.

10. Produce legislation that identifies limits on the amount of Oil and Gas resources that can be exploited in the short term.

11. Build a defence and security framework to protect the Exclusive Economic Zone.

Transportation Sector

12. Create biofuel standards for wholesale and retail supply of vehicles.

13. Establish a transportation information system to provide data for transportation and energy policies, strategic planning, tracking of CO_2 emissions, and environmental impacts.

14. Introduce more renewable energy and clean energy into the public transportation system.

15. Provide appropriate incentives to promote "green pumps" within service stations and on commercial properties.

16. Remove MTBE from gasoline and diesel, and replace it with ethanol and bio-diesel.

17. Promote linkages with the agriculture sector to encourage the production of agro-energy crops where financially and economically viable.

18. Encourage energy efficiency in the transportation sector.

19. Provide tax incentives to vehicle dealerships that train their mechanics to maintain and repair EVs.

20. Establish a programme for identifying appropriate international sources of funding to facilitate and assist the government in transitioning from fossil fuels to EVs.

21. Remove duties and VAT from EVs and encourage a scheduled approach to increasing their use in the national transportation fleet, while at the same time, not harming government's revenue stream.

22. Develop a road network that promotes energy efficiency.

23. Establish the use of management technology in public transit, e.g. using smartphone apps to verify arrival times of buses.

24. Create a system that includes mobile charging stations for vehicles.

25. Introduce ethanol rather than MTBE as an anti-knock agent.

26. Implement more stringent regulations on vehicles' exhausts and emissions.

27. Integrate charging stations with traditional gas stations.

28. Construct more charging stations for EVs.

29. Control and maintain CO_2 emissions at levels consistent with local and global climate change targets.

30. Establish a system that facilitates the change from traditional vehicles to those powered by renewable energy, taking transition costs into consideration.

31. Implement standards for streetlight efficiency.

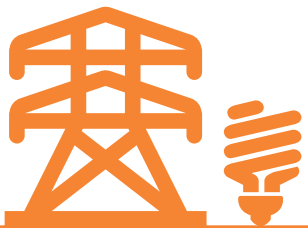
32. Provide cost incentives that encourage investment in required infrastructure with charging stations etc.

33. Acquire more details on the number of vehicles using each fuel type.

34. Establish standards in charging and other renewable energy infrastructure related to fuelling.

35. Develop a regulatory framework for the implementation of vehicle to grid storage and supply technology.

Electricity Supply



36. Establish electric market structures that reduce the effects of monopolistic operations where financially and economically feasible.

37. Create a pricing mechanism for electricity from renewable energy suppliers.

38. Devise protocols for interconnectivity between IPPs and the utility to supply electricity.

39. Expand electricity regulation to include the wide-ranging aspects of the market, generation, distribution, supply, dispatch, transmission, and electricity use within the electricity sector.

40. Produce standards and specifications for generation, supply, dispatch, transmission, distribution, storage and consumption that allow the electricity sector to operate in a financially, economically, environmentally, and technically viable manner.

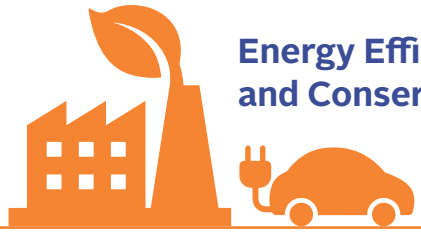
41. Institute targets for limits on CO_2 emissions in the electricity sector.

42. Promote the use of renewable and other clean sources of energy to produce electricity.

43. Develop clear rules for determining roles and timelines for updating the Integrated Resource Plan.

44. Use SMART meters as part of an advanced communication infrastructure for distribution management, to facilitate the use of more intermittent technologies and aid in demand-side management.

Energy Efficiency and Conservation



45. Establish efficiency standards governing electricity production for utility and distribution-scale operations.

46. Develop a maximum useful life and cost/performance ratio of operations for generation equipment.

47. Create legislation and regulations to govern movement towards greater energy efficiency in businesses and residences in Barbados.

48. Create an energy efficiency plan as a policy guideline document.

49. Develop an energy conservation education and awareness programme that will promote lifestyle changes among Barbadians with regard to energy consumption.

50. Promote energy efficiency in the productive and trading sectors.

51. Develop sectoral energy efficiency and consumption standards for buildings, and encode them in the Town and Country Planning Act.

52. Establish or adopt business standards for the design of energy efficient homes and offices.

53. Create energy efficiency standards for appliances and equipment used for residential, commercial and industrial purposes.

54. Provide equity for households that are unable to pay for energy efficiency retrofits and products.

55. Develop a set of regulations in tandem with all government ministries involved in the energy sector, which identifies a clear and defined process for new applicants in energy efficiency projects.

56. Produce a system of duties, taxes and economic incentives to promote greater use of high-efficiency energy technologies.

57. Implement standards for insulation in buildings.

58. Use Life Cycle Analysis to determine the best materials to be used for buildings and other construction projects.

Provide equity for households that are unable to pay for energy efficiency retrofits and products.

Energy and the Environment and Climate Change

59. Standards and protocols for the safe and effective disposal of equipment and devices in the energy sector.

60. A sustainable environmental management framework for the upstream offshore petroleum sector.

61. A decommissioning fund for the energy sector to facilitate the decommissioning and abandonment of energy operations and facilities.

62. Standards and protocols for energy production in the petroleum and renewable energy subsectors that promote and encourage the goal of zero harm to the people and the environment.

63. Information systems and infrastructure that promote the flow of information requiring environmental standards, best practices and legislation.

64. Studies within the sector that assess the correlation between carbon dioxide emissions and health risks (e.g. cancer and asthma).

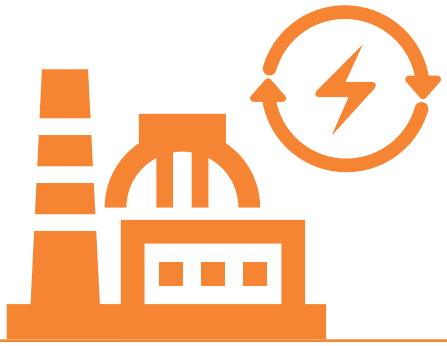
65. Create a mechanism to cap and trade CO_2 emissions within the Barbados energy sector.

66. Provide a trade facility that allows holders of CO_2 emissions permits to trade with other emitters of CO_2.

67. Develop strong rules for capping CO_2 emissions.

68. Establish a clear international agenda for the acquisition of climate change funding.

Renewable Energy Supply and Storage



69. Diversify and optimize the renewable energy mix that results in the maximisation of socio-economic and financial benefits to Barbados.

70. Establish a capacity-building programme locally to prepare the workforce for employment in the renewable energy sector.

71. Develop a central database containing details on the extent of renewable energy resource available at various locations in Barbados (solar, wind and bioenergy potential).

72. Establish legislation and regulations that provide for a transparent process in acquiring licences for supplying electricity from renewable energy sources.

73. Provide an enabling environment that encourages collaborative approaches to producing renewable energy that is technically sound, and is financially, economically and environmentally viable.

74. Establish a programme of international financing and 'in kind' assistance that effectively supports the supply of renewable energy, and promotes Barbados' economic growth and competitiveness.

75. Increase staffing (secretariat) and human capacity to support local NGOs such as BREA.

76. Develop a clear protocol for clients to follow for investigating and trouble-shooting in new renewable energy systems with a method of recourse for clients in case of unsatisfactory company performance.

77. Provide regular and clear communication to the public on developments within the renewable energy industry.

78. Institute efficiency standards for manufacturing local renewable energy products such as solar water heaters.

79. Establish appropriate fiscal incentives for emerging renewable energy and storage technologies.

80. Promote an enabling environment that encourages local involvement in renewable energy projects.

81. Create a system to ensure the protection of intellectual property and patents for renewable energy technologies.

82. Define land areas for bio-energy and wind production in Barbados' Physical Development Plan.

83. Establish and support infrastructure for the collection, handling, and processing of organic material to produce energy.

84. Provide fiscal and financial support for research and development in bio-energy technologies and methods.

85. Develop standards of production for bio-methane from biogas.

86. Create standards for electricity generation efficiency in the bio-energy, wind energy and other renewable energy subsectors.

Promote an enabling environment that encourages local involvement in renewable energy projects

87. Produce a legislative and regulatory framework for bio-energy production, distribution, storage, and plant decommissioning.

88. Devise a strategy for expanding Barbados' renewable energy markets into the Caribbean.

89. Establish a transparent decision protocol for choosing between energy storage measures.

90. Create clear guidelines for integration of battery technology in PV systems.

91. Implement proven storage technologies and systems that promote renewable energy and are economically, environmentally and financially viable.

92. Establish a system for recycling and disposing of batteries at end of use (cradle to cradle).

Site tour GAIA

Implementation Activities by Year and Thematic Area

The following schedules depict enabling activities, their associated policy measures (PM), proposed durations and responsible parties (abbreviated) across the 5 thematic areas. Please refer to Acronyms and Abbreviations for guidance on Responsible Parties listed in each activity grid.

Oil and Gas Supply

Year 1

Activity	PM	Q1 1	2	3	Q2 4	5	6	Q3 7	8	9	Q4 10	11	12
Conduct a review of current data management systems	2a	MEWR											
Conduct Risk Assessment	11a		BDF										
Establish Oil and Gas stakeholder committee	1a			MEWR									
Conduct GAP analysis	11b			BDF									
Review and enhance relevant policies and guidelines related to Auditor General	8b			AG									
Develop a post-discovery framework	9a			BNOCL - NPC - MEWR									
Review and/or establish appropriate legislation, policies and response mechanisms	11c			CPC - EPD									
Develop standards for companies to operate in the Oil and Gas sector	1c				BNSI								
Formulate enviornmental and other guidelines	3b				MEWR - EPD								
Develop awareness and communication programme	3a							MEWR					
Host conferences and inform potential developers	1b								MEWR				
Establish Wealth Management Fund	8a											MOFEI - MEWR	

Year 2

Activity	PM	Q1 1	2	3	Q2 4	5	6	Q3 7	8	9	Q4 10	11	12
Establish a Resource Mobilisation Unit	5d	MOFEI - MEWR - MFAFT											
Establish Wealth Mangement Fund	8a	MOFEI - MEWR											
Review existing framework	2c		MEWR										
Develop awareness and communication programme	3a			MEWR									
Formulate clear legislation governing environmental management in offshore oil and gas activities	4a			MEWR - CPC									
Develop mechanism for external/independent performance reviews of strategic plans	8c			MEWR - MOFEI									
Develop a data management system	2b				BNOCL								
Establish training programmes with key overseas institutions	5b				METVC - MFAFT - MEWR - MOL - UWI - BCC - SJPIT -TVET								
Advance and/or develop relevant courses at local institutions	5a							METVC - MEWR - MOL - UWI - BCC - PI -TVET					
Review Corporate Tax Rate	7a							MOFEI					

Year 3

Activity	PM	Q1 1	2	3	Q2 4	5	6	Q3 7	8	9	Q4 10	11	12
Build marine security and response capacity	5c	BDF - MEWR											
Conduct evaluation on methdology and approach to determine appropriate/optimum extraction rates	10a		MEWR - BNOCL - NPC										
Develop awareness and communication programme	4b				EPD								
Develop appropriate legislation	10b									CPC - EPD - MEWR			
Develop a berthing faciity for offshore Oil and Gas	6c											TBD	

Transport

Year 1

Activity	PM	Q1 1	2	3	Q2 4	5	6	Q3 7	8	9	Q4 10	11	12
Review duties on EVs	19a	MOFEI											
Conduct study to establish benchmarks and facilitate future comparisons	33a	MOFEI - MEWR - MTWM											
Review building codes to integrate charging stations into new developments (residential, commercial and open public spaces)	27a		TCPD										
Develop awareness and communication strategy	18b		MTWM										
Develop National Transportation Network Strategy	22a		MTWM										
Provide incentive strategy to buffer costs (import, sales and operations)	30a			MOFEI - MEWR									
Develop a regulatory framework for the implementation of vehicle to grid storage and supply technology.	35a			FTC									
Create biofuel standards for wholesale and retail supply of vehicles.	12a			BNSI									
Stricken penalties pertaining to offloading/onboarding points	18a			MTWM									
Conduct pilot project to test framework	26b			MTWM - EPD									
Develop awareness and communication strategy	30b			MEWR									
Establish a transportation information and management system	13a				MTWM - EPD - MEWR - BSS								
Develop transportation information and management system	23a				MTWM - EPD - MEWR - BSS								
Develop framework for more robust emission data collection in private and public sector	29a				EPD								
Incentivise projects focused on generating Biodiesel for public transport vehicles	14a						MEWR - MOFEI						
Explore retrofitting options for existing fleet	14d						MTWM						
Undertake pilot projects for EV usage along major routes to determine efficiency	14b									MTWM - MEWR			

Year 2

Activity	PM	Q1 1	2	3	Q2 4	5	6	Q3 7	8	9	Q4 10	11	12
Establish Resource Mobilisation Unit	20a	MOFEI											
Develop framework based on quantitative variables to incentivise and penalise below-average and excessive emission levels	26a	MTWM - EPD											

Transport Cont'd

Year 3

Activity	PM	Q1			Q2			Q3			Q4		
		1	2	3	4	5	6	7	8	9	10	11	12
Review duties on EVs	14c	MOFEI											
Construct more charging stations for EVs	28a	PS											
Create system to incorporate mobile maintenance infrastructure to support Evs	24a				PS								

Electricity Supply, Energy Efficiency and Conservation

Year 1

Activity	PM	Q1			Q2			Q3			Q4		
		1	2	3	4	5	6	7	8	9	10	11	12
Identify key technologies to be targeted	56a	MEWR											
Develop a public sector energy conservation programme	48b	MEWR											
Develop Integrated Resource Planning tool to determine energy mix	36a		BL&P et al										
Develop clear rules for determining roles and timelines for updating the Integrated Resource Plan.	43a		BL&P et al										
Develop framework for more frequent collection of data and CO_2 emissions and targets	41b			EPD - BL&P - IPPs									
Develop awareness and communication programme	42a			BREA - MEWR									
Develop media campaign (social media, television, radio, GIS)	49b			BREA - MEWR									
Conduct pilots and case studies showing the cost benefits	50c			MEWR									
Review building codes to ensure energy efficiency (RE) is incorporated	51a			TCPD - GEED - EPD									
Develop framework and criteria for incentives to promote greater use of energy efficiency technologies	56b			MEWR - MOFEI									
Implement standards for insulation in buildings	57a			TCPD - BNSI									
Review building codes to include best materials to be used for building and construction projects	58a			TCPD - GEED - BAPE - EPD									
Create energy efficiency standards for appliances and equipment used for residential, commercial and industrial purposes	53a			BNSI									
Create a pricing mechanism for electricity from renewable energy suppliers	37a				FTC								
Expand electricity regulation to include the wide ranging aspects of the market: generation, distribution, supply, dispatch, transmission, and electricity use	39a				CPC								
Develop Asset Management plan	46a				MEWR - BL&P - IPPs								
Implement pilot project to assess impact of incentives	56c					MEWR - MOFEI							
Establish or adopt business standards for the design of energy efficient homes and offices.	52a								TCPD - EPD - GEED				

Year 2

Activity	PM	Q1 1	2	3	Q2 4	5	6	Q3 7	8	9	Q4 10	11	12
Undertake pilot for digitised Air Emissions Moniotoring System	41a	EPD											
Create legislation and regulations to govern movement towards greater energy efficiency in businesses and residences in Barbados	47a	TCPD - CPC											
Develop toolkit for basic, DIY household energy audits	49a	MEWR - BREA											
Develop terms of reference for requirement of private sector to designate energy efficiency officers in their establishments	50a	MEWR MOFEI											
Form project review committee to expedite review of projects over a certain size	55b		TCPD										
Establish Data Sharing Agreements between relevant entities	44b		MEWR - EPD - MTWM - NPC - BWA - BL&P										
Develop media campaign (social media, television, radio, GIS)	49b		BREA - MEWR										
Provide incentives for ESCOs whose activities are aligned to that of suggestions of relevant energy audits	50b				MEWR								
Develop platform to facilitate simultaneous input from multiple ministries on to a shared application template	55a				TCPD								

Year 3

Activity	PM	Q1 1	2	3	Q2 4	5	6	Q3 7	8	9	Q4 10	11	12
Craft an energy efficiency plan as a policy guideline document	48a	MEWR											
Develop a Needs Assessment Tool to determine household income levels	54a		BSS										
Provide equity for households that are unable to pay for energy efficiency retrofits and products	54b				MEWR - MOFEI								

Energy and the Environment and Climate Change

Year 1

Activity	PM	Q1 1	2	3	Q2 4	5	6	Q3 7	8	9	Q4 10	11	12
Establish a clear international agenda for the acquisition of climate change funding	68a	MFAFT - MEWR											
Determine and mandate standardised methodology to measure CO_2 equivalent emissions across the energy sector	65a	MENB											
Examine options for waste treatment and identify best practices for dealing with industrial waste	60e	EPD - SSA											
Identify waste streams and characterise lifespans	59a	EPD - SSA											
Identify volumes of emissions and markets for trading	65b		MENB										
Identify standards for equipment and devices	59b			BNSI - EPD - SSA									
Develop protocols for disposal of equipment and devices	59c			EPD - SSA									
Identify and adopt international best practice and international framework	60c			EPD - SSA - MEWR									
Examine existing Environmental Act and Marine Pollution Control Act and inform legislation	60d				EPD - SSA - MEWR								
Develop policy recommendation for cabinet decision	65c										MENB		

Energy and the Environment and Climate Change Cont'd

Year 2

Activity	PM	Q1 1	2	3	Q2 4	5	6	Q3 7	8	9	Q4 10	11	12
Establish a Resource Mobilisation Unit	66a	MOFEI											
Develop framework to support private waste reuse/recycling	59d	EPD - SSA											
Conduct study to assess correlation between CO_2 emissions and health risks	64a		MOH - PAHO - EPD										
Develop legislation for decommissioning and abandonment of energy operations	61a			MEWR - CPC									
Provide training in environmental management for offshore upstream oil and gas	60a				EPD - BNOCL - MEWR								
Establish joint information system	63a				MEWR - EPD - BREA								
Develop education and awareness programme for public dissemination	59f						SSA						
Develop public awareness programme	63b						BREA - MEWR						
Develop legislation to govern effective waste disposal	59e							SSA - EPD - CPC					

Year 3

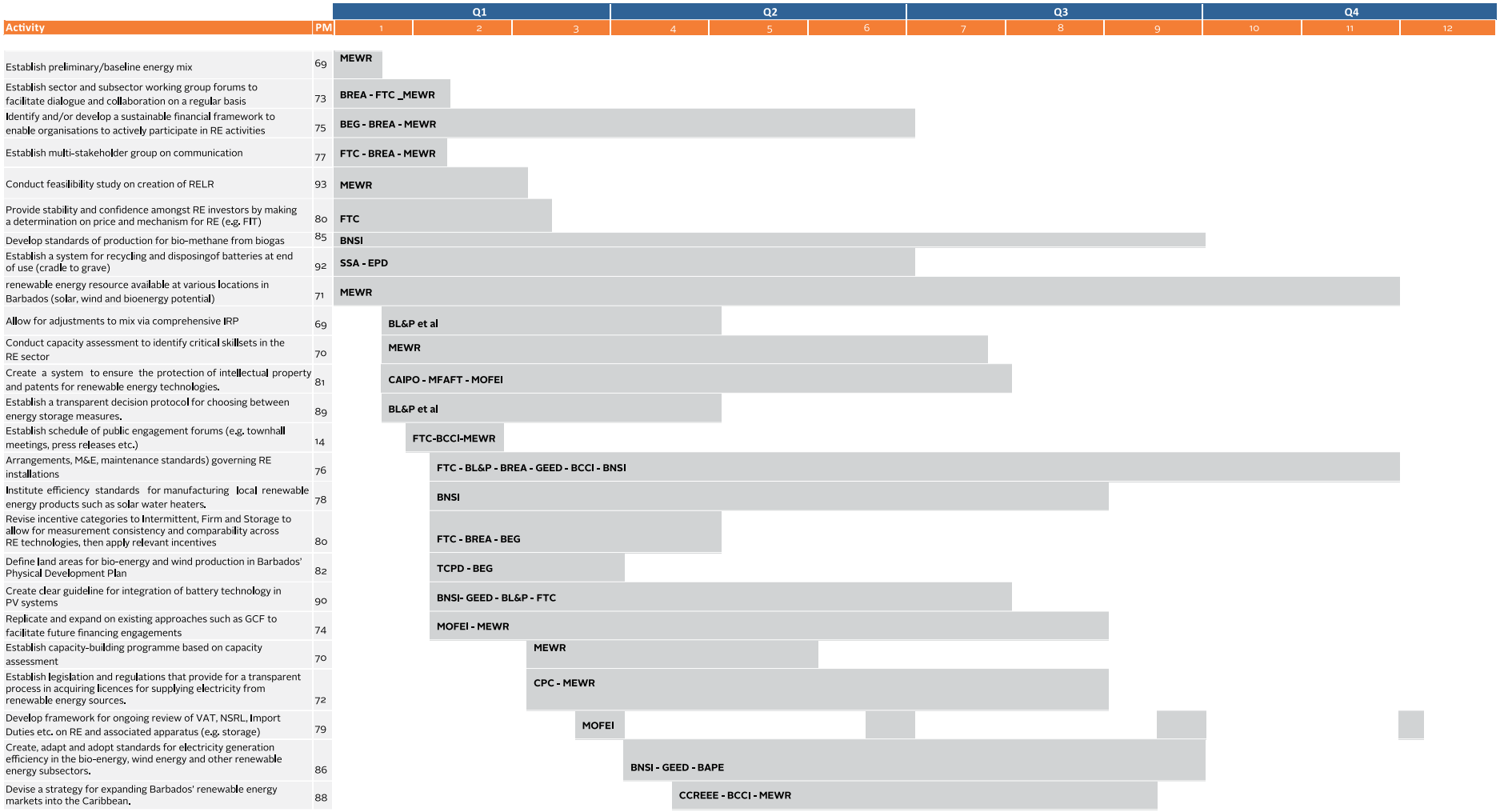
Activity	PM	Q1 1	2	3	Q2 4	5	6	Q3 7	8	9	Q4 10	11	12
Provide training in environmental management for offshore upstream oil and gas	60a	EPD - BNOCL- MEWR											
Develop education and awareness programme for public dissemination	59f	SSA											
Develop legislation to govern effective waste disposal	59e	SSA - EPD - CPC											
Develop legislation for decommissioning and abandonment of energy operations	61a	MEWR - CPC											

Year 4

Activity	PM	Q1 1	2	3	Q2 4	5	6	Q3 7	8	9	Q4 10	11	12
Develop legislation for decommissioning and abandonment of energy operations	61a	MEWR - CPC											
Establish decomissioning fund	61b				MEWR								

Renewable Energy Supply and Storage

Year 1



Activity	PM	Q1 1	Q1 2	Q1 3	Q2 4	Q2 5	Q2 6	Q3 7	Q3 8	Q3 9	Q4 10	Q4 11	Q4 12
Establish preliminary/baseline energy mix	69	MEWR											
Establish sector and subsector working group forums to facilitate dialogue and collaboration on a regular basis	73	BREA - FTC _MEWR											
Identify and/or develop a sustainable financial framework to enable organisations to actively participate in RE activities	75	BEG - BREA - MEWR											
Establish multi-stakeholder group on communication	77	FTC - BREA - MEWR											
Conduct feasibility study on creation of RELR	93	MEWR											
Provide stability and confidence amongst RE investors by making a determination on price and mechanism for RE (e.g. FIT)	80	FTC											
Develop standards of production for bio-methane from biogas	85	BNSI											
Establish a system for recycling and disposingof batteries at end of use (cradle to grave)	92	SSA - EPD											
renewable energy resource available at various locations in Barbados (solar, wind and bioenergy potential)	71	MEWR											
Allow for adjustments to mix via comprehensive IRP	69		BL&P et al										
Conduct capacity assessment to identify critical skillsets in the RE sector	70		MEWR										
Create a system to ensure the protection of intellectual property and patents for renewable energy technologies.	81		CAIPO - MFAFT - MOFEI										
Establish a transparent decision protocol for choosing between energy storage measures.	89		BL&P et al										
Establish schedule of public engagement forums (e.g. townhall meetings, press releases etc.)	14		FTC-BCCI-MEWR										
Arrangements, M&E, maintenance standards) governing RE installations	76			FTC - BL&P - BREA - GEED - BCCI - BNSI									
Institute efficiency standards for manufacturing local renewable energy products such as solar water heaters.	78			BNSI									
Revise incentive categories to Intermittent, Firm and Storage to allow for measurement consistency and comparability across RE technologies, then apply relevant incentives	80			FTC - BREA - BEG									
Define land areas for bio-energy and wind production in Barbados' Physical Development Plan	82			TCPD - BEG									
Create clear guideline for integration of battery technology in PV systems	90			BNSI- GEED - BL&P - FTC									
Replicate and expand on existing approaches such as GCF to facilitate future financing engagements	74			MOFEI - MEWR									
Establish capacity-building programme based on capacity assessment	70				MEWR								
Establish legislation and regulations that provide for a transparent process in acquiring licences for supplying electricity from renewable energy sources.	72				CPC - MEWR								
Develop framework for ongoing review of VAT, NSRL, Import Duties etc. on RE and associated apparatus (e.g. storage)	79				MOFEI								
Create, adapt and adopt standards for electricity generation efficiency in the bio-energy, wind energy and other renewable energy subsectors.	86					BNSI - GEED - BAPE							
Devise a strategy for expanding Barbados' renewable energy markets into the Caribbean.	88						CCREEE - BCCI - MEWR						

Renewable Energy Supply and Storage Cont'd

Year 2

Activity	PM	Q1 1	2	3	Q2 4	5	6	Q3 7	8	9	Q4 10	11	12
Establish capacity-building programme based on capacity assessment	70b	MEWR											
Provide fiscal and financial support for research and development in bio-energy technologies and methods	84a	MEWR - BCIC - MOFEI											
Produce a legislative and regulatory framework for bio-energy production, distribution, storage, and plant decommissioning	87a	MAFS - CPC - MEWR											
Establish and support infrastructure for the collection, handling, and processing of organic material to produce energy	83a		MENB										
Implement proven storage technologies and systems that promote renewable energy and are economically, environmentally and financially viable	91a			GEED - BL&P - FTC - BREA									
Develop framework for ongoing review of VAT, NSRL, Import Duties etc. on RE and associated apparatus (e.g. storage)	79a			MOFEI									

Year 3

Activity	PM	Q1 1	2	3	Q2 4	5	6	Q3 7	8	9	Q4 10	11	12
Establish capacity-building programmme based on capacity assessment	70b	MEWR											
Provide fiscal and financial support for research and development in bio-energy technologies and methods	84a	MEWR - BCIC - MOFEI											

Year 4

Activity	PM	Q1 1	2	3	Q2 4	5	6	Q3 7	8	9	Q4 10	11	12
Establish capacity-building programme based on capacity assessment	70b	MEWR											
Provide fiscal and financial support for research and development in bio-energy technologies and methods.	84a	MEWR - BCIC - MOFEI											

Results Framework

Outputs	Thematic Area
Year 1	
• 1 Report on current data management systems for geological and geophysical data collection completed • 3 Oil and Gas Committee Meetings held • Report on recommendations to enhance Auditor General's role in Wealth Management Fund submitted • 1 Post-Discover Framework for Offshore Oil and Gas sector completed • 1 Comprehensive Security Response Strategy for Offshore Oil and Gas sector developed • Operational Standards for Offshore Oil and Gas sector developed • Environmental Guidelines for licensing consideration for offshore Oil and Gas sector developed • 1 Communication Strategy Offshore Oil and Gas sector developed • 1 Investors/Developers Conference for offshore Oil and Gas sector held • 1 General Framework for Wealth Management Fund developed	**Oil and Gas**
• 2 Review Reports on adjusting duties on EVs completed • 1 Framework to address emission levels of vehicles developed • 1 Vehicle Fuel Consumption Study completed • 1 Review Report on integrating charging stations in all new major developments completed • 1 Awareness and Communication Strategy for Energy Efficiency in the Transportation Sector developed • 1 National Transportation Network Strategy developed • 1 Regulatory Framework for Vehicle to Grid Storage developed • Biofuel Standards for wholesale and retail supply of vehicles developed • 1 Pilot Project to test data collection methods for vehicle exhaust and emissions completed • 1 Framework for Emissions Data Collection in private and public sector developed • 1 Pilot Project for EV usage on major routes completed	**Transportation**
• Standard Framework for Asset Management Plan for IPPs developed • Standards for the design of energy efficient homes and offices developed • Standards for appliances and equipment used for residential, commercial and industrial purposes developed • List of targeted technologies from each RE subsector identified • Standards for the insulation of buildings	**Electricity Supply, Energy Efficiency and Conservation**

• Standards for equipment and devices used in disposal of equipment and devices in the energy sector developed • Protocols for disposal of equipment and devices established • 1 Framework for standardised measurement of CO_2 equivalent emissions across the energy sector developed	**Natural Environment and Climate Change**
• 1 Revised Energy Mix completed • 1 Capacity Assessment to identify critical skillset gaps in the RE Sector completed • 1 Capacity Building Programme commenced • 1 Database for analysing specific and aggregated RE resources across Barbados developed • Legislation governing the acquisition of licences for supplying electricity from RE sources developed • 5 RE subsector working groups established • 4 meetings of Multi-stakeholder Group on communication held • 2 public engagements of Multi-stakeholder Group on Communication held • Standards for manufacturing local renewable energy products developed • 1 Framework for protection of IP patents for RE technologies developed • Lands for bio-energy and wind production identified • Standards for production of bio-methane from biogas developed • Standards for electricity generation efficiency in bio-energy, wind and other RE subsectors developed • Legislation and regulatory framework for bio-energy production, distribution storage and plant decommissioning completed • 1 Regional RE Expansion Strategy for Barbados developed • Decision protocols for selecting from amongst energy storage measures developed • Guidelines for integration of batter technology in PV systems developed • 1 Battery disposal strategy and guidelines developed	**Renewable Energy Supply and Storage**
Outputs	**Thematic Area**
Year 2	
• 1 Data management system for geological and geophysical analysis developed • 1 skill and capacity assessment for offshore Oil and Gas sector conducted • 1 training programme with key overseas and local institutions established • 1 Resource Mobilisation Unit Established • Awareness and communication programme communicating opportunities for enterprises (e.g. laundry service, food supply, waste management) developed • 1 Report on review of Corporate Tax Rate completed • 1 Mechanism for external/independent performance review of Wealth Management Fund identified	**Oil and Gas**

• 1 Pilot for digitised Air Emissions Monitoring System Completed • 5 Data Sharing Agreements between relevant entities completed • Legislation and regulations to govern movement towards greater energy efficiency in businesses and residences in Barbados created • 1 Targeted school engagement programme developed • 1 Toolkit for basic, DIY household energy audits developed • 1 Terms of reference for requirement of private sector to designate energy efficiency officers developed • Incentives for ESCOs whose activities are aligned to that of suggestions of relevant energy audits identified • 1 Digital platform/extension for easy referencing of standards for various equipment and appliances developed • 1 Digital Platform to facilitate simultaneous input from key multiple agencies in project approval process identified • 1 Project review committee in (TCPD) to expedite review of projects over a certain size formed	**Electricity Supply, Energy Efficiency and Conservation**
• 1 Framework to support private waste reuse/recycling developed • Legislation to govern effective waste disposal developed • 1 Training programme in environmental management for offshore upstream Oil and Gas provided • Legislation for decommissioning and abandonment of energy operations developed • Joint information system that promotes the flow of information requiring environmental standards, best practices and legislation established • Study to assess correlation between CO_2 emissions and health risks conducted	**Natural Environment and Climate Change**
• Infrastructure for the collection, handling, and processing of organic material to produce energy provided • Fiscal and financial support for research and development in bio-energy technologies and methods provided • Legislative and regulatory framework for bio-energy production, distribution, storage, and plant decommissioning provided	**Renewable Energy Supply and Storage**

Monitoring and Evaluation Framework

In accordance with the accepted project management standards, policies and procedures within the Executing Agency (MEWR), implementation will be monitored through the following:

Inception Workshop

The project will be officially launched no later than three months after the project start with a Project Inception Workshop for those with assigned roles and responsibilities in the project's organisational structure, and where appropriate/feasible, technical policy advisors as well as other stakeholders.

The Inception Workshop will address a number of key issues including: (a) Assist all key stakeholders to fully understand and take ownership of the project. (b) Detail the roles, support services and complementary responsibilities of MEWR staff vis à vis the project team. (c) Discuss the roles, functions, and responsibilities within the project's decision-making structures, including reporting and communication lines, and conflict resolution mechanisms. (d) The Terms of Reference (TOR) for project staff is reviewed as needed. (e) Provide a detailed overview of reporting, M&E requirements. The M&E work plan and budget should be agreed and scheduled. (f) Discuss financial reporting procedures and obligations, and arrangements for annual audit. (g) Plan and schedule Project Task Force (PTF) meetings. Roles and responsibilities of all project organisation structures should be clarified and meetings planned. The first PTF meeting should be held within the first 2 months following the inception workshop.

Within the annual implementation cycle

- On a quarterly basis, a quality assessment shall record progress towards the completion of key milestones, based on the criteria and methods captured in an approved Quality Assurance Assessment Form.

- An Issue Log shall be created and updated by the Project Coordinator to facilitate tracking and resolution of potential problems and/or requests for changes.

- Based on the initial risk analysis submitted (see Risk Analysis), a risk log shall be developed and regularly updated by reviewing the external environment that may affect implementation.

- Based on the above information, to be recorded in a location suitable to the PTF, a Project Progress Reports (PPR) shall be submitted by the Project Coordinator to the Programme Steering Committee through Project Assurance (MEWR), using a standard report format agreed to by the PTF

- A project Lesson-learned log shall be activated and regularly updated to ensure on-going learning and adaptation within the MEWR, and to facilitate the preparation of the Lessons-learned Report at the end of the project.

- A Monitoring Schedule Plan shall be developed to track key management actions/events.

Annually

- Annual Review Report. An Annual Review Report shall be prepared by the Project Coordinator and shared with the Project Board.

- Annual Project Review. Based on the above report, an annual project review shall be conducted during the fourth quarter of the year or soon after, to assess the performance of the project and appraise the Annual Work Plan (AWP) for the following year. In the last year, this review will be a final assessment. This review, commissioned by the Project Board, may involve other stakeholders as required. It shall focus on the extent to which progress is made towards outputs, and that these remain aligned to appropriate outcomes.

Project Evaluation

Due to the complexity of this project and the myriad of inter-related components being implemented by multiple responsible parties, mid-term and final evaluations are proposed. These are to occur during the fourth quarter of 2024 and 2029 respectively.

The Mid-Term Review will determine progress being made toward the achievement of outcomes and will identify course correction if needed. It will focus on the effectiveness, efficiency and timeliness of project implementation; will highlight issues requiring decisions and actions; and will present initial lessons learned about project design, implementation and management. Findings of this review will be incorporated as recommendations for enhanced implementation during the final half of the project's term. The organisation and terms of reference of the mid-term review will be decided after consultation between the parties to the IP. The Terms of Reference (TOR) for this Mid-term review will be prepared by the MEWR based on guidance from the Public Implementation Unit (PIU) in the Ministry of Finance, Economic Affairs and Investment. This independent expert will be recruited at least six months prior to the planned commencement of the mid-term review. The management response and the review will be uploaded to a location as designated by the MEWR and accessible to the PSC.

The final evaluation will focus on the delivery of the project's results as initially planned (and as corrected after the mid-term review, if any such correction took place). The final evaluation will look at impact and sustainability of results, including the contribution to capacity development and the achievement of global environmental benefits/ goals. The TOR for this evaluation will be prepared by the MEWR based on guidance from the PIU.

The Final Evaluation should provide recommendations for follow-up activities and requires management responses.

Monitoring and Evaluation Work Plan

Type of M&E activity	Responsible Parties	Budget US$ Excluding project team staff time	Time frame
Inception Workshop and Report	• Project Coordinator • MEWR	4,000	Within first two months of project start up
Quality Assessment	• UNDP/CONANP/PCU • Oversight by Project Coordinator • PMCT	None	Quarterly
PPR	• PMCT	None	Annually
Periodic status/ progress reports	• PMCT	None	Quarterly
Project Steering Committee Meetings	• Project Coordinator • MEWR	None	Following Project "Inception Workshop" and subsequently at least Quarterly

Mid-term Review	• PMCT • MEWR • PIU • External Consultants (i.e. review team)	30,000	At the mid-point of project implementation
Final Evaluation	• PMCT • MEWR • PIU • External Consultants (i.e. evaluation team)	30,000	At least three months before the end of project implementation
Audit	• MEWR • PMCT	20,000 (indicative cost per year: 5,000)	Annually
Visits to field sites	• MEWR • PMCT		As needed
TOTAL INDICATIVE COST **Excluding project team staff time and staff and travel expenses**		84,000	

Cruise Terminal

Risk Analysis

The risks reflect the concerns expressed in the working group sessions, as well as the individual interviews with key stakeholders. These threats to implementation will guide the Project Implementation Team accordingly, along with relevant remedial actions aimed at minimising and/or avoiding the occurrence of identified threats.

Step 1: Risk Identification						Step 2: Risk Assessment		
Project: Barbados National Energy Policy: Implementation Plan						Rank		
#	Category	Phase	Opportunity/ Threat	Risk Name	Detailed Description	"Probability (1 - 5)"	Consequence (1-5)	Severity (Priority)
1	Comm. & Awareness	Execution	Threat	Limited knowleged of Renewable Energy	Prolonged lack of education on EVs and how they work could alienate efforts of get public buy-in	2	4	8
2	Financial/ Economic	Execution	Threat	Prohibitive Cost (EV)	Upfront Cost of EVs is prohibitive and will result in very slow transition to this type of personal transport	5	5	25
3	Financial/ Economic	Execution	Threat	Prohibitive Cost (EV)	Upfront Cost of EVs is prohibitive and will result in very slow transition to this type of personal transport	5	5	25
4	Financial/ Economic	Execution	Threat	Loss of Revenue	Government will lose revenue via import duties and fuel tax	5	4	20
5	Financial/ Economic	Execution	Threat	Loss of economic activity	Dealers and automechanics will lose business after the sales of Evs	4	3	12
6	Financial/ Economic	Execution	Threat	Limited financial resources to transition	Sharp transition to RE will require huge investments from government and the private sector	5	2	10
7	Financial/ Economic	Execution	Opportunity	Substantial financial investments	Concessionary financing in RE may incentivise the private sector to more actively participate	-3	-5	-15
8	Financial/ Economic	Execution	Threat	Increased cost of living	Costs of Evs may result in PSVs having to increase commuting prices to recoup costs in a reasonable timeframe	4	5	20
9	Financial/ Economic	Execution	Threat	Prohibitive Costs (Charging Stations)	Costs to install charging stations at home may be prohibitive	4	3	12
10	Operational	Execution	Threat	Insufficient Infrastructure	Limited charging ports across the island may limit the ability to commute frequently on Evs	3	5	15

Step 2: Risk Assessment		Step 3: Risk Response			Step 4: Monitor & Control		
Cost Impact ($M)							
Likely cost	% of Project Cost	Response Category	Response	Risk Owner	Status	Date Last Updated	Tracking Comments
0.00		Avoid	Launch National Communication and Awareness initiative within 3 months following the official start of the IP. This initiative will continue alongside other activities, throughout the IP's project lifecycle	Ministry of Energy and Water Resources	Active (Not Started)	14-Dec-18	
0.00		Mitigate	Identify incentives (VAT, duties, etc.) to consider for revision	Ministry of Finance	Active (Not Started)	14-Dec-18	
0.00		Mitigate	Provide fully functional and reliable public transport system	Ministry of Transport	Active (Not Started)	14-Dec-18	
0.00		Accept		Ministry of Finance	Active (Not Started)	14-Dec-18	
0.00		Mitigate	Develop national skills training programme to help retool mechanics and dealerships for EVs	Ministry of Labour	Active (Not Started)	14-Dec-18	
0.00		Avoid	Establish Resource Mobilisation Unit that will help private enterprises and government access financing for RE projects	Ministry of Energy and Water Resources	Active (Not Started)	14-Dec-18	
0.00		Accept		Ministry of Finance	Active (Not Started)	14-Dec-18	
0.00		Mitigate	Identify targeted incentives (revise duties, VAT, etc.)	Ministry of Finance	Active (Not Started)	14-Dec-18	
0.00		Mitigate	Work with financial institutions and suppliers to develop credit-based and loan-based programmes to install charging stations and coordinate requirements with Resourcse Mobilisation Unit	Ministry of Energy and Water Resources	Active (Not Started)	14-Dec-18	
0.00		Avoid	Develop structured installation programme to focus on targeted routes and public areas	Ministry of Energy and Water Resources	Active (Not Started)	14-Dec-18	

Step 1: Risk Identification						Step 2: Risk Assessment		
Project: Barbados National Energy Policy: Implementation Plan						Rank		
#	Category	Phase	Opportunity/ Threat	Risk Name	Detailed Description	"Probability (1 - 5)"	Consequence (1-5)	Severity (Priority)
11	Strategic	Execution	Threat	Limited support from other sectors	Limited cooperation from Oil and Gas sector may result in some market disruptions (lower investment)	5	2	10
12	Operational	Execution	Threat	Insufficient Infrastructure	Limited infrastructure to facilitate full RE transition in the public transport sector (charging ports, buses, efficient routes)	3	5	15
13	Comm. & Awareness	Execution	Threat	Limited knowlege of RE	Limited public knowledge of the benefits of RE would result in limited public buy-in and cause progressive perceptions of RE to stagnate	2	5	10
14	Strategic	Execution	Threat	Investment confidence	Instability and indecisivenes over energy price to IPPs (e.g. Feed-In-Tariff) affects investment confidence	3	5	15
15	Financial/ Economic	Execution	Threat	Prohibitive costs (EVs)	The present cost of most models may be out of the reach of middle to lower income drivers	3	4	12
16	Financial/ Economic	Execution	Threat	Stranded assets	Writing off of infrastructure, vehicles and other assets in other sectors will result in significant losses for many companies and investors.	4	3	12
17	Financial/ Economic	Execution	Opportunity	Reduction in govenrment expenditure	The reduction in expenditure from Oil and Gas imports will result in savings for the government	-5	-4	-20
18	Financial/ Economic	Execution	Threat	Loss of business and employment	Traditional mechanics are not currently equipped to provide service to EVs. As the transition occurs, those who do not upgrade their knowledge and training will be challenged to maintain a customer base and economic activity.	3	2	6
19	Financial/ Economic	Execution	Threat	High technology costs	Sharp transition will result in acquiring technology at the highest price in the development phase	5	3	15
20	Financial/ Economic	Execution	Threat	Increased cost to commuters as bus fare will increase	Providing PSV services with more expensive EVs may necessitate an increase in bus fare in order for the PSV sector to repay and/or recover the considerable investment	3	5	15

Step 2: Risk Assessment		Step 3: Risk Response			Step 4: Monitor & Control		
Cost Impact ($M)							
Likely cost	% of Project Cost	Response Category	Response	Risk Owner	Status	Date Last Updated	Tracking Comments
0.00		Mitigate	Develop framework and prospectus for Oil and Gas stakeholders to identify economic opportunities in the RE sector	Ministry of Energy and Water Resources	Active (Not Started)	14-Dec-18	
0.00		Mitigate	Develop structured installation programme to focus on targeted routes and public areas	Ministry of Transport	Active (Not Started)	14-Dec-18	
0.00		Avoid	Launch broad and consistent communication and awareness programme in the early stages of implementation	Ministry of Energy and Water Resources	Active (Not Started)	14-Dec-18	
0.00		Mitigate	Equip relelavant institutions with the tools and information needed to make informed decisions at the beginning of implementation	Ministry of Energy and Water Resources	Active (Not Started)	14-Dec-18	
0.00		Mitigate	Provide an affordable and reliable public service infrastructure that could buffer the immediate demand for EVs. This then allows for some time and savings within this economic level to eventually acquire EVs	Ministry of Transport	Active (Not Started)	14-Dec-18	
0.00		Share	Establish fund to assist with repurposing and/or decomissioning of assets	Ministry of Finance	Active (Not Started)	14-Dec-18	
0.00		Accept			Active (Not Started)	14-Dec-18	
0.00		Mitigate	Establish programme to identify and provide the requisite courses for upgrading the skills of the existing mechanics	Ministry of Energy and Water Resources	Active (Not Started)	14-Dec-18	
0.00		Accept	Encourage diversity of technologies and constant mapping of industry developments to capitalise on technology savings	Ministry of Energy and Water Resources	Active (Not Started)	14-Dec-18	
0.00		Mitigate	Identify incentives (VAT, duties, etc.) to consider for revision to offset requirement for bus fare increase	Ministry of Finance	Active (Not Started)	14-Dec-18	

Step 1: Risk Identification						Step 2: Risk Assessment		
Project: Barbados National Energy Policy: Implementation Plan						Rank		
#	Category	Phase	Opportunity/ Threat	Risk Name	Detailed Description	"Probability (1 - 5)"	Consequence (1-5)	Severity (Priority)
21	Financial/ Economic	Execution	Threat	Limited grant funding avaialble to support the transition	Without grant funding and concessions, the transport sector will not be able to convert to EV's at their present cost	3	5	15
22	Strategic	Execution	Threat	Little support from financial institutions	Financial institutions are hesitant to provide financing for EV projects as they view them as risky ventures due to the perceived uncertainty of the pricing mechanism for IPPs	4	4	16
23	Operational	Execution	Threat	Inadequate land use policy	The land use policy, bureaucratic planning approval process and land ownership disputes are significant hurdles in getting RE projects aproved and implemented.	3	5	15
24	Operational	Execution	Threat	Lack of policy and implementation synchronisation	If there is no clear correlation between the existing policy and projects being implemented this creates confusion in the market and provides a disincentive for investment in RE	3	5	15
25	Strategic	Planning	Threat	Lack of Global precedence set for such a rapid turnaround to 100% RE	There is no comparable undertaking from which Barbads can extract lessons learned for its 100% FFF 2030 initiative. This lack of experience may cause a delay in accelerating some activities	5	3	15
26	Strategic	Planning	Threat	Agency response times	Agencies take too long to get things off the ground (TCPD, FTC, MEWR, BNSI) and provide facilitation tools.	4	5	20
27	Strategic	Planning	Threat	Agency response times	Agencies take too long to get things off the ground (TCPD, FTC, MEWR, BNSI) and provide facilitation tools.	4	5	20
28	Reputational	Execution	Threat	General historical mistrust of the utility as a monopoly distributor	IPPs and other relevant stakeholders are traditionally cautious of the intentions of utility and this may cause some shortfall in buy-in when engaging in forums and tasks which include the utility	3	2	6
29	Operational	Execution	Threat	Attitudes towards change within government and the private sector	Persons may not embrace the transition as they should and this can be a hindrance to the RE 2030 target	4	5	20
30	Strategic	Execution	Threat	Alignment to BERT	Some activities of the 100% FFF Vision may cotradict the short term objectives of BERT	3	4	12

Step 2: Risk Assessment		Step 3: Risk Response			Step 4: Monitor & Control		
Cost Impact ($M)							
Likely cost	% of Project Cost	Response Category	Response	Risk Owner	Status	Date Last Updated	Tracking Comments
0.00		Mitigate	Establish Resource Mobilisation Unit to focus specifically on finding financing solutions for RE transition	Ministry of Energy and Water Resources	Active (Not Started)	14-Dec-18	
0.00		Avoid	Equip relelavant institutions with the tools and information needed to make informed decisions at the beginning of implementation	Ministry of Energy and Water Resources	Active (Not Started)	14-Dec-18	
0.00		Mitigate	Establish multi-stakeholder processing platform and special review board comprising all relevant entities to accelerate the review of RE project over a certain size.	Town and Country Planning Department	Active (Not Started)	14-Dec-18	
0.00		Avoid	Enabling activities which are being addressed in the current implementation plan will address this lack of syncronisation.	Ministry of Energy and Water Resources	Active (Not Started)	14-Dec-18	
0.00		Avoid	Undertake extensive industry wide research to identify lessons learned and capacity requirements	Ministry of Energy and Water Resources	Active (Not Started)	14-Dec-18	
0.00		Avoid	Establish Project Implmentation Unit, which will coordinate the day to day implementation of the activities	Ministry of Energy and Water Resources	Active (Not Started)	14-Dec-18	
		Avoid	Identify and address capacity gaps and needs at beginning of implementation	Ministry of Energy and Water Resources	Active (Not Started)	14-Dec-18	
		Avoid	Provide forum (Working Groups) to promote constant and relevant dialogue on the developments pertinent to the operations of the utility and IPPs	Ministry of Energy and Water Resources	Active (Not Started)	14-Dec-18	
		Avoid	Develop and deploy Education, Awareness and Change Management Programme for private and public sector	Ministry of Energy and Water Resources	Active (Not Started)	14-Dec-18	
		Mitigate	Promote thorough analysis and dialogue at the Cabinet Sub-Committee on Energy	Ministry of Energy and Water Resources	Active (Not Started)	14-Dec-18	

Management Arrangements

The MEWR will establish a Project Team, referred to as the Project Management Team (PMCT), which will be entrusted to support the MEWR to deliver on the outputs outlined in this IP. The PMCT will assist with the coordination of multi-stakeholder deliverables and monitor the progression of the various established enabling activities. The MEWR will provide financial oversight and fiduciary and safeguard handling capacity.

Project Management Team

The PMCT will be responsible for the day-to-day management and coordination of the project and its respective activities. It will be responsible for the general management actions, such as the preparation of consolidated annual work plans and technical and financial reports to be presented to the Project Task Force.

The PMCT will provide services of Project Management, Monitoring and Evaluation, Procurement, Administrative Support, Technical Support and Finance and Awareness and Communication within the IP. The organisation of the PMCT will reflect a focus on these services, as well as coordination of activities across responsible parties and thematic areas identified. The PMCT of the MEWR-overseen project will report to the Project Steering Committee. The PMCT will be recruited by the MEWR and will be given the authority to manage the implementation components on a daily basis as per the boundaries established by this IP.

Project Task Force

The Project Task Force (PTF) – is constituted of MEWR, Ministry of Finance, Economic Affairs and Investment, a representative of the National Climate Change Committee (NCCC), a representative from the Barbados Chamber of Commerce and a representative from a relevant Non-Governmental Organisation. The roles of the following specific members of the PSC are as follows:

- Executive representing the Project ownership to chair the group (MEWR)
- Senior Beneficiary representing the interests of those who will ultimately benefit from the project to ensure the realisation of benefits from the perspective of national beneficiaries (NCCC).
- Other Project Board Member

The Project Steering Committee will liaise with the Barbados Cabinet Sub-Committee on Energy for its members to participate actively during meetings and to propose agenda items to be discussed.

The PTF will provide guidance, in accordance with overarching policy direction, to the PMCT on specific components project as outlined in this IP document and in alignment with the policy measures of the BNEP. The PTF is responsible for making, on a consensus basis, management decisions for the project, in particular when guidance is required by the PMCT, including recommendation for approval of IP revisions. IP reviews by this group are made at designated decision points (including at least annually) during the running of the IP, or as necessary when raised by the PMCT.

The responsibilities of the PTF shall include, but not be limited to:

1. Review, approve and amend this IP, including the Monitoring and Evaluation (M&E) framework
2. Monitor compliance with the IP's objectives
3. Discuss progress and identify solutions to problems facing any of the IP's partners
4. Review and approve the Annual Work Plan (AWP) and the consolidated financial and progress reports
5. During the life of the IP, review proposals for major budget re-allocation such as major savings or cost increases, or for use of funds for significantly different activities
6. Review evaluation findings related to impact, effectiveness and the sustainability of the IP
7. Monitor both the budget and the prompt delivery of financial, human and technical inputs to comply with the work plan

8. Ensure the participation and ownership of stakeholders in achieving the objectives of the IP

9. Ensure communication of the project and its objectives to stakeholders and the public

10. Approve the project communication strategy and public information plans prepared by the PTF

11. Facilitate linkages with high-level decision-making

12. Convene ordinary meetings to consider the proposals and recommendations, as well as the progress made by the IP

13. Convene, if necessary, extraordinary meetings.

The project team, for decisions, consults the PTF when their tolerances (i.e. constraints normally in terms of time and budget) are exceeded. The project team acts as the secretary to the PTF and is responsible for organising meetings, preparing meeting documents and follow up on PTF recommendations. The PTF will convene four times a year and can meet extraordinarily whenever circumstances require.

In order to ensure MEWR ultimate accountability for the project results, PTF decisions will be made in accordance to standards that shall ensure management for development results, best value money, fairness, integrity, transparency and effective international competition. On occasion when there is no consensus on any particular matter within the PSC, the final decision shall rest with the MEWR.

Management Committee

The Management Committee (MC) will meet at least once a month, led by the Project Coordinator of the PMCT. The MC will be comprised of MEWR and other stakeholders invited on an as-needed basis (e.g. other ministries). The MC will discuss and agree work plans, provide for information exchange and synergies between IP components and agree on TORs, recruitment of experts and other related managerial activities.

Project Assurance

The Project Assurance role is the responsibility of MEWR.

Reporting Structure

The PMCT provides quarterly reports to the PTF on progress and other relevant associated developments of the project. The PTF reports to the Cabinet Sub-Committee on Energy, which provides oversight to the IP and filters comments and directives through the PTF to the PMU.

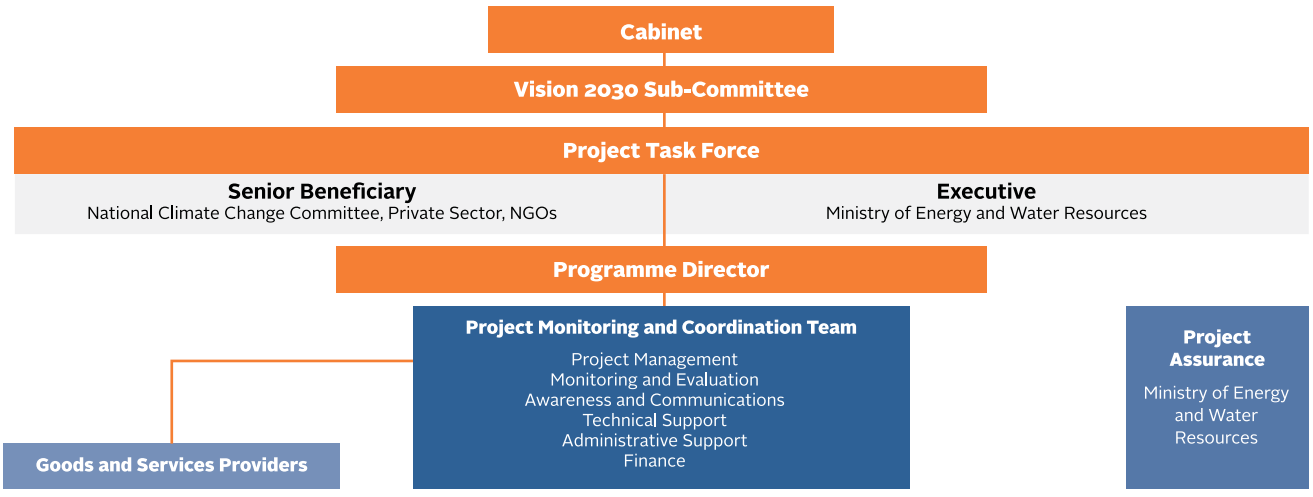
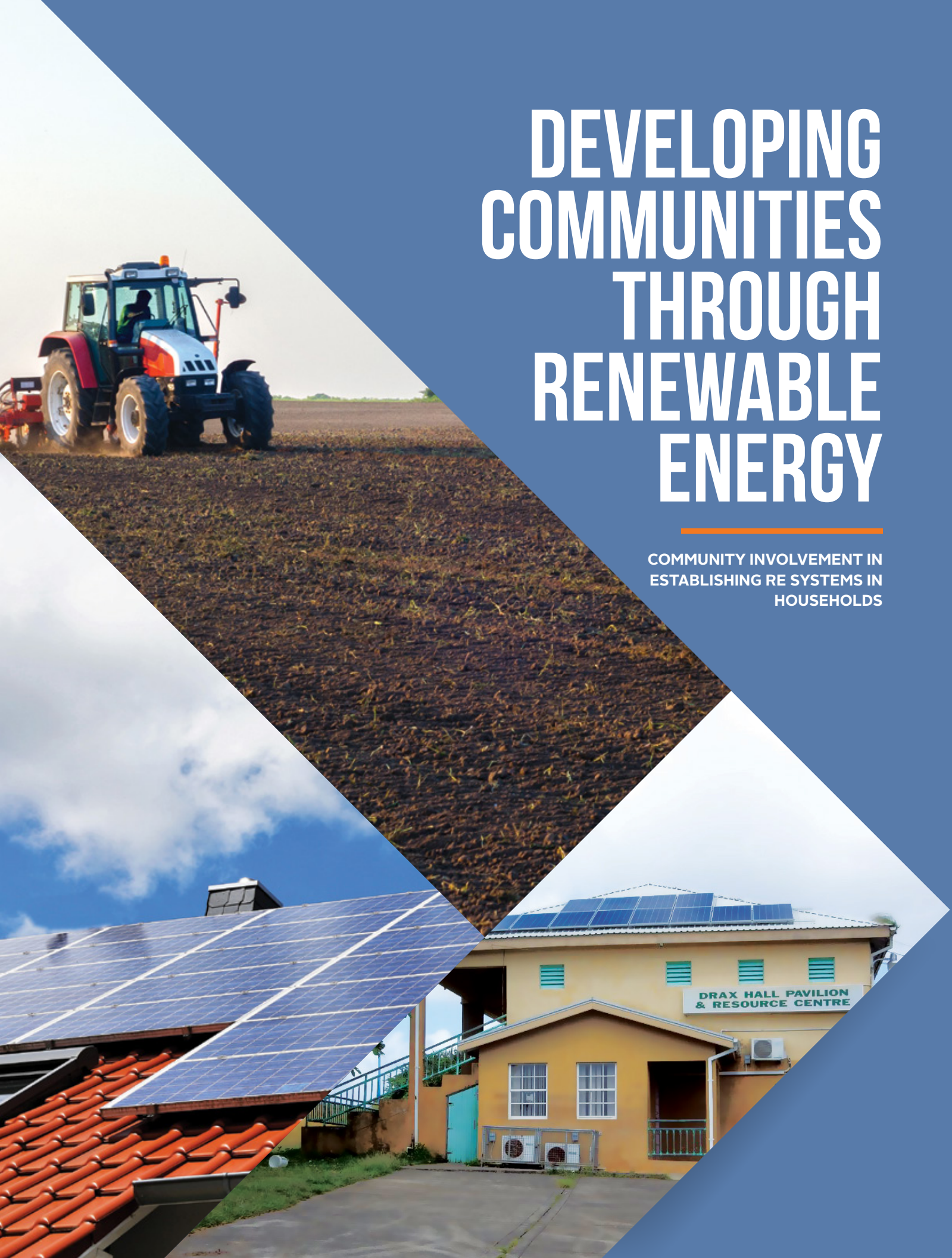


Figure 5: Project Implementation Management Structure

DEVELOPING COMMUNITIES THROUGH RENEWABLE ENERGY

COMMUNITY INVOLVEMENT IN ESTABLISHING RE SYSTEMS IN HOUSEHOLDS



Management Arrangements

One critical measure of success in the IP will be how well it promotes the involvement, development and empowerment of residents at the community level.

Traditionally, measuring this indicator implicated a heavy reliance on outputs of awareness and communication. However, this IP embarks on an ambitious proposition to create a more formal, robust and sustainable engagement with all communities across Barbados, by establishing a Renewable Energy Licensing Regime (RELR), which when launched, would automatically monetize all property interests in Barbados, with respect to the prospects of renewable energy generation at their respective locations.

The study identified in Activity 93, under Renewable Energy Supply and Storage will serve as a major catalyst for this engagement. The study aims to validate and define the framework for establishing an RE market of tradable instruments (e.g. licences) for all residential, commercial and agricultural properties. The establishment of the RELR will enable small (8000sq ft. or less), medium (8001 sq. ft – 43559 sq. ft.) and large (1 acre and above) property owners across Barbados, including government, to trade energy equivalency licenses (EEL) at their discretion, subject to any accompanying relevant trade regulations and national development plans. The study will also explore and make recommendations addressing situations in which individuals reside in a structure that they own, while not being the actual owners of the land on which the structure is stationed. This consideration centres on the IP's commitment to creating the largest possible base of local involvement in the transition to 100% FFF. With this approach, every property owner in Barbados will have a calculated stake in the paradigm shift to becoming 100% FFF.

The EEL can therefore create many avenues for small, medium and large-scale economic activity across Barbados, thereby favourably affecting employment and foreign exchange generation. Tailoring the instrument to accommodate an approach of 'one licence per property' also adds value to the prospects of entrepreneurship and the ability to generate new small businesses in the RE sector, with the creation of a new and broader base of clients. The feasibility of collateralising the instrument will be a focus of the study, with a view to exploring opportunities where economically disenfranchised and vulnerable persons with property holding rights can utilise their EELs to offset a variety of financial burdens such as the inability to service some forms of debt (e.g. taxes owed and loans).

The EEL can therefore create many avenues for small, medium and large-scale economic activity across Barbados, thereby favourably affecting employment and foreign exchange generation.

KEY ASSUMPTIONS AND LIMITATIONS OF IMPLEMENTATION PLAN

Management Arrangements

This IP will operate effectively under specific conditions that are assumed to be in operational alignment with the approach of the Ministry of Energy and Water Resources, as party responsible for overall quality assurance. These assumptions are:

1. **Management Arrangements –** Implementation will be supervised by a team of officers, collectively a project management team, who will be tasked with delivering on the results outlined in the IP.

2. **Working Groups –** Thematic Working Groups will continue to meet and provide additional oversight to activities.

3. **Working Groups –** Additional stakeholders from under and/or non-represented thematic areas will be integrated into the IP

4. **Responsible Parties -** Stakeholders (MOU etc.) will formally commit to being champions of the various activities to which they are identified as Responsible Parties.

5. **Public Communication -** Developments regarding progress and milestone achievements will be communicated to the general public.

6. **Resource Coordination Team (RCT) -** An RCT, dedicated to identifying financing opportunities for the activities in the IP, will be established.

Throughout the development of the IP, there were a number of factors taken into consideration, to which timely adjustments were made with a view to preserving the integrity and quality of the IP. These considerations include:

1. **Consultation Time frame -** The IP, which involved the assessment of 92 policy measures via 5 workshops and 35 individual interviews, resulted in the identification of 145 enabling activities over the period November 19, 2018 through December 14, 2018. This narrow timeline resulted in the prioritisation of thematic areas based on input from a wide range of relevant documents (e.g. Barbados Second National Communication, 2015). Therefore, within this IP some thematic areas appear disproportionately represented. However, in light of this fact, the IP will advance working group engagements to incorporate other critical sectors throughout the project cycle.

2. **Broad Stakeholder Participation –** Although the working group sessions were well attended and representative of the core drivers of the IP, input from other critical stakeholders will be needed to fully align activities to the existing operations of relevant institutions. While this omission would normally implicate a less-than favourable progression towards reaching the outlined objectives, the IP is designed as a 'working document' with sufficient flexibility and adaptability to rapidly incorporate inputs at any given time, without compromising the overall quality of the outputs identified. To address this possible dilemma, the IP may receive additional inputs in the period between the establishment of the Project Steering Committee and the Inception Workshop. This will allow sufficient time to include considerations from other key agencies in advance of the PSC, outlining the scope of the IP during its kick-off workshop. These agencies include:

- The Ministry of Finance, Economic Affairs and Investment
- Ministry of Education, Technological and Vocational Training
- Ministry of Foreign Affairs and Foreign Trade
- Ministry of Housing, Lands and Rural Development
- Ministry of Tourism and International Transportation
- Ministry of Maritime Affairs and the Blue Economy
- Ministry of the Public Service
- Ministry of Youth and Community Empowerment

With regards to the energy targets, at this stage the IP presents preliminary forecasts of requirements for key variables. These values are to be likely revised following the completion of the Integrated Resource Plan by the Barbados Light and Power Company Ltd. Therefore, the IP acknowledges in advance that possible amendments may impact the predictions for:

- Schedule of Installation of Renewable Energy Over the Next 5 Years (MWh)
- Schedule Electricity Production (GWh) from Renewable Energy Over the Next 5 Years
- Schedule of Investment in Renewable Energy Over the Next 5 Years
- Spatial Requirements for Electricity Generation

APPENDIX A

APPENDIX A

ALLOCATION OF ACTIVITIES BY RESPONSIBLE PARTY

For ease of reference in the below table, please note that

- Numbers under column heading 'PM' relate to Policy Measures identified on pages 16 to 20.
- Letters under column heading 'EA' relate to the sequence of Enabling Activities. In some instances, you may find that enabling activities are the same as the policy measure. This reflects the detailed level of some policy measures relative to others.
- Enabling activities with more than one associated responsible party are in **Red** text while activities with one responsible party are in **Black** text.
- The following Responsible Parties are listed in alphabetical order.

Barbados Association of Professional Engineers Sector

PM#	EA#	Enabling Activity
58	a	Review building codes to include best materials to be used for building and construction projects
86	a	Create, adapt and adopt standards for electricity generation efficiency in the bio-energy, wind energy and other renewable energy subsectors.

Barbados Community College

PM#	EA#	Enabling Activity
70	b	Establish capacity-building programme based on capacity assessment

Barbados Chamber of Commerce and Industry

PM#	EA#	Enabling Activity
76	a	Create standardised framework (processes, contractual arrangements, M&E, maintenance standards) governing RE installations
77	a	Establish multi-stakeholder group on communication
77	b	Establish schedule of public engagements forums (e.g. town hall meetings, press releases etc.)
88	a	Devise a strategy for expanding Barbados' renewable energy markets into the Caribbean.

Barbados Cane Industry Corporation

PM#	EA#	Enabling Activity
84	a	Provide fiscal and financial support for research and development in bio-energy technologies and methods.

Barbados Defence Force

PM#	EA#	Enabling Activity
5	c	Build marine security and response capacity
11	a	Conduct Risk Assessment
11	b	Conduct GAP analysis

Bio-Economy Group

PM#	EA#	Enabling Activity
75	a	Identify and/or develop a sustainable financial framework to enable organisations to actively participate in RE activities
80	b	Revise incentive categories to Intermittent, Firm and Storage to allow for measurement consistency and comparability across RE technologies, then apply relevant incentives
82	b	Define land areas for bio-energy and wind production in Barbados' Physical Development Plan
85	a	Develop standards of production for bio-methane from biogas

Barbados Light and Power Company Ltd.

PM#	EA#	Enabling Activity
36	a	Develop an Integrated Resource Planning tool to determine energy mix
41	a	Undertake Pilot for digitised Air Emissions Monitoring System
41	b	Develop framework for more frequent collection of data and CO_2 emissions and targets
44	b	Establish Data Sharing Agreements between relevant entities
46	a	Develop Asset Management plan
49	b	Develop media campaign (social media, television, radio, GIS)
69	b	Allow for adjustments to mix via comprehensive IRP
76	a	create standardised framework (processes, contractual arrangements, M&E, Maintenance standards) governing RE installations
89	a	Establish a transparent decision protocol for choosing between energy storage measures
90	a	Create clear guidelines for integration of battery technology in PV systems
91	a	Implement proven storage technologies and systems that promote renewable energy and are economically, environmentally and financially viable

Barbados National Oil Company Ltd.

PM#	EA#	Enabling Activity
2	c	Review existing framework
1	a	Establish a Petroleum Authority
2	a	Conduct a review of current data management systems
2	b	Develop a data management system
9	a	Develop a post-discovery framework
10	a	Conduct evaluation on methodology and approach to determining appropriate/optimum extraction rates
60	a	Provide training in environmental management for offshore upstream Oil and Gas

Barbados National Standards Institute

PM#	EA#	Enabling Activity
1	c	Develop standards for companies to operate in the Oil and Gas sector
12	a	Create biofuel standards for wholesale and retail supply of vehicles
27	a	Review building codes to integrate charging stations into new developments (residential, commercial and open public spaces)
34	a	Review building codes to integrate charging stations into new developments (residential, commercial and open public spaces)
45	a	BL&P already covered in Standards of Services Agreement
45	a	Develop energy efficiency standards for IPPs
53	a	Create energy efficiency standards for appliances and equipment used for residential, commercial and industrial purposes
57	a	Implement standards for insulation in buildings
59	b	Identify standards for equipment and devices
62	a	Develop standards and protocols for energy production in the petroleum and renewable energy subsectors
76	a	Create standardised framework (processes, contractual arrangements, M&E, Maintenance standards) governing RE installations
78	a	Institute efficiency standards for manufacturing local renewable energy products such as solar water heaters

85	a	Develop standards of production for bio-methane from biogas
86	a	Create, adapt and adopt standards for electricity generation efficiency in the bio-energy, wind energy and other renewable energy subsectors
90	26	Create clear guidelines for integration of battery technology in PV systems

Barbados Renewable Energy Association

PM#	EA#	Enabling Activity
42	a	Develop Awareness and Communication Programme
49	b	Develop media campaign (Social media, television, radio, GIS)
63	14	Establish joint information system
73	a	Establish sector and subsector working group forums to facilitate dialogue and collaboration on a regular basis
75	a	Identify and/or develop a sustainable financial framework to enable organisations to actively participate in RE activities
76	a	Create a standardised framework (processes, contractual arrangements, M&E, maintenance standards) governing RE installation's
77	a	Establish multi-stakeholder group on communication
77	b	Establish schedule of public engagements forums (e.g. town hall meetings, press releases etc.)
80	b	Revise incentive categories to Intermittent, Firm and Storage to allow for measurement consistency and comparability across RE technologies, then apply relevant incentives
91	a	Implement proven storage technologies and systems that promote renewable energy and are economically, environmentally and financially viable

Barbados Statistical Service

PM#	EA#	Enabling Activity
13	a	Establish a transportation information and management system

Barbados Water Authority

PM#	EA#	Enabling Activity
44	b	Establish Data Sharing Agreements between relevant entities

Corporate Affairs and Intellectual Property Office

PM#	EA#	Enabling Activity
81	a	Create a system to ensure the protection of intellectual property and patents for renewable energy technologies

Caribbean Centre for Renewable Energy and Energy Efficiency

PM#	EA#	Enabling Activity
88	a	Devise a strategy for expanding Barbados' renewable energy markets into the Caribbean

Chief Parliamentary Counsel

PM#	EA#	Enabling Activity
4	a	Formulate clear legislation governing environmental management in offshore Oil and Gas activities, with provisions for removal of licenses if stipulations are not met
8	b	Review and enhance relevant policies and guidelines related to Auditor General
10	b	Develop appropriate legislation
12	c	Review and/or establish appropriate legislation, policies and response mechanisms
47	b	Create legislation and regulations to govern movement towards greater energy efficiency in businesses and residences in Barbados
59	e	Develop legislation to govern effective waste disposal
72	a	Establish legislation and regulations that provide for a transparent process in acquiring licenses for supplying electricity from renewable energy sources
73	a	Establish Sector and subsector working group forums to facilitate dialogue and collaboration on a regular basis
87	a	Produce a legislative and regulatory framework for bio-energy production, distribution, storage, and plant decommissioning

Environmental Protection Department

PM#	EA#	Enabling Activity
3	b	Formulate environmental and other guidelines
4	a	Formulate clear legislation governing environmental management in offshore Oil and Gas activities, with provisions for removal of licenses if stipulations are not met
4	b	Develop Awareness and Communication Strategy

11	c	Review and/or establish appropriate legislation, policies and response mechanisms
13	a	Establish a transportation information and management system
26	a	Develop framework based on quantitative variables to incentivise and penalise below average and excessive emission levels respectively
26	b	Conduct pilot project to test framework
29	a	Develop framework for more robust emission data collection in private and public sector
29	b	Develop Air Emission/Transport Management Systems
41	a	Undertake Pilot for digitised Air Emissions Monitoring System
41	b	Develop framework for more frequent collection of data and CO_2 emissions and targets
44	b	Establish Data Sharing Agreements between relevant entities
51	a	Review building codes to ensure energy efficiency (RE) is incorporated
52	a	Establish or adopt business standards for the design of energy efficient homes and offices.
55	a	Develop platform with application template to facilitate simultaneous input and tracking on applications from multiple relevant entities
58	a	Review building codes to include best materials to be used for building and construction projects
59	a	Identify waste streams and characterise lifespans
59	b	Identify standards for equipment and devices
59	c	Develop protocols for disposal of equipment and devices
59	d	Develop framework to support private waste reuse / recycling
60	b	Examine existing Environmental Act and Marine Pollution Control Act and inform legislation
60	c	Examine options for waste treatment and identify best practices for dealing with industrial waste.
60	a	Provide training in environmental management for offshore upstream Oil and Gas
62	a	Develop standards and protocols for energy production in the petroleum and renewable energy subsectors
63	14	Establish joint information system
63	15	Develop public awareness programme
64	a	Conduct study to assess correlation between carbon dioxide emissions and health risks

65	a	Determine and mandate standardised methodology to measure CO_2 equivalent emissions across the energy sector
65	b	Identify volumes of emissions and markets for trading
92	a	Establish a system for recycling and disposing of batteries at end of use (cradle to cradle).

Fair Trading Commission

PM#	EA#	Enabling Activity
35	a	Develop a regulatory framework for the implementation of vehicle to grid storage and supply technology
37	a	Create a pricing mechanism for electricity from renewable energy suppliers
39	a	Expand electricity regulation to include the wide-ranging aspects of the market, generation, distribution, supply, dispatch, transmission, and electricity use within the electricity sector
73	a	Establish sector and subsector working group forums to facilitate dialogue and collaboration on a regular basis
77	a	Establish multi-stakeholder group on communication
77	b	Establish schedule of public engagements forums (e.g. town hall meetings, press releases etc.)
79	a	Develop framework for ongoing review of VAT, NSRL, Import Duties etc. on RE and associated apparatus (e.g. storage)
80	a	Provide stability and confidence amongst RE investors by making a determination on price and mechanism for RE (e.g. FIT)
80	b	Revise incentive categories to Intermittent, Firm and Storage to allow for measurement consistency and comparability across RE technologies, then apply relevant incentives
90	26	Create clear guidelines for integration of battery technology in PV systems
91	a	Implement proven storage technologies and systems that promote renewable energy and are economically, environmentally and financially viable

Government Electrical and Engineering Department

PM#	EA#	Enabling Activity
51	a	Review building codes to ensure energy efficiency (RE) is incorporated
52	a	Establish or adopt business standards for the design of energy efficient homes and offices
58	a	Review building codes to include best materials to be used for building and construction projects

76	a	Create standardised framework (processes, contractual arrangements, M&E, maintenance standards) governing RE installations
86	a	Create, adapt and adopt standards for electricity generation efficiency in the bio-energy, wind energy and other renewable energy subsectors
90	26	Create clear guidelines for integration of battery technology in PV systems
91	a	Implement proven storage technologies and systems that promote renewable energy and are economically, environmentally and financially viable

Ministry of Agriculture and Food Security

PM#	EA#	Enabling Activity
55	a	Develop platform with application template to facilitate simultaneous input and tracking on applications from multiple relevant entities
87	a	Produce a legislative and regulatory framework for bio-energy production, distribution, storage, and plant decommissioning

Ministry of Environment and National Beautification

PM#	EA#	Enabling Activity
65	c	Develop policy recommendation for cabinet decision
83	a	Establish and support infrastructure for the collection, handling, and processing of organic material to produce energy

Ministry of Education, Technology and Vocational Training

PM#	EA#	Enabling Activity
5	a	Establish training programmemes with key overseas institutions

Ministry of Energy and Water Resources

PM#	EA#	Enabling Activity
1	a	Establish Oil and Gas stakeholder committee
1	a	Establish a Petroleum Authority
1	b	Host conferences and inform potential developers
2	a	Conduct a review of current data management systems
2	d	Review existing framework

3	a	Develop awareness and communication strategy
3	b	Formulate environmental and other guidelines
4	a	Formulate clear legislation governing environmental management in offshore Oil and Gas activities, with provisions for removal of licenses if stipulations are not met
5	c	Build marine security and response capacity
5	d	Establish a Resource Mobilisation Unit
6	c	Develop a berthing facility for offshore Oil and Gas
8	a	Establish Wealth Management Fund
8	c	Develop mechanism for external/independent performance reviews of strategic plans
9	a	Develop a post-discovery framework
10	a	Conduct evaluation on methodology and approach to determining appropriate/ optimum extraction rates
13	a	Establish a transportation information and management system
14	a	Incentivise projects focused on generating Biodiesel for public transport vehicles
19	b	Government will cover the cost of training for first 2 mechanics
30	a	Develop Awareness and communication Strategy
31	a	This activity is a continuation of an ongoing Energy Smart Fund Programme in the Division of Energy, in collaboration with the Enterprise Growth Fund, Caribbean LED Lighting Inc. and the Barbados Light and Power Company Ltd.
33	a	Conduct study to establish benchmark and facilitate future comparisons
36	a	Develop Integrated Resource Planning tool to determine energy mix
39	a	Expand electricity regulation to include the wide-ranging aspects of the market, generation, distribution, supply, dispatch, transmission, and electricity use within the electricity sector
42	a	Develop Awareness and Communication Programme
43	a	Develop clear rules for determining roles and timelines for updating the Integrated Resource Plan
44	b	Establish Data Sharing Agreements between relevant entities
48	a	Develop an energy efficiency plan as a policy guideline document
48	b	Develop a public sector energy conservation programme
49	a	Develop toolkit for basic, DIY household energy audits
49	b	Develop media campaign (social media, television, radio, GIS)

50	a	Develop terms of reference for requirement of private sector to designate energy efficiency officers
50	b	Provide incentives for ESCOs whose activities are aligned to that of suggestions of relevant energy audits
50	c	Conduct Pilots and case studies showing the costs benefits
54	b	Provide equity for households that are unable to pay for energy efficiency retrofits and products
55	a	Develop platform with application template to facilitate simultaneous input and tracking on applications from multiple relevant entities
56	a	Identify key technologies to be targeted
56	b	Develop framework and criteria for incentives to promote greater use of energy efficiency technologies
56	c	Implement pilot project to assess impact of incentive
60	a	Provide training in environmental management for offshore upstream Oil and Gas
61	a	Develop legislation for decommissioning and abandonment of energy operations
61	b	Establish decommissioning fund
62	a	Develop standards and protocols for energy production in the petroleum and renewable energy subsectors
63	a	establish joint information system
68	a	Establish a clear international agenda for the acquisition of climate change funding
69	a	Establish preliminary/baseline mix
69	b	Allow for adjustments to mix via comprehensive IRP
70	a	Conduct capacity assessment to identify critical skillsets in the RE sector
71	a	Develop a central database containing details on the extent of renewable energy resource available at various locations in Barbados (solar, wind and bioenergy potential).
73	a	Establish Sector and subsector working group forums to facilitate dialogue and collaboration on a regular basis
74	a	Replicate and expand on existing approaches such as GCF to facilitate future financing engagements
75	a	Identify and/or develop a sustainable financial framework to enable organisations to actively participate in RE activities
77	a	Establish multi-stakeholder group on communication
77	b	Establish schedule of public engagements forums (e.g. town hall meetings, press releases etc.)

84	a	Provide fiscal and financial support for research and development in bio-energy technologies and methods.
87	a	Produce a legislative and regulatory framework for bio-energy production, distribution, storage, and plant decommissioning
88	a	Devise a strategy for expanding Barbados' renewable energy markets into the Caribbean.
93	a	Conduct feasibility study into the creation of RELR

Ministry of Foreign Affairs and Foreign Trade

PM#	EA#	Enabling Activity
5	a	Establish training programmemes with key overseas institutions
5	d	Establish a Resource Mobilisation Unit
68	a	Establish a clear international agenda for the acquisition of climate change funding
81	a	Create a system to ensure the protection of intellectual property and patents for renewable energy technologies

Ministry of Finance, Economic Affairs and Investment

PM#	EA#	Enabling Activity
5	d	Establish a Resource Mobilisation Unit
6	b	Provide tax incentives to businesses that directly engage the offshore sector
8	a	Establish Wealth Management Fund
8	c	Develop mechanism for external/independent performance reviews of strategic plans
14	c	Review duties on EVs
19	a	Review duties on EVs
20	a	Establish Resource Mobilisation Unit
21	a	Quarterly simultaneous review of Duties, VAT, Excise Tax in line with BERT programme
30	a	Provide incentives to buffer costs (import, sales and operations)
32	a	Provide cost incentives that encourage investment in required infrastructure with charging stations etc.
33	a	Conduct study to establish benchmark and facilitate future comparisons

50	a	Develop terms of reference for requirement of private sector to designate energy efficiency officers
54	a	Develop assessment tool to determine household income levels
56	b	Develop framework and criteria for incentives to promote greater use of energy efficiency technologies
56	c	Implement pilot project to assess impact of incentives
66	a	Establish a Resource Mobilisation Unit
74	a	Replicate and expand on existing approaches such as GCF to facilitate future financing engagements
79	a	Develop framework for ongoing review of VAT, NSRL, Import Duties etc. on RE and associated apparatus (e.g. storage)
81	a	Create a system to ensure the protection of intellectual property and patents for renewable energy technologies
84	a	Provide fiscal and financial support for research and development in bio-energy technologies and methods
7	a	Review Corporate Tax Rate

Ministry of Health and Wellness

PM#	EA#	Enabling Activity
55	a	Develop platform with application template to facilitate simultaneous input and tracking on applications from multiple relevant entities
64	a	Conduct study to assess correlation between carbon dioxide emissions and health risks

Ministry of Labor and Social Partnership Relations

PM#	EA#	Enabling Activity
5	b	Advanced and/or develop relevant courses at local institutions

Ministry of Small Business, Entrepreneurship and Commerce

PM#	EA#	Enabling Activity
6	a	Develop awareness and communication strategy. Communicate opportunities for enterprise. E.g. laundry service, food supply, waste management

Ministry of Transport, Works and Maintenance

PM#	EA#	Enabling Activity
13	a	Establish a transportation information and management system
14	b	Undertake pilot projects for electric vehicle usage along major routes to determine efficiency
18	a	Stricken penalties pertaining to offloading/onboarding points
18	b	Develop awareness and communication strategy
22	a	Develop National Transportation Network Strategy
23	a	Develop transportation information and management system
26	a	Develop framework based on quantitative variables to incentivise and penalise below average and excessive emission levels respectively
26	b	Conduct pilot project to test framework
29	b	Develop Air Emission/Transport Management Systems
33	a	Conduct study to establish benchmark and facilitate future comparisons
44	b	Establish Data Sharing Agreements between relevant entities

National Petroleum Corporation

PM#	EA#	Enabling Activity
9	a	Develop a post-discovery framework
10	a	Conduct evaluation on methodology and approach to determining appropriate/optimum extraction rates
44	b	Establish Data Sharing Agreements between relevant entities

Private Sector Road Transportation Sector

PM#	EA#	Enabling Activity
14	d	Explore retrofitting options for existing fleet
24	a	Create system to incorporate mobile maintenance and support for EVs
28	a	Construct more charging stations for EVs.

Samuel Jackman Prescod Institute of Technology

PM#	EA#	Enabling Activity
70	b	Establish capacity-building programme based on capacity assessment

Sanitation Service Authority

PM#	EA#	Enabling Activity
60	a	Identify waste streams and characterise lifespans
59	b	Identify standards for equipment and devices
60	c	Develop protocols for disposal of equipment and devices
59	d	Develop framework to support private waste reuse/recycling
59	e	Develop legislation to govern effective waste disposal
59	f	Develop education and awareness programme for public dissemination
60	a	Identify and adopt international best practice and international framework
60	a	Identify and adopt international best practice and international framework
60	b	Examine existing Environmental Act and Marine Pollution Control Act and inform legislation
60	c	Examine options for waste treatment and identify best practices for dealing with industrial waste.
92	a	Establish a system for recycling and disposing of batteries at end of use (cradle to grave)

Town and Country Planning Department

PM#	EA#	Enabling Activity
27	a	Review building codes to integrate charging stations into new developments (residential, commercial and open public spaces)
34	a	Review building codes to integrate charging stations into new developments (residential, commercial and open public spaces)
47	b	Create legislation and regulations to govern movement towards greater energy efficiency in businesses and residences in Barbados.
51	a	Review building codes to ensure energy efficiency (RE) is incorporated
52	a	Establish or adopt business standards for the design of energy efficient homes and offices.
55	a	Develop platform with application template to facilitate simultaneous input and tracking on applications from multiple relevant entities
55	b	Form project review committee to expedite review of projects over a certain size
57	a	Implement standards for insulation in buildings
58	a	Review Building codes to include best materials to be used for building and construction projects
82	b	Define land areas for bio-energy and wind production in Barbados' Physical Development Plan

University of the West Indies

PM#	EA#	Enabling Activity
5	a	Establish training programmers with key overseas institutions
70	b	Establish capacity-building programme based on capacity assessment

APPENDIX B

APPENDIX B

ALLOCATION OF ACTIVITIES & RESPONSIBLE PARTIES

PM#	Policy Measure	EA#	Enabling Activity	Responsible Party
1	Establish regularly held investor conferences to inform potential developers about the rules and requirements needed to undertake activities in the Oil and Gas sector.	a	Establish Oil and Gas stakeholder committee	BNOCL - MEWR
		b	Host conferences and inform potential developers	MEWR
		c	Develop standards for companies to operate in the Oil and Gas sector	BNSI
2	Increase the cultivation of data relating to the geological and geophysical conditions in the offshore Oil and Gas sector to aid the government in setting license fees and determining levels of royalties.	a	Conduct a review of current data management systems	BNOCL - MEWR
		b	Develop a data management system	BNOCL
		c	Review existing framework	BNOCL
		d	Review existing framework	MEWR
3	Develop a licensing system with clear criteria on the ranking of various factors critical to the decision on bids. This system should be made available widely to potential bidders as well as the public.	a	Develop awareness and communication strategy	MEWR
		b	Formulate enviornmental and other guidelines	EPD - MEWR
4	Formulate clear legislation governing environmental management in offshore Oil and Gas activities, with provisions for removal of licenses if stipulations are not met.	a	Formulate clear legislation governing environmental management in offshore Oil and Gas activities, with provisions for removal of licenses if stipulations are not met	CPC - EPD - MEWR
		b	Develop Awareness and Communication Strategy	EPD

5	**Develop a capacity-building programme locally to prepare the workforce for employment in the emerging Oil and Gas offshore sector.**	a	Establish training programmemes with key overseas institutions	METVC - MFAFT - UWI
		b	Advancde and/or develop relevant courses at local institutions	METVT - MOL
		c	Build marine security and response capacity	BDF - MEWR
		d	Establish a Resource Mobilisation Unit	MEWR - MFAFT - MOFEI
6	**Create an enabling environment that will empower local businesses to participate effectively in the supply of goods and services to the offshore Oil and Gas sector.**	a	Develop awareness and communication Strategy. Communicate oppurtunities for enterprise-e.g laundry service, food supply, waste management	MSBEC
		b	Provide tax incentives to businesses that directly engage the offshore sector	MOFEI
		c	Develop a berthing faciity for offshore Oil and Gas sector	MEWR
7	**Offer fiscal incentives for developers, which are tied to factors such as the expected internal rate of return.**	a	Review Corporate Tax Rate	MOFEI
8	**Establish a wealth management programme to ensure that revenues from the offshore Oil and Gas sector are used effectively.**	a	Establish Wealth Management Fund	MEWR - MOFEI
		b	Review and enhance relevant policies and guidelines related to Auditor General	CPC
		c	Develop mechanism for external/ independent performance reviews of strategic plans	MEWR - MOFEI
9	**Develop an unambiguous system for determining whether a future gas find should be used for export or included as part of the domestic market.**	a	Develop a post-discovery framework	BNOCL - MEWR - NPC

10	**Produce legislation that identifies limits on the amount of Oil and Gas resources that can be exploited in the short term.**	a	Conduct evaluation on methdology and approach to determining appropriate/ optimum extraction rates	BNOCL - MEWR - NPC
		b	Develop appropriate legislation	CPC
11	**Build a defence and security framework to protect the Exclusive Economic Zone.**	a	Conduct Risk Assessment	BDF
		b	Conduct GAP analysis	BDF
		c	Review and/or establish appropriate legislation, policies and response mechanisms	EPD
12	**Create biofuel standards for wholesale and retail supply of vehicles.**	a	Create biofuel standards for wholesale and retail supply of vehicles.	BNSI
13	**Establish a transportation information system to provide data for transportation and energy policies, strategic planning, tracking of CO_2 emissions, and environmental impacts.**	a	Establish a transportation information and management system	BSS - EPD - MEWR - MTWM
14	**Introduce more renewable energy and clean energy into the public transportation system.**	a	Incentivise projects focused on generating Biodiesel for public transport vehicles	MEWR
		b	Undertake pilot projects for EV usage along major routes to determine efficiency	MTWM
		c	Review duties on EVs	MOFEI
		d	Explore retrofitting options for existing fleet	PS
18	**Encourage energy efficiency in the transportation sector.**	a	Stricken penalties pertainimg to offloading/onboarding points	MTWM
		b	Develop awareness and communication strategy	MTWM - PSVA

19	**Provide tax incentives to vehicle dealerships that train their mechanics to maintain and repair EVs.**	a	Review duties on EVs	MOFEI
		b	Government will cover the cost of training for first 2 mechanics	MEWR
20	**Establish a programme for identifying appropriate international sources of funding to facilitate and assist the government in transitioning from fossil fuels to EVs.**	a	Establish Resource Mobilisation Unit	MOFEI
21	**Remove duties and VAT from EVs and encourage a scheduled approach to increasing their use in the national transportation fleet, while at the same time, not harming government's revenue stream.**	a	Quarterly simultaneous review of Duties, VAT, Excise Tax in line with BERT programme	MOFEI
22	**Develop a road network that promotes energy efficiency.**	a	Develop National Transportation Network Strategy	MTWM
23	**Establish the use of management technology in public transit, e.g. using smartphone apps to verify arrival times of buses.**	a	Develop transportation information and management system	MTWM
24	**Create a system that includes mobile charging stations for vehicles**	a	Create system to incorporate mobile maintenance and support for EVs	PS
25	**Introduce ethanol rather than MTBE as an anti-knock agent.**	a	N/A	
26	**Implement more stringent regulations on vehicles' exhausts and emissions.**	a	Develop framework based on quantitative variables to incentivise and penalise below-average and excessive emission levels respectively.	EPD - MTWM
		b	Conduct pilot project to test framework	EPD - MTWM

27	Integrate charging stations with traditional gas stations.	a	Review building codes to integrate charging stations into new developments (residential, commercial and open public spaces)	BNSI
		a	Review building codes to integrate charging stations into new developments (residential, commercial and open public spaces)	TCPD
28	Construct more charging stations for EVs.	a	Construct more charging stations for EVs	PS
29	Control and maintain CO_2 emissions at levels consistent with local and global climate change targets.	a	Develop framework for more robust emission data collection in private and public sector	EPD
		b	Develop Air Emission/Transport Management Systems	EPD - MTWM
30	Establish a system that facilitates the change from traditional vehicles to those powered by renewable energy, taking transition costs into consideration.	a	Develop Awareness and communication Strategy	MEWR
		b	Provide incentives to buffer costs (import, sales and operations)	MOFEI
31	Implement standards for streetlight efficiency.	a	Already in progress	MEWR
32	Provide cost incentives that encourage investment in required infrastructure with charging stations etc.	a	Provide cost incentives that encourage investment in required infrastructure with charging stations etc.	MOFEI
33	Acquire more details on the number of vehicles using each fuel type.	a	Conduct study to establish benchmark and facilitate future comparisons	MEWR - MOFEI - MTWM
34	Establish standards in charging and other renewable energy infrastructure related to fuelling.	a	Review building codes to integrate charging stations into new developments (residential, commercial and open public spaces)	BNSI - TCPD
35	Develop a regulatory framework for the implementation of vehicle to grid storage and supply technology.	a	Develop a regulatory framework for the implementation of vehicle to grid storage and supply technology	FTC

36	**Establish electric market structures that reduce the effects of monopolistic operations where financially and economically feasible.**	a	Develop Integrated Resouce Planning tool to determine energy mix	BL&P - MEWR
37	**Create a pricing mechanism for electricity from renewable energy suppliers.**	a	Create a pricing mechanism for electricity from renewable energy suppliers	FTC
38	**Devise protocols for interconnectivity between IPPs and the utility to supply electricity.**	a	N/A - Already addressed in the Grid Code	
39	**Expand electricity regulation to include the wide ranging aspects of the market, generation, distribution, supply, dispatch, transmission, and electricity use within the electricity sector.**	a	Expand electricity regulation to include the wide ranging aspects of the market, generation, distribution, supply, dispatch, transmission, and electricity use within the electricity sector	FTC - GEED - MEWR - CPC
40	**Produce standards and specifications for generation, supply, dispatch, transmission, distribution, storage and consumption that allow the electricity sector to operate in a financially, economically, environmentally, and technically viable manner.**	a	Produce standards and specifications for generation, supply, dispatch, transmission, distribution, storage and consumption that allow the electricity sector to operate in a financially, economically, environmentally, and technically viable manner	BNSI
41	**Institute targets for limits on CO_2 emissions in the electricity sector.**	a	Undertake Pilot for digitised Air Emissions Moniotoring System	BL&P - IPPs - EPD
		b	Develop framework for more frequent cllection of data and CO_2 emissions and targets	BL&P - IPPs - EPD
42	**Promote the use of renewable and other clean sources of energy to produce electricity.**	a	Develop Awareness and Communication Programme	BREA - MEWR
43	**Develop clear rules for determining roles and timelines for updating the Integrated Resource Plan.**	a	Develop clear rules for determining roles and timelines for updating the Integrated Resource Plan	MEWR

44	**Use SMART meters as part of an advanced communication infrastructure for distribution management, to facilitate the use of more intermittent technologies and aid in demand-side management.**	a	Establish Data Sharing Agreements between relevant entities	BL&P - BWA - EPD - MEWR - MTWM - NPC
45	**Establish efficiency standards governing electricity production for utility and distribution-scale operations.**	a	Develop energy efficiency standards for IPPs	BNSI
46	**Develop a maximum useful life and cost/performance ratio of operations for generation equipment.**	a	Develop Asset Management Plan	BL&P - IPPs
47	**Create legislation and regulations to govern movement towards greater energy efficiency in businesses and residences in Barbados.**	a	Create legislation and regulations to govern movement towards greater energy efficiency in businesses and residences in Barbados	CPC - TCPD
48	**Craft an energy efficiency plan as a policy guideline document**	a	Develop an energy efficiency plan as a policy guideline document	MEWR
49	**Develop an energy conservation education and awareness programme that will promote lifestyle changes among Barbadians with regard to energy consumption.**	a	Develop toolkit for basic, DIY household energy audits	BREA - MEWR
		b	Develop media campaign (Social media, television, radio, GIS)	BL&P - BREA - IPPs - MEWR
50	**Promote energy efficiency in the productive and trading sectors.**	a	Develop terms of reference for requirement of private sector to designate energy efficiency officers	MEWR - MOFEI
		b	Provide incentives for ESCOs whose activities are aligned to that of suggestions of relevant energy audits	MEWR
		c	Conduct pilots and case studies showing the costs benefits	MEWR
51	**Develop sectoral energy efficiency and consumption standards for buildings, and encode them in the Town and Country Planning Act.**	a	Review building codes to ensure energy efficiency (RE) is incorporated	EPD - GEED - TCPD

52	**Establish or adopt business standards for the design of energy efficient homes and offices.**	a	Establish or adopt business standards for the design of energy efficient homes and offices	EPD - GEED - TCPD
53	**Create energy efficiency standards for appliances and equipment used for residential, commercial and industrial purposes.**	a	Create energy efficiency standards for appliances and equipment used for residential, commercial and industrial purposes.	BNSI
54	**Provide equity for households that are unable to pay for energy efficiency retrofits and products.**	a	Develop assessment tool to determine household income levels	MOFEI
		b	Provide equity for households that are unable to pay for energy efficiency retrofits and products	MEWR
55	**Develop a set of regulations in tandem with all government ministries involved in the energy sector, which identifies a clear and defined process for new applicants in energy efficiency projects.**	a	Develop platform with aplication template to facilitate simultaneous input and tracking on applications from multiple relevant entities	EPD - MAFS MEWR - MOH - TCPD
		b	Form project review committee to expedite review of projects over a certain size	TCPD
56	**Produce a system of duties, taxes and economic incentives to promote greater use of high-efficiency energy technologies.**	a	Identify key technologies to be targeted	MEWR
		b	Develop framework and criteria for incentives to promote greater use of energy efficiency technologies	MEWR - MOFEI
		c	Implement pilot project to assess impact of incentived	MEWR - MOFEI
57	**Implement standards for insulation in buildings.**	a	Implement standards for insulation in buildings	BNSI - TCPD
58	**Use life cycle analysis to determine the best materials to be used for building and other construction projects**	a	Review Building codes to include best materials to be used for building and construction projects	BAPE - EPD - GEED - TCPD - EPD

59	**Standards and protocols for the safe and effective disposal of equipment and devices in the energy sector.**	a	Identify standards for equipment and devices	BNSI - EPD - SSA
		b	Develop protocols for disposal of equipment and devices	EPD
		c	Develop framework to support private waste reuse/recycling	EPD -SSA
		d	Develop legislation to govern effective waste disposal	CPC - SSA
		e	Develop education and awareness programme for public dissemination	SSA
60	**A sustainable environmental management framework for the upstream offshore petroleum sector.**	a	Provide training in environmental management for offshore upstream Oil and Gas	BNOCL - EPD - MEWR
		b	Identify waste streams and characterise lifespans	SSA
		c	Identify and adopt international best practice and international frameword	SSA
		d	Examine existing environmental act and Marine Pollution Control Act and inform legislation	EPD - SSA
		e	Examine options for waste treatment and identify best practices for dealing with industrial waste	EPD - SSA
61	**A decommissioning fund for the energy sector to facilitate the decommissioning and abandonment of energy operations and facilities.**	a	Develop legislation for decommissioning and abandonment of energy operations	MEWR
		b	Establish decomissioning fund	MEWR

62	**Standards and protocols for energy production in the petroleum and renewable energy subsectors that promote and encourage the goal of zero harm to the people and the environment**	a	Develop Standards and protocols for energy production in the petroleum and renewable energy subsectors	BNSI - EPD - MEWR
	Standards and protocols for the safe and effective disposal of equipment and devices in the energy sector.	b	Develop protocols for disposal of equipment and devices	SSA
63	**Information systems and infrastructure that promote the flow of information requiring environmental standards, best practices and legislation.**	a	Establish joint information system	BREA - EPD - MEWR
		b	Develop public awareness programme	EPD
64	**Studies within the sector that assess the correlation between carbon dioxide emissions and health risks (e.g. cancer and asthma).**	a	Conduct study to assess correlatin between carbon dioxide emissions and health risks	EPD - MOH - PAHO
65	**Create a mechanism to cap and trade CO_2 emissions within the Barbados energy sector.**	a	Determine and mandate standardised methodology to measure CO_2 equivalent emissions across the energy sector	EPD
		b	Identify volumes of emissions and markets for trading	EPD
		c	Develop policy recommendation for cabinet decision	MENB
66	**Establish a clear international agenda for the acquisition of climate change funding.**	a	Establish a Resource Mobilisation Unit	MOFEI
68	**Establish a clear international agenda for the acquisition of climate change funding**	a	Establish a clear international agenda for the acquisition of climate change funding	MFAFT - MEWR
69	**Diversify and optimize the renewable energy mix that results in the maximisation of socio-economic and financial benefits to Barbados.**	a	Establish preliminary/ baseline mix	MEWR
		b	Allow for adjustments to mix via comprehensive IRP	BL&P - MEWR

70	**Establish a capacity-building programme locally to prepare the workforce for employment in the renewable energy sector.**	a	Conduct capacity assessment to identify critical skillsets in the RE sector	MEWR
		b	Establish Capacity-building programme based on capacity assessment	BCC - SJPIT - TEVT - UWI
71	**Develop a central database containing details on the extent of renewable energy resource available at various locations in Barbados (solar, wind and bioenergy potential).**	a	Develop a central database containing details on the extent of renewable energy resource available at various locations in Barbados (solar, wind and bioenergy potential).	MEWR
72	**Establish legislation and regulations that provide for a transparent process in acquiring licences for supplying electricity from renewable energy sources.**	a	Establish legislation and regulations that provide for a transparent process in acquiring licences for supplying electricity from renewable energy sources.	CPC
73	**Provide an enabling environment that encourages collaborative approaches to producing renewable energy that is technically sound, and is financially, economically and environmentally viable.**	a	Establish Sector and subsector working group forums to facilitate dialogue and collaboration on a regular basis	BREA - CPC - FTC - MEWR
74	**Establish a programme of international financing and 'in kind' assistance that effectively supports the supply of renewable energy, and promotes Barbados' economic growth and competitiveness.**	a	Replicate and expand on existing approaches such as GCF to facilitate future financing engagements	MEWR - MOFEI
75	**Increase staffing (secretariat) and human capacity to support local NGOs such as BREA.**	a	Identify and/or develop a sustainable financial framework to enable organisations to actively participate in RE activities	BEG - BREA - MEWR
76	**Develop a clear protocol for clients to follow for investigating and trouble-shooting in new renewable energy systems with a method of recourse for clients in case of unsatisfactory company performance.**	a	Create standardised framework (processes, contractual arrangements, M&E, maintenance standards) governing RE installations	BCCI - BL&P

76	**Develop a clear protocol for clients to follow for investigating and trouble-shooting in new renewable energy systems with a method of recourse for clients in case of unsatisfactory company performance.**	a	Create standardised framework (processes, contractual arrangements, M&E, maintenance standards) governing RE installations	BNSI - BREA - FTC - GEED
77	**Provide regular and clear communication to the public on developments within the renewable energy industry.**	a	Establish multi-stakeholder group on communication	BCCI - BREA - FTC - MEWR
		b	Establish schedule of public engagements forums (e.g. townhall meetings, press releases etc.)	BCCI - BREA - FTC - MEWR
78	**Institute efficiency standards for manufacturing local renewable energy products such as solar water heaters.**	a	Institute efficiency standards for manufacturing local renewable energy products such as solar water heaters	BNSI
79	**Establish appropriate fiscal incentives for emerging renewable energy and storage technologies.**	a	Develop framework for ongoing review of VAT, NSRL, Import Duties etc. on RE and associated apparatus (e.g. storage)	FTC - MOFEI
80	**Promote an enabling environment that encourages local involvement in renewable energy projects.**	a	Provide stability and confidence amogst RE investors by making a determination on price and mechanism for RE (e.g. FIT)	FTC
		b	Revise incentive categories to intermittent, firm and storage to allow for measurement consistency and comparability across RE technologies, then apply relevant incentives	BEG - BREA - FTC
81	**Create a system to ensure the protection of intellectual property and patents for renewable energy technologies.**	a	Create a system to ensure the protection of intellectual property and patents for renewable energy technologies	CAIPO - MFAFT - MOFEI
82	**Define land areas for bio-energy and wind production in Barbados' Physical Development Plan.**	b	Define land areas for bio-energy and wind production in Barbados' Physical Development Plan	BEG - TCPD

83	**Establish and support infrastructure for the collection, handling, and processing of organic material to produce energy.**	a	Establish and support infrastructure for the collection, handling, and processing of organic material to produce energy	MENB
84	**Provide fiscal and financial support for research and development in bio-energy technologies and methods.**	a	Provide fiscal and financial support for research and development in bio-energy technologies and methods	BCIC - MEWR - MOFEI
85	**Develop standards of production for bio-methane from biogas.**	a	Develop standards of production for bio-methane from biogas.	BEG - BNSI
86	**Create standards for electricity generation efficiency in the bio-energy, wind energy and other renewable energy subsectors.**	a	Create standards for electricity generation efficiency in the bio-energy, wind energy and other renewable energy subsectors	BAPE - BNSI - GEED
87	**Produce a legislative and regulatory framework for bio-energy production, distribution, storage, and plant decommissioning.**	a	Produce a legislative and regulatory framework for bio-energy production, distribution, storage, and plant decommissioning	CPC - MAFS - MEWR
88	**Devise a strategy for expanding Barbados' renewable energy markets into the Caribbean.**	a	Devise a strategy for expanding Barbados' renewable energy markets into the Caribbean	BCCI - CCREEE - MEWR
89	**Establish a transparent decision protocol for choosing between energy storage measures.**	a	Establish a transparent decision protocol for choosing between energy storage measures	BL&P
90	**Create clear guidelines for integration of battery technology in PV systems.**	a	Create clear guidelines for integration of battery technology in PV systems	BL&P - BNSI - FTC - GEED
91	**Implement proven storage technologies and systems that promote renewable energy and are economically, environmentally and financially viable.**	a	Implement proven storage technologies and systems that promote renewable energy and are economically, environmentally and financially viable	BL&P - BREA - FTC - GEED
92	**Establish a system for recycling and disposing of batteries at end of use (cradle to grave).**	a	Establish a system for recycling and disposing of batteries at end of use (cradle to grave)	EPD - SSA

APPENDIX C

APPENDIX C

RISK REGISTER GUIDELINES

	Description of Risk Register Column	Helpful Hints for Risk Assessment
No.:	Identification number of each risk.	Once risks are identified, they should be given a unique identification number, beginning with 1.
Project:	The name of the project.	The name used should be consistent for each focal area
Category:	The primary category or functional area that the risk pertains to.	Generally, the risk breakdown structure is a way of categorising or grouping risks by the potential cause of the risk.
Opportunity/Threat:		
Opportunity	Risk identified as an opportunity in the assessment section of the risk register.	
Threat	Risk identified as a threat in the assessment section of the risk register.	
Opportunity/Threat:	Risk identified as an opportunity and a threat in the assessment section of the risk register.	
Summary Description:	Brief, generally unique, description of the risk specific to the Project.	In the identification process, think about risks relevant to the project scope, schedule, or cost. Additionally think of risks that may affect the agency's reputation.
Detailed Description:	Detailed description of the risk, generally including a "cause", possible "risk event", and "effects".	The goal is to ensure that other users of the register can interpret the risk identified. Try to be specific and not overly vague. Sample risk statement templates are "If <uncertain event> → then <effect on objectives>." or "Due to <definite cause>, <uncertain event> may occur, resulting in <effect on objectives>.

Probability:	The estimated likelihood in percent (%) of the risk occurring based on current state of the risk. For subsequent risk assessments as response plans are implemented, the value should reflect the estimated probability at the time of assessment.	
Most Likely (Cost):	The estimated most likely cost impact of the risk if it were to occur (in millions of dollars). For subsequent risk assessments as response plans are implemented, the value should reflect the estimated impact at the time of assessment.	
Response Category:		
Threat Response - Pick One		
Accept	Indicates that the project team has decided not to change the project plan to deal with a risk, or is unable to identify any other suitable response strategy. It should be noted, that mitigation or transference is not necessary for all risk threats, particularly those with a small severity rating. Judgment must be used as to whether a more rigorous (and potentially costly) response should be implemented.	If "accept" is chosen as the response, generally the pre-and post-response assessment ratings remain the same.
Share	Allocates a portion of ownership of a risk threat to another party who is best able to minimise the impact and/or probability of the risks. Allocates all or a portion of ownership of a risk opportunity to another party who is best able to maximise its probability of occurrence and increase the potential benefits if it does occur.	

Mitigate	Seeks to reduce the probability and/or impact of a risk threat to below an acceptable threshold.	If "mitigate" is chosen as the response, generally the pos-response assessment is lower than the pre-response assessment.
Transfer	Allocates all ownership of a risk threat to another party who is best able to minimise the impact and/or probability of the risk.	If "transfer" is chosen as the response, generally the post response assessment is lower than the pre-response assessment. If the risk were fully transferred with no residual risk, the post-response assessment would equal zero.
Avoid	Involves changing the project plan to eliminate the risk threat or to protect the project objectives from its impact.	If "avoid" is chosen as the response, generally the risk is totally eliminated in the post response assessment.
Response:	Primary plan to address the risk.	Response plans should be specific enough to implement. It is okay to include steps to implementation. For example, further study may be needed (prior to implementing a response plan) to determine whether it would be effective; or options may need to be evaluated and decided upon by the project team prior to implementation. Owners assigned are those who are best able to monitor the risk and implement the response. More than one owner can be assigned, but it should be clear what each owner is responsible for.
Risk Owner:	Person or people assigned to implement the response plan and monitor the risk.	If multiple people are assigned as owners, it should be clear what each of their roles are and what they are individually responsible for.

Status:		
Active (Not Started)	Risk is being actively monitored and controlled, but the response plan has not been initiated.	
Active (Ongoing)	Risk is being actively monitored and controlled, and the response plan is currently being implemented.	
Active (Complete)	The risk is still being actively monitored and controlled; however all work on the response plan is complete.	
Dormant (Not Started)	Risk is not currently a high priority, but may become active in the future.	This status is not often used.
Retired (Complete)	Risk is no longer a threat to project objectives.	Risks that are no longer applicable should be listed as "retired" and not deleted from the register.
Tracking Comments:	Include any comments associated with the risk and the update to the risk in this box.	Utilise the comments section to provide updates on actions or owners, or to note changes associated with the response plans.

APPENDIX D

APPENDIX D

RISK REGISTER THREAT RATING DESCRIPTION

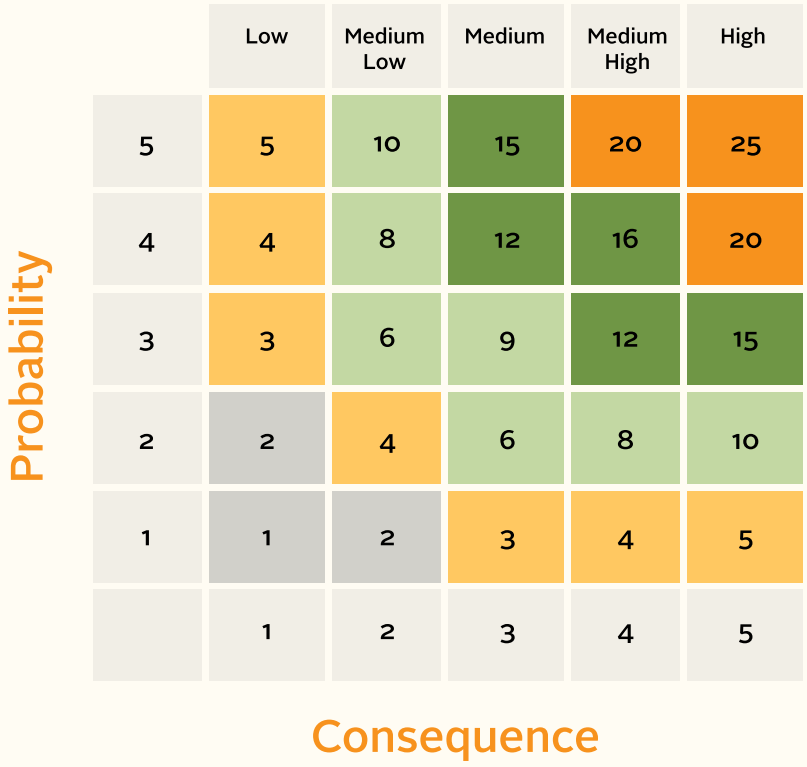
Impact Rating					
Context	**Project Impacts**				
	1	**2**	**3**	**4**	**5**
	Low	**Medium-Low**	**Medium**	**Medium-High**	**High**
Quality	"Negligible impacts to design quality Negligible impacts to long-term maintenance Barely noticeable"	"Requires Design Variance Minor impacts to long-term maintenance Minor scope reduction"	"Requires Design waiver Significant impacts to long-term maintenance Major scope reduction"	"Does not meet acceptable standards and requires Design Exception Major impacts to long-term maintenance Changes unacceptable to TxDOT or stakeholders"	"Does not meet acceptable standards and Design Exception not likely Unacceptable impacts to long-term maintenance Project does not meet need and purpose"
" Cost (% of project cost) "	cost increase = 1%	cost increase = 2%	cost increase = 3%	cost increase = 4%	cost increase > 5%
"Schedule (% of project schedule, subject to schedule analysis)"	delay = 1%	delay = 2%	delay = 3%	delay = 4%	delay > 5%

	Probability Rating				
	1	**2**	**3**	**4**	**5**
	Low	**Medium-Low**	**Medium**	**Medium-High**	**High**
Probability of occurrence	1-15%	16-30%	31-65%	66-80%	81-100%

Note: probability scale for threats and opportunities are color coded the same to ensure conditional formatting of cells is consistent and severity rankings are calculated correctly

	1	**2**	**3**	**4**	**5**		
	Low	**Medium-Low**	**Medium**	**Medium-High**	**High**	**Total**	**Needed to reach 100**
Scale modifier	15	15	35	15	20	100	0

Risk Register: Severity Matrix



MINISTRY OF
Energy &
Water Resources
UTILISING OUR NATURAL RESOURCES

Division of Energy
Trinity Business Complex
Country Road
ST. MICHAEL

T: 535-2501/5
F: 429-7489
E: info@energy.gov.bb
W: www.energy.gov.bb