Sustainable Management and Resilient Thinking for our Energy Revolution (SMARTER)

Part I: Project Information

GEF ID
10849

Project Type
MSP

Type of Trust Fund
GET

CBIT/NGI
CBIT **No**
NGI **No**

Project Title
Sustainable Management and Resilient Thinking for our Energy Revolution (SMARTER)

Countries
Barbados

Agency(ies)
UNDP

Other Executing Partner(s)
Ministry of Energy, Small Business and Entrepreneurship (MESBE)

Executing Partner Type
Government

GEF Focal Area
Climate Change

Taxonomy
Focal Areas, Climate Change, Influencing models, Transform policy and regulatory environments, Stakeholders, Private Sector, Gender Equality, Gender results areas, Capacity, Knowledge and Research, Capacity Development, Climate Change Mitigation, Renewable Energy, Type of Engagement, Partnership, Information Dissemination, Consultation, Communications, SMEs, Civil Society, Academia, Gender Mainstreaming, Beneficiaries, Access to benefits and services

Sector
Renewable Energy

Rio Markers
Climate Change Mitigation
Climate Change Mitigation 2

Climate Change Adaptation
Climate Change Adaptation 0

Duration
48 In Months

Agency Fee($)
151,414.00

Submission Date
2/4/2022

A. Indicative Focal/Non-Focal Area Elements

Programming Directions	Trust Fund	GEF Amount($)	Co-Fin Amount($)
CCM-1-1	GET	1,593,836.00	11,160,000.00
	Total Project Cost ($)	**1,593,836.00**	**11,160,000.00**

B. Indicative Project description summary

Project Objective

To strengthen Barbados? institutional and technological capacities to transit towards a resilient, affordable and low-carbon electricity infrastructure

Project Component	Financing Type	Project Outcomes	Project Outputs	Trust Fund	GEF Amount($)	Co-Fin Amount($)

Project Component	Financing Type	Project Outcomes	Project Outputs	Trust Fund	GEF Amount($)	Co-Fin Amount($)
1. Institutional strengthening for resilient, low-emission energy planning	Technical Assistance	1.1 Government capacity for resilient, low-emission energy planning and electricity system purview has been strengthened.	1.1.1 Technical support for reviewing of relevant sector policies to identify opportunities for incorporation of climate resilience criteria and circular economy concepts, and strengthen the energy-water-agriculture-health nexus, including gender aspects. (100k$). 1.1.2 Detailing of the management framework for supervision and servicing of renewable energy systems in public sector. (50k$). 1.1.3 Technical assistance for updating of MESBE ICT systems in support of energy planning and purview, including decentralised electricity generation and storage systems. (80k$). 1.1.4 Outreach and promotional activities to public sector beneficiaries of RE systems (ministries, health,	GET	255,000.00	800,000.00

Project Component	Financing Type	Project Outcomes	Project Outputs	Trust Fund	GEF Amount($)	Co-Fin Amount($)
2. Bioenergy policy and technology	Technical Assistance	2.1 Enabling conditions for successful bioenergy deployment in Barbados have been created.	2.1.1 Biomass resource mapping covering hotel sector, wastewater plants, municipal waste, and agro-industrial residues. (90k$). 2.1.2 Preparation of national bioenergy policy including supportive studies and licensing process authorizing construction and operation of grid-connected biomass generators. (50k$). 2.1.3 Characterisation of biomass feedstock samples for energy production by qualified laboratories and institutes. (70k$). 2.1.4 Strengthening of the in-country technological basis for bioenergy development in Barbados through ?match-making? between Barbadian and foreign experts and institutes. (80k$).	GET	380,000.00	550,000.00

Project Component	Financing Type	Project Outcomes	Project Outputs	Trust Fund	GEF Amount($)	Co-Fin Amount($)
3. Preparation and investment for decentralised renewable energy power systems.	Technical Assistance	3.1 A pipeline of decentralised RE projects (including bioenergy) has been developed and put into operation.	3.1.1 Technical assistance to MESBE to accelerate RE pipeline development including authorisation of permits and licenses. (85k$). 3.1.2 Pre-feasibility studies implemented for bioenergy business cases to promote circular use of organic resources in Barbados (envisioned: sugar sector; hotels and tourism, agro-industrial residues; and wastewater). (80k$). 3.1.3 Training of bioenergy plant operators on process monitoring, safety and operational aspects, feedstock logistics and technical and financial optimization. (50k$).	GET	215,000.00	534,000.00

Project Component	Financing Type	Project Outcomes	Project Outputs	Trust Fund	GEF Amount($)	Co-Fin Amount($)
3. Preparation and investment for decentralised renewable energy power systems.	Investment	3.1 A pipeline of decentralised RE projects (including bioenergy) has been developed and put into operation.	3.1.4 Investment in resilient, decentralised RE power plants by public and private investors. (75k$). 3.1.5 Procurement and operation of first-of-a-kind biodigester power plant (100-250 kW electrical power) at a selected host institute. (400k$)	GET	475,000.00	8,100,000.00

Project Component	Financing Type	Project Outcomes	Project Outputs	Trust Fund	GEF Amount($)	Co-Fin Amount($)
4. Knowledge management, monitoring and evaluation	Technical Assistance	4.1 The Project's Knowledge Management (KM) and Monitoring & Evaluation (ME) Plans have been implemented.	4.1.1 Collation and dissemination of operational experiences, lessons learned and recommendations for value chain development. (20k$). 4.1.2 Scientific, technological, engineering, and social experiences with bioenergy development in Barbados, shared within the Caribbean region. (30k$). 4.1.3 Formalization of stakeholder agreements and delivery criteria during inception phase, periodic monitoring and reporting. (35k$). 4.1.3 Project MTR and TE carried out and findings shared with stakeholders. (38,942$).	GET	123,942.00	60,000.00
				Sub Total ($)	**1,448,942.00**	**10,044,000.00**

Project Management Cost (PMC)		
GET	144,894.00	1,116,000.00
Sub Total($)	**144,894.00**	**1,116,000.00**
Total Project Cost($)	**1,593,836.00**	**11,160,000.00**

Please provide justification

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

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Investment Mobilized	Amount($)
Recipient Country Government	Ministry of Energy, Small Business and Entrepreneurship (MESBE)	In-kind	Recurrent expenditures	1,350,000.00
Recipient Country Government	Government of Barbados	Public Investment	Investment mobilized	7,000,000.00
Beneficiaries	Bioenergy associations, sugar companies and research institutes	In-kind	Recurrent expenditures	670,000.00
Recipient Country Government	National Petroleum Corporation/Barbados National Oil Company	Loans	Investment mobilized	2,050,000.00
Civil Society Organization	Barbados Renewable Energy Association (BREA),	In-kind	Recurrent expenditures	20,000.00
Recipient Country Government	Barbados Water Authority (BWA),	In-kind	Recurrent expenditures	10,000.00
Recipient Country Government	Fair Trading Commission (FTC)	In-kind	Recurrent expenditures	10,000.00
Private Sector	Barbados Light and Power Company Limited (BLPC)	In-kind	Recurrent expenditures	10,000.00
Recipient Country Government	Barbados Agricultural Management Corporation	In-kind	Recurrent expenditures	10,000.00
Recipient Country Government	Ministry of Agriculture and Food Security	In-kind	Recurrent expenditures	10,000.00
GEF Agency	UNDP	Grant	Recurrent expenditures	20,000.00

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Investment Mobilized	Amount($)
			Total Project Cost($)	11,160,000.00

Describe how any "Investment Mobilized" was identified

- Investment by the Government of Barbados is backed by multi-year loan and grant programs including the EU-IDB Energy Smart Fund ? II. Additional debt capital is not listed here but can be provided from credit facilities (IDB and/or CDB).

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

Agency	Trust Fund	Country	Focal Area	Programming of Funds	Amount($)	Fee($)	Total($)
UNDP	GET	Barbados	Climate Change	CC STAR Allocation	1,593,836	151,414	1,745,250.00
			Total GEF Resources($)		**1,593,836.00**	**151,414.00**	**1,745,250.00**

E. Project Preparation Grant (PPG)

PPG Required **true**

PPG Amount ($)

50,000

PPG Agency Fee ($)

4,750

Agency	Trust Fund	Country	Focal Area	Programming of Funds	Amount($)	Fee($)	Total($)
UNDP	GET	Barbados	Climate Change	CC STAR Allocation	50,000	4,750	**54,750.00**
				Total Project Costs($)	**50,000.00**	**4,750.00**	**54,750.00**

Core Indicators

Indicator 6 Greenhouse Gas Emissions Mitigated

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
Expected metric tons of CO?e (direct)	213000	0	0	0
Expected metric tons of CO?e (indirect)	210000	0	0	0

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

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

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

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
Expected metric tons of CO?e (direct)	213,000			
Expected metric tons of CO?e (indirect)	210,000			
Anticipated start year of accounting	2025			
Duration of accounting	20			

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

Total Target Benefit	Energy (MJ) (At PIF)	Energy (MJ) (At CEO Endorsement)	Energy (MJ) (Achieved at MTR)	Energy (MJ) (Achieved at TE)
Target Energy Saved (MJ)	881,820,000			

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

Technology	Capacity (MW) (Expected at PIF)	Capacity (MW) (Expected at CEO Endorsement)	Capacity (MW) (Achieved at MTR)	Capacity (MW) (Achieved at TE)
Solar Photovoltaic select	7.50			
Biomass select	0.25			

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

	Number (Expected at PIF)	Number (Expected at CEO Endorsement)	Number (Achieved at MTR)	Number (Achieved at TE)
Female				
Male				
Total	0	0	0	0

Provide additional explanation on targets, other methodologies used, and other focal area specifics (i.e., Aichi targets in BD) including justification where core indicator targets are not provided

Part II. Project Justification

1a. Project Description

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

1. Barbados is the most easterly island of the Lesser Antilles in the Caribbean and became a Republic in November 2021. With about 284,000 inhabitants (2015)[1][1] on a land area of 430 km2 (166 mi2) it is densely populated (660 pp/km2). Lacking extensive natural resources, its economy is service-oriented including a developed financial sector; Barbados is a major tourism destination thanks to its splendid beaches and the safe environment for visitors.[2][2] Although it is ranked as a high-income country[3][3], Barbados faces many of the challenges typical for a Small Island Developing State (SIDS). Given its small economy and dependency on imports (including fuels), the country is exposed to global economic shocks. The country is also vulnerable to the effects of climate change, in particular flooding and wind damage; however, hurricanes are somewhat less frequent in Barbados due to its easterly location. Notably, Barbados ranks among the countries with lowest available freshwater resources per capita in the world.

2. As in most SIDS, Barbados? energy sector is characterised by a dependency on imported fossil fuels and an under-exploitation of local RE sources. Electricity generation accounts for about 50% of total fossil fuel imports (diesel and heavy fuel oil), while 33% is consumed by the transport sector.[4][4] Several thermal power plants are old and inefficient and due for replacement. The high average electricity consumption (3,655 kWh/yr per capita) and price level (approx. US$ 0.21 per kWh) undermine the competitiveness of the manufacturing and services sector and put a large burden on households? budgets, as increases in fuel costs above a reference level are passed through to the end-user under the Fuel Clause Adjustment.[5][5] Barbados has some domestic oil production by the National Petroleum Corporation (NPC) which is a fraction of the demand (less than 10%).[6][6] Fuel imports amounted to about US$ 250 million (11% of Gross Domestic Product - GDP) in 2018. The fuel bill for electricity generation alone was US$176.5 million in 2017. Due the fossil fuel share, the carbon-intensity of grid electricity is high (0.87 ton CO2eq/MWh).

3. The Government of Barbados (GOB) is well aware of the unsustainability of the country?s energy sector. In 2009, GOB and the Inter-American Development Bank (IDB) signed an agreement for developing the Sustainable Energy Framework Barbados (SEFB). By 2020, this programme is in its fourth iteration. Over the last decade, the GOB has taken very significant steps to move away from a de

facto monopoly and take more control of sector governance, including planning for resilience and reduced carbon emissions by the sector. The introduction of feed-in tariffs (FIT, 2019) the revision of Electricity Act (2013) allowing independent power production (IPP), and the preparation of an Integrated Resource and Resilience Plan (IRRP, 2021) shall guide electricity sector planning under GOB leadership.[7][7] This electricity sector reform process is not completed though.

4. Going beyond its NDC commitments, the updated Barbados National Energy Policy (BNEP 2019-2030) sets a goal of 100% RE by 2030.[8][8] The UNDP/GEF DREAM project (GEF ID 5453), which ran from 2015-2019, delivered significant contributions towards this goal.[9][9] Drawing on its robust institutions and qualified people, and with support from the international community, Barbados has embarked on an ambitious plan to introduce renewable energy (RE) generation, energy storage systems and electric mobility to replace fossil-based technologies and is recognized for its vanguard role in the region.[10][10]

Electricity sector developments

5. BLPC is one of the oldest utilities in the Caribbean. Until 2013, BLPC operations were governed by the Electric Light and Power Act (1899), under which it was granted the exclusive right to supply energy for all public and private purposes. The current license will expire in 2028.[11][11] In 2013, a new ELPA (2013-2021) came into force; it opens the market for Independent Power Producers (IPPs) while respecting the rights granted under BLPC?s licence until 2028. The GOB progressively sold its shares in the company until BLPC became 100%-owned by Emera Caribbean Inc in 2015.[12][12]

6. Tariffs, quality standards and other matter concerning the relation between BLPC and its customers, are regulated by the Fair Trading Commission (FTC) under the Utilities Regulation Act, Cap. 282. In 2018, the Ministry of Energy and Water Resources (MEWR) was created as the Government entity in charge of the sector, which in 2020 was changed into the Ministry of Energy, Small Business and Entrepreneurship (MESBE). The new ELPA created an opportunity for the GOB, private sector, and all Barbadians to become an energy producer and sell electricity to the utility (which is so far the sole off-taker).

7. In 2010 a feed-in tariff pilot was started, the Renewable Energy Rider (RER) program, which was renewed in 2014. Net billing was applied for RE systems under 3-kW; above this level, the modality was ?buy all ? sell all?. In September 2019, the FTC approved a feed-in tariff (FIT) framework for RE technologies for installations up to 1-MW. FIT tariffs are differentiated by technology and project size,

based on their levelized cost of energy (LCOE) and a multiple criteria analysis (MCA) of costs and benefits.[13][13] By October 1st, 2020, the maximum plant sizes were raised to 5-MW for solar PV and 10-MW for wind power. Under the FIT mechanism BLPC shall purchase 100% of the energy production of each RE plant for a period of 20 years under the ?buy all-sell all? modality. The FTC revises the tariffs every two years. The first FIT schedule (October 2019-December 2021) considers a cap of 32.7 MW.[14][14]

8. Since 2015, MESBE[15][15] has set steps to put the sector, including BLPC, on a pathway towards a more competitive, low-carbon electricity generation market, financially assisted by IDB, UNDP, and bilateral donors. Important milestones in the regional context include the adoption of the Caricom Energy Policy (CEP, 2013) the Caribbean Sustainable Energy Strategy and Roadmap (C-SERMS, 2015).[16][16] With support from SIDS-DOCK and UNIDO, the Caribbean Centre for Renewable Energy and Energy Efficiency (CCREEE) was legally established in 2019 as the Caricom knowledge hub for renewable energy (RE) and energy efficiency (EE), which is hosted by Barbados. The C-SERMS set regional RE targets for the RE share in electricity generation (28% by 2022 and 47% by 2027).

9. Importantly, any generator above 5-kW connected to the utility grid must apply for a licence, to be reviewed and granted by MESBE. The (generation) licensing process verifies that a project complies with all relevant regulation including the existence of a Grid Connection Agreement, Power Purchase Agreement, and General Liability Insurance. Specific terms and criteria for solar PV technology were elaborated under DREAM (GEF 5 Project) and incorporated into the licensing process. As by 2021, the licensing process for RE project developers is partly integrated in a web-based software application.

10. The draft proposals supported by the DREAM project enhanced MESBE?s insight in the fundamental challenges and political choices to be made for shaping Barbados? future electricity sector framework. These included the need to separate power generation from other utility functions: (i) grid operation, transmission and distribution); and (ii) commercialisation. Generation licences would apply to independent power producers (IPPs) and to the existing utility (BLPC). Several workshops were held and viewpoints exchanged with regional actors and experts.

11. Very challenging for GOB is to gain more control of sector planning as historically, the know-how, operational data and staff capacity has been with BPLC. The GOB had little arguments to counter BLPC?s claims concerning generation costs, grid node costs, or the claim that the grid could not handle more than 10-MW distributed power systems. Earlier grid studies by MESBE were not very successful due to a lack of input parameters and the absence of a legal obligation for BLPC to share key data. Since 2018, significant process is being made. MESBE finalised Barbados? IRRP with support from IDB, securing inputs from the utility. The study anticipates on an accelerated integration of RE sources and anticipates on increased demand by electric mobility. Negotiations concerning BLPC?s utility

license post-2028 have also started. While the capacity gap (asymmetry) between MESBE and the utility has become smaller, it remains challenging for GOB to sustain staffing and skills for sector purview, given Barbados? condition as a small economy (SIDS).

Renewable energy

12. Barbados is well endowed with RE resources, especially solar, biomass and wind.[17][17] Barbados has the highest number of solar water heaters per capita worldwide, with over 50,000 units installed in the country by national industries. Benefiting from the north-easterly trade winds, wind energy can be commercially viable. However, land is scarce given Barbados? small size and dense population. Efforts by BLPC to develop a wind farm in Lamberts (St. Lucy parish) have not prospered so far.

13. The BNEP estimates that the transition of the energy matrix requires 635 MW RE sources and 200 MW battery storage.[18][18] Several financial incentives are in place to foster investment in RE generation. The FIT targets power plants below 10-MW, while larger power plants will be developed as IPPs under tenders led by MESBE. Tax benefits for RE investors include the exemption from import duties.[19][19] Residential and commercial RE systems may benefit from a tax benefits and a one-time deduction for qualifying projects. Businesses can apply for a 10-year income tax holiday on the investment. Accelerated depreciation or ?frontloading? of FIT tariffs to improve cashflow during early project years are not foreseen, with the objective to oblige RE operators to maximise energy production over the full 20-year period.

14. In 2017, BLPC commissioned a 10 MW ground-mounted solar PV farm while about 25 MW rooftop systems are placed by households and private sector businesses.[20][20] Over 5 MW of PV systems have been installed on public buildings such as clinics, community buildings. As per BLPC information, this capacity has produced 51,909 kWh of electricity in 2019 which accounts for 5.5% of Barbados? current demand. The total RE share in electricity generation mid 2020 was about 13%.[21][21]

Bioenergy and circular economy

15. Bioenergy is a domestic resource and is expected to play a role in Barbados? energy transition to provide dispatchable power. Barbados? history is marked by sugar cane farming, which still represents most agricultural land use. The country is home to the World?s oldest rum distillery (Mount Gay Ltd). As in many Caribbean countries, the sugar industry has declined due to fierce competition on the commodity markets, combined with scarce labour force, inefficient technologies and scale

limitations.[22][22] Bagasse was used in the sugar mills for heat production. The Portvale sugar mill - the only one remaining in operation ? produces electricity from co-generation but is not connected to the main grid.

16. Sugar sector stakeholders strive at diversification, including income generation from production of biomass and biogas for the national energy sector. The public holding Barbados Agricultural Management Corporation (BAMC) owns the Portvale sugar mill. Private farmers and producers are organised in the Barbados Sugar Industry Limited (BSIL). Plans have been put forward for a large-scale switch to high fibre canes (king grass) offering higher yields than traditional sugar cane. So far, it is not demonstrated that new crops are agronomically, environmentally and economically appropriate. Moreover, a reconversion to other commodity crops is unlikely to happen as long a broader orientation on future agricultural land use in Barbados has not taken place.

17. The collection and valorisation of organic waste streams fits into a circular economy approach. Besides the sugar cane trash and stalks, significant waste flows exist in sugar processing (notably rum production), food crop residues, animal breeding, and wastewater treatment.[23][23] Significant amounts of waste are generated by Barbados? large tourism industry (food waste and sewage from hotels, restaurants and cruise ships). Informal estimates of the total biomass waste in Barbados range between 237,000 and 1.5 million tons.[24][24] Systematic mapping of biomass resources in the country is needed to assess its potential for electricity generation and biofuel production, as well as higher-value processes as in biorefineries. Household biodigester technology may prove beneficial for Barbados as an alternative for the septic tanks currently considered to protect aquifers.

18. Biogas obtained through the anaerobic digestion of organic waste is a promising technology for small-scale production of electricity and biomethane. Several stakeholders have demonstrated interest in biodigester technology for processing of wet biomass streams. A 250-kW biodigester system is installed in Saint Lucy using manure from a chicken farm.[25][25] The University of the West Indies (UWI) recently obtained a grant for a two-year research pilot through the Global Solutions Forum. The UWI is interested in the use of sargassum as an energy crop. This species has become a plague in coastal seas around Barbados due to hyper-trophication, affecting tourism and fisheries. Interest in biogas technology is also demonstrated by the recent foundation of the Barbados Biogas Association (BBA). Other interested parties are NPC and its daughter company, the Barbados National Oil Company (BNOCL).

19. The abandonment of the sugar fields has far-reaching implications for Barbados? water systems, soils, biodiversity and environmental quality. Sugar production in Barbados is part of a complex agronomical system. Sugar is traditionally rotated with food crops to balance nitrogen and nutrients, control weeds, and increase field productivity. This system has proven to function sustainably for more than two centuries despite the fresh water scarcity on the island. Now many farmers pull out of sugar

production while others leave the fields bare during rotation periods. Soil erosion and land degradation occur, exacerbated by Barbados? thin soils and propensity for erosion and sedimentation. Short-term agronomical measures include increased mechanical weeding and the use of synthetic fertilisers to compensate for nutrient loss. These practices are costly and undermine competitiveness of farms and food security. Notably, nitrate pollution has been one of the triggers for the revision of the water zoning system (2020).[26][26]

20. As a result of population growth and structural changes in the economy, Barbados must face a broader reorientation on its agricultural sector with a view on (i) land conservation, (ii) local food production, (iii) reduced labour availability for agricultural sector; (iv) land use conversion (from sugar production into non-agricultural uses including construction and tourism); and (v) search for economic diversification and job opportunities. Increased and sustainable domestic food production is receiving attention given Barbados? expenditures worth over US$300 million on food imports, affecting its commercial balance and food security. The larger share of inputs for the tourism sector being imported, domestic supplies would provide an opportunity to add value and retain a larger part of earnings in the country.

Barriers

21. Notwithstanding its significant achievements, the GOB faces a number of challenges to further increase the uptake of RE systems including bioenergy in its energy matrix, to tap into the value of domestic resources, and to transit towards a more sustainable and circular economy.

22. Electricity sector planning and governance. The electricity sector framework is in full development and important progress is reported by 2021, including the finalisation of the IRRP, the outlines for BLPC?s role and license post-2028, and ongoing negotiations to this purpose. One pending element is the definition of grid connection code ensuring that third parties are connected by BLPC within a reasonable timeframe. Neither is defined which party should bear the interconnection costs and up to which point (the ?cut?). Private investors may be reluctant to enter the RE market if confronted with high interconnection costs.

23. Importantly, the dispatch rules for IPPs must be clear and respected. Metering of delivered power should be impartial and transparent; an arbitration mechanism should be in place as the financial interests will grow with the scale of the investments. Delays and legal uncertainty can act as a deterrent for private investors. The Government does not possess all specialised skills and experience to develop a comprehensive, new licensing regime; hence technical assistance such as provided in recent years by IDB, European Union (EU) and UNDP is highly needed.

24. The GOB is responsible for the maintenance and exploitation of public buildings ranging from ministries to community and resource centres (CRCs), clinics and hospitals, schools, and the emergency and relief shelters for protection of the population in case of a major event (typically a

hurricane). Since 2017, a large number of buildings have been equipped with solar PV and battery back-up to replace or complement existing diesel power (funded by EU/IDB funded PSSEP and the UNDP/GEF DREAM project). Building staff and the Government Electrical Engineering Department (GEED), are not well prepared to take charge of this maintenance and, given the growing portfolio, an integral management framework needs to be shaped and rolled out to ensure system performance and sustainability.

25. Moreover, inter-ministerial coordination needs to be improved for mainstreaming low-carbon energy supply, resilience, and circularity principles across all relevant sectors. Information channels to assess baselines and achievements need to be enhanced; meanwhile there is still little awareness of the energy nexus with climate resilience, circular economy, agriculture, health services, and gender. Cross-sectorial analyses at the systemic level are particularly important given the need to replace fossil fuels for transport (mobility), cooking and steam production (e.g., hotel sector) by low-carbon energy carriers (fuel switches).

26. Finally, the retention of qualified staff within key public entities including MESBE?s energy division is a challenge for Barbados (as for any SIDS). This includes the specialised skills for developing ICT platforms for sector purview and planning.

27. Bioenergy policy and technology. Barbados lacks a national bioenergy policy covering aspects such as biomass resource mapping[27][27], spatial planning, siting, financial incentives, value chain development, capacity building, and more. Bio-economy and circular economy concepts provide useful guidance for policy development and structuring of value chains, including higher-value uses of biomass supplies.[28][28] Integrated physical planning, involving all stakeholders and considering all possible constraints including competing land uses and water limitations, will define the biomass potential effectively available in Barbados.

28. It is recalled that electricity generators require a licence from MESBE. This is essentially a verification and registration process, followed by the permission to install and operate the RE plant if all criteria are met. This licence system is well-established for solar PV and wind energy. However, there is no reference framework for assessing the technical, environmental, social and economic aspects of bioenergy projects, including biomass production and transport. There is little expertise of safety and occupational hazards associated with bioenergy systems and regulation is not in place. Safety guidelines for natural gas may offer Barbados a kick-start for biogas installations, but should be reviewed and adapted. Key stakeholders are the National Petroleum Corporation (NPC) and the Barbados National Standards Institution (BNSI).

29. SERMSPromising business cases for bioenergy-based electricity generation exist in Barbados based on a variety of dry and wet residue streams. Since Barbados has little experience with advanced bioenergy technology, building national capacity is critical. Bioenergy systems are complex and

comprise not only the power plant itself but also the feedstock supply chain, transport and storage facilities, the efficiency of logistics, residue management, water usage, and mitigation of local pollution and nuisance. The availability of feedstock is typically dependent on external providers and must therefore be secured. Hence, environmental and social standards have to context based further assessed.

30. The availability of fibre-rich sugar cane offers scope for co-digestion of a wide range of humid waste streams. The University of the West Indies and several other stakeholders consider biogas technology as an opportunity for Barbados. The country could benefit from biodigester technology if expert know-how is drawn into the country. Also, biomass feedstocks need to be characterised by laboratory tests and process parameters adjusted accordingly. A positive factor to strengthen the in-country knowledge base is CCREEE?s prioritization of bioenergy in the Caribbean, which can provide a platform for technology transfer and training of local technicians to become experienced biogas operators. Hands-on experience with biodigester technology is best acquired through the design, construction and operation of a fully operational demonstration plant in Barbados.

31. Delivery skills for RE project development. Various bottle-necks affect the throughput time of RE project development processes. In the first place, the authorities need sufficient staffing and tools to handle project requests. This concerns ?front-office? processes including RE licensing by MESBE and the evaluation of project applications under the FIT scheme by FTC. In the ?back-office?, staff capacity is needed for dialogue with partners including BLPC, monitoring of IRRP implementation progress, interpretation of forthcoming electricity system data, incorporation of regulatory updates into the licensing process, and more. For larger-scale projects, bidding documents must be prepared and the tender process organized and implemented. Meanwhile, operational processes and skills need to be maintained and upgraded. In response, donor-funded projects in the past established a dedicated project execution unit (PEU) within MESBE to supplement staff capacities.

32. Second, project developers in Barbados have limited resources to push forward their project portfolio and absorb the cost of site prospection, RE resource evaluation, permitting and negotiation with stakeholders. The processes for private RE project development are not yet streamlined as the market is just taking off, which increases risk profile. De-risking measures include the preparation of RE resource maps through public funding, definition of land areas for RE projects (zoning), streamlining of procedures, and development of base cases and prefeasibility studies. From this, standardised parameters can be extracted for cost benchmarking and the ex-ante calculation of incentives (including carbon credits).

33. In the third place, specific knowledge is missing within the GOB to understand and properly evaluate bioenergy projects. Alongside the formalization of a licensing scheme for dry and wet bioenergy systems, expert knowledge is required at MESBE level (this may be sourced externally). Impartial inputs are further needed for FTC to define and update the FIT tariffs and terms. Importantly, engagement with other ministries and the private sector is key to identify bioenergy business cases and opportunities for circular use of biomass waste streams. There may be a need to draw on international experts (for example through CCREEE) if local expertise is not adequate.

34. At the operational level, technicians and engineers in Barbados are not familiar with bioenergy installations. For successful operation of a biomass or biodigester power plant, operators need to be trained and certified. Such training is a key element for building a local ecosystem for bioenergy technology. Other aspects include biomass feedstock characterization; understanding of the opportunities for valorisation of residues, including non-energy uses; and the technical, environmental and cost aspects for biomass transport and logistics.

Finance

35. The transition towards a resilient, affordable and low-carbon energy sector requires substantial capital investment in RE generation, grid upgrades, increased resilience. digitalization, and energy efficiency. Precise estimates for Barbados have not been made but should be in the range US$ 1-2 billion over the next 10 years.[29][29] Several multilateral funds are active in Barbados including the EU-IDB Energy Smart Fund II, but the bulk funding must come from large public and private investors which is challenging for Barbados and other Caribbean island states, given the lack of scale and constrained lending capacity.

36. A regional approach to attract investment capital can reduce transaction costs and offer more attractive volumes for project developers, suppliers and investors, especially if procedures are harmonised. A regional investment fund in support of the energy transition could provide equity and debt capital thereby reducing financial risks including exchange rate risks. There is ample scope for de-risking of RE investments to increase their success rate, bankability and profitability. RE power plants (wind and solar) combined with battery energy storage systems (BESS) have been installed on several islands during the last 5 years.[30][30] A Technical Working Group is being established to target finance as part of the C-SERMS platform. Technical assistance from its development partners (such as UNDP, IDB and GIZ) will help Barbados to take part of this process to the best of its interests.

37. Bioenergy has a high risk profile because the technology has not been demonstrated in Barbados and the project development costs may not be recovered. The investor?s risk can be reduced through public funding of biomass resource studies and facilitating permitting and consultation processes. Additional incentives including grants and tax benefits can help mitigate upfront capital costs, moreover if the environmental benefits of organic waste processing in biomass plants, and the creation of employment along the value chain, are taking into account (i.e., monetarised). Barbados can benefit from the best practices and methodologies that are available to this purpose worldwide.

38. In summary, all types of barriers are present to a larger or lesser extent, affecting Barbados? capacity to achieve its goal to become a 100% RE country by 2030 and foster the utilization of domestic bioenergy. The barriers that can reasonably be addressed within the framework of a GEF MSP are: sector governance and energy asset management; access to (bioenergy) technology; and RE pipeline development. Transversal challenges include inter-sectorial dialogue, information, and

development of the energy nexus, in particular linked to circularity, resilience and gender. The identified barriers are summarised depicted in the following table.

Preliminary Barrier Analysis	
Policy and regulation	Asymmetries between GOB and the utility with respect to access to information affecting planning and cost optimisation (dispatch, efficiencies, operational costs).
	Arrangements for effective and transparent system operation not fully defined including grid connection code and dispatch rules.
	Scenario-based planning is needed to steer transition from centralised fossil-fuel electricity production to grid system with embedded decentralised renewable energy generators.
	Bioenergy requires feedstock typically produced by actors outside the energy sector, which urges for coordination with other sectors and holistic development planning.
	Lack of regulation or guidelines for safety and hazard mitigation for bioenergy systems.
Technology	Incipient in-country knowledge of bioenergy power systems (wet and dry biomass systems) and their integration into electric grid.
	Small market size requires careful dimensioning of power systems and ensuring availability of spare parts and skills for maintenance and servicing.
	Integration of dispatchable RE systems has not been demonstrated so far, specifically bioenergy systems and battery storage.
	Uncertainty about biomass potential and suitability of feedstock, and organisation of supply chains for dry and wet biomass streams.
	Entities with organic waste streams such as hotels, water treatment and municipal waste management companies, have little or no experience with energy technologies and linkages with energy sector are not in place.
Information	Electricity sector data is not always available or not made public by power utility, affecting optimisation of system planning and operation, and determination of tariffs and incentives.
	Data on bioenergy feedstock production and current uses are insufficient for detailed policy development and RE project planning.
	Existing information is often scattered among stakeholders and is not easily shared.

	There is no designated entity in Barbados to act as an information clearinghouse to collect and validate sector information (including data on RE systems), and to collate lessons learned and case studies for reaching out to project developers, investors and the general public.
Delivery skills and business models	Project developers face limitations (know-how, human resources, information) to deliver mature project proposals.
	Government of Barbados lacks methodologies and tools for holistic planning of land use in relation to bioenergy and transformation of sugar sector.
	An overarching management structure for RE/EE in public buildings is not in place yet.
	The ecosystem for preparation, design, operation and maintenance of bioenergy plants is incipient and trained and certified technicians are not available yet.
Finance	Private developers are unwilling or unable to assume upfront investment costs given current RE project risk profile, in particular for biomass projects.
	Capital costs for individual countries in the Caribbean are higher above business standards due to lack of project scale and volume and high transaction costs.

2) The baseline scenario and any associated baseline projects.

39. Under the baseline scenario, Barbados will continue progressing towards a more competitive and open electricity sector taking benefit from new technologies for energy generation, T&D and grid operation. The GOB (MESBE) will gradually strengthen its role to govern the sector. Notwithstanding, the transition towards a low-carbon electricity sector will unlikely meet the 2030 target if GOB is not supported by international cooperation partners, given Barbados? circumstances as a SIDS. Specific challenges requiring support include: MESBE staffing, skills and ICT infrastructure; technical backstopping during utility negotiations; technical assistance to implement the IRRP; development of sector regulation including grid code and bioenergy license process; access to new technologies including bioenergy, smart grids, energy sector digitalization, clean fuels; resilient sector development addressing key energy nexus; strengthening of RE technology ecosystems; and access to finance. The challenges are duly acknowledged in the BNEP 2019-2030 and previously by the Caricom Energy Policy (2013) and the C-SERMS (2015).

40. The prospects under the baseline scenario are affected by the impact of the COVID-19 pandemic on the national economy. Studies[31][31] reveal that COVID-19 has worsened existing financial, economic and social vulnerabilities as tourism arrivals have collapsed; unemployment, inequality and poverty levels have grown worse; and economic output (GDP) has contracted (about 10% for Barbados). It must be noted that the Caribbean has the highest GDP losses for 2020 and the third-

highest job losses worldwide. Women are disproportionally hit by the pandemic given their role as micro-entrepreneurs and family caretakers, and as workers in the tourism industry. Under these conditions, the near-term evolution of the baseline scenario is uncertain. Yet, all development partners in the region, including UNDP, are aware that a sustained programmatic approach is required to recover from the COVID-19 pandemic[32][32] and are fully committed to deliver the support needed. As related to the Barbados? energy transition this means a strong commitment to achieve, or get close to, the goal of 100% RE by 2030.

41. The proposed project ?Sustainable Management and Resilient Thinking for our Energy Revolution (SMARTER)? is designed to complement a series of baseline activities, programs and projects, including:

42. (a) Ongoing work by MESBE?s energy division to strengthen sector purview, build internal competences, invest in ICT infrastructure, and engage with public and private stakeholders. Acting as the incumbent authority, MESBE will continue to review and grant RE project license applications, monitor the implementation of the national Integrated Resource and Resilience Plan (IRRP) and prepare and supervise tendering processes for future Independent Power Producers (IPPs).

43. (b) Stakeholders in bioenergy development will continue activities to create momentum and increase in-country knowledge and competences, therewith hampered by small budgets and the absence of senior expertise and strong technology suppliers. These stakeholders include the Barbados Biogas Association (BBA), the Barbados National Oil Company (BNOCL), the Barbados Agricultural Management Corporation (BAMC), Barbados Sugar Industries Limited (BSIL), and the University of the West Indies (UWI Cave Hill Campus).

44. (c) Institutional support to MESBE is provided through IDB?s Sustainable Energy Framework Barbados (SEFB), which is in its fourth iteration.[33][33] It provides support to the GOB?s PSSEP and the ?Deployment of Cleaner Fuels and Renewable Energies Programme?. The SEFB finances consultancy services for the development of the electricity sector framework and for the design of a Sustainable Electric Mobility Policy. It also funds activities for institutional strengthening of MESBE and other sector institutions, training sessions, and workshops.

45. (d) The Sustainable Energy Investment Programme (known as the Energy Smart Fund-II) is funded by the European Union?s Caribbean Investment Facility (CIF) and the IDB, and is composed of a CIF contribution worth ?13M plus ?40M contributions from IDB, the Caribbean Development Bank (CDB) and the GOB.[34][34] It has recently been approved and will reduce Barbados? reliance on imported fossil fuels to strengthen Barbados? macroeconomic situation and contribute to local and global environmental sustainability. By 2026 the project shall have installed 11.4 MW solar PV systems.

46. The ESF-II program entails elements including: (i) promotion of RE and EE in Small and Medium Enterprises (SME), covering pre-investment studies, implementation of RE and EE projects, and

financing for EE air conditioners (A/C) for households and businesses; (ii) public sector financing to promote RE and other technologies including smart grids and energy storage; (iii) electric mobility and charging stations for GOB vehicle fleet; (iv) pre-investment studies including energy audits, hazardous material management strategies; (v) design of contract modalities for project implementation; and (vi) project development support including feasibility analysis, environmental and social assessments (ESIA), implementation schemes, and support for structuring of public-private partnerships.

47. (e) The German GIZ supports Barbados from its office in the Dominican Republic by technical studies and advice for the GOB and through its support to Caricom as its regional partner. Worthwhile mentioning is GIZ?s support to develop the C-SERMS regional strategy and a roadmap assessing climate risks in Barbados? RE sector. GIZ is also a strong partner for technology transfer to Barbados, notably biodigester technology in which Germany is a world leader.

48. (f) The C-SERMS Platform provides a framework for integrated planning among actors including: the development partner community; financial services sector; academic institutions, civil society; national and regional policy-makers, as well as institutions of the Caricom. The Platform operates on the principle of regional ownership with respect and mutual accountability among stakeholders. Four Thematic Working Groups (TWGs) will address common challenges and serve as conduits for stakeholder inputs: (i) Policy and regulation; (ii) Information and knowledge management; (iii) Capacity building and research; and (iv) Finance. The Platform is chaired by CCREEE, which is conveniently hosted by the GOB, offering opportunities to leverage technical and financial resources.

49. (g) Parallel programs in Barbados include the Residential Energy Efficiency Programme (REEP) funded by Caribbean Development Bank (CDB) loan, worth US$ 5M, and the Technical Cooperation for the Demonstration of Smart Energy Buildings, funded through a US$ 3M grant from the Republic of Korea. Both programs aim to increase awareness and adoption of EE technologies and measures in commercial and residential buildings.

50. As demonstrated above, the baseline programs and activities provide valuable technical assistance and investment support for Barbados. Yet, a series of challenges and barriers are not addressed (or not fully addressed) under the baseline. This provides the rationale for the proposed "SMARTER" project.

3) The proposed alternative scenario with a brief description of expected outcomes and components of the project.

51. The Project will pursue the following development objective: ?To strengthen Barbados? institutional and technological capacities to transit towards a resilient, affordable and low-carbon electricity infrastructure.? The Project is aligned with GEF-7 CCM Program 1 ?Promote innovation and technology transfer for energy breakthroughs?, specifically objective ?1 - De-centralised RE power with energy storage.? The Project is structured along four components which are outlined below:

Component 1. Institutional strengthening for resilient, low-emission energy planning.

Outcome 1.1 Government capacity for resilient, low-emission energy planning and electricity system purview has been strengthened (GEF: US$ 255,000; cofinance: US$ 800,000).

52. The purpose of this component is to strengthen MESBE?s capacities to lead Barbados? transition towards a low-emission, resilient, and affordable energy sector. Specifically, the GEF project will focus on: (i) mainstreaming of resilience, decarbonization, and circularity concepts into energy sector planning; (ii) strengthening of the energy-nexus with water, agriculture, and health, including gender aspects of energy planning and use; and (iii) enhancement of operational competences for RE licensing and monitoring of distributed electricity generators and (future) independent power producers. The GEF project will draw upon baseline developments including the ongoing support by the IDB (Sustainable Energy Framework for Barbados, SEFB) and the evolving electricity sector reform (e.g., recent IRRP, forthcoming utility license).

53. Technical support envisions contracting of senior RE advisory services to address GOB staffing challenges. Key tasks include support for interpretation of electricity sector needs and reviewing of sector expansion plans and budgets with a focus on resilience and decarbonization; if needed, terms of reference can include backstopping for the preparation of tender documents for RE IPPs by MESBE. The advisor will further liaise with other sectors including agriculture, water, and tourism, and with civil society to assess the energy nexus in Barbados. In follow-up on the findings of the UNDP/GEF DREAM project, the advisor will analyse and document relevant and evidence-based aspects of the energy and gender nexus in Barbados and issue recommendations for policy making and the design of activities (1.1.1).

54. The Project will further assist MESBE to detail the management scheme for public RE assets (i.e., solar PV systems on public buildings) to ensure operational performance and accountability. While government entities such as GEED can be trained to carry out O&M, alternative management models shall be investigated including outsourcing to private suppliers. A sustainable operational model covering O&M costs and insurances could be made budgetary neutral by setting aside the electricity expenditures avoided by the installed solar-PV systems. Centralised supervision can enable benchmarking, standardisation of working routines and best practices, and the design of preventive maintenance strategies. This output will closely involve the building end-users and the corresponding Government entities (1.1.2).

55. With a view on strengthening MESBE?s operational capacities, the GEF project will complement GOB funding to update and enhance available ICT infrastructure including existing electricity sector planning tools and GIS platform, and to enhance the current webpages to handle RE licensing applications by project developers. This output, which builds upon an earlier assessment (2018) to map and improve MESBE operations, is intended to secure swift processing of applications to avoid delays in RE pipeline development and keep the energy transition on track. Since the institutional framework for the electricity sector will continue to evolve during the Project?s lifetime, GEF funding will be oriented to ensure incrementality in this digitalization process (1.1.3).

56. Finally, the GEF project will continue to support MESBE in its role to mobilise civil society and liaise with private sector stakeholders, including the Barbados Renewable Energy Association (BREA) and academic and vocational education institutes in the country (e.g., University of the West Indies, and Samuel Jackman Prescod Polytechnic). In recent years, the Barbados Sustainable Energy Conference and Expo, co-funded by the UNDP/GEF DREAM Project, has become a landmark event bringing together the RE community in Barbados. Importantly, it targets schools and youngsters to create awareness of sustainability challenges in Barbados and worldwide, while promoting qualified employment in the sector. Continued GEF funding will contribute to social awareness and support the creation of a local ecosystem for sustainable energy (1.1.4).

57. The following outputs have been identified under this component:

1.1.1 Technical support for reviewing of relevant sector policies to identify opportunities for incorporation of climate resilience criteria and circular economy concepts, and strengthen the energy-water-agriculture-health nexus, including gender aspects.

1.1.2 Detailing of the management framework for supervision and servicing of renewable energy systems in public sector.

1.1.3 Technical assistance for updating of MESBE ICT systems in support of energy planning and purview, including decentralised electricity generation and storage systems. And:

1.1.4 Outreach and promotional activities to public sector beneficiaries of RE systems (ministries, health, education, sports council), private sector and residential customers.

Component 2. Bioenergy policy and technology.

Outcome 2.1 Enabling conditions for successful bioenergy deployment in Barbados have been created (GEF: US$ 380,000; cofinance: US$ 480,000).

58. The project component aims to enable Barbados to successfully exploit domestic biomass resources for energy generation and promote circularity of agricultural and other organic waste streams. Unlike wind and solar, biomass is a dispatchable energy technology and a key element in the BNEP 2019-20130 towards a 100% RE energy sector.

59. Starting point is the mapping of biomass streams in the country. This component will assist the country to complement available information, map existing biomass streams, and assess bioenergy scenarios. Cost aspects and suitability of (foreign) technologies under local conditions will be reviewed, as well as land constraints, logistics, effects on employment, and social and environmental externalities. The assessment will depart from the principles of bioeconomy and valorisation of biomass to extract high-value products where possible rather than assuming an all-energy end-use. The mapping shall include current biomass waste streams that represent an environmental liability, such as from waste water and residues from hotels and cruise ships. It will further evaluate the opportunities and constraints related to Barbados? sugar sector and issue recommendations for policy design (2.1.1).

60. Bioenergy development needs adequate policy that anticipates on land and water use aspects, organic waste management, utilization of agricultural and agro-industrial residues, opportunities for circular economy, employment and the development of a local ecosystem in support of bioenergy technology. Besides sugar cane and other energy crops, the UWI has highlighted the use of sargassum which is an invasive species in the marine environment that has turned into a plague. Regulatory aspects include safety, occupational hazards and air pollution from particle emissions. Barbados may benefit from advances in other countries concerning the treatment and innocuity of digestate (for removal of pathogens). Technical assistance to MESBE to implement the licencing process for bioenergy is instrumental to allow projects to interconnect to the grid. The Project will compile evaluation criteria and term sheets, differentiated per biomaas technology type (2.1.2).

61. The GEF Project aims to become a catalyst for biogas technology development in Barbados. In support of bioenergy policy making and resource mapping, the Project will finance the characterisation of biomass samples by specialised providers of such services. While combustion of biomass is a mature technology in the region (and has widely been applied for heat production by sugar mills), gasification and thermolysis (for dry biomass) and bio-digestion (for wet biomass) are more complex and these technologies are largely limited to industrialised countries including Germany and Austria, but also India, Brazil, and Mexico. Biodigester technology is essentially mature but requires adjustment of biochemical processes as well as material choices in accordance with local availability and climate conditions (2.1.3).

62. To ensure technical availability, a local or regional ecosystem should be created offering design skills, maintenance and spare parts, and laboratory services. Rather than starting from scratch, the GEF project aims to tap into the global resource base by ?match-making? of Barbadian stakeholders and foreign knowledge institutes and technology suppliers. Local stakeholders include UWI, BBA, and BNOCL. CCREEE?s presence in Barbados can be a valuable asset to build synergies as bioenergy is among its technology priorities (with support from UNIDO, Germany and Austria) (2.1.4).

63. By mobilising local and foreign expertise, the GEF Project will issue a call for the design of a pilot-scale biodigester plant adapted to the local circumstances, including biomass feedstock, material choices, digester size, and technological complexity and cost level. The pilot-scale biodigester will produce biogas for heat self-supply and electricity connected to the distribution grid (2.1.5). After a selection of business cases and interest shown by local counterparts, the final design will be engineered in full detail in preparation of procurement (see output 3.1.5).

64. The following outputs are proposed under this component:

2.1.1 Biomass resource mapping covering hotel sector, wastewater plants, municipal waste, and agro-industrial residues.

2.1.2 Preparation of national bioenergy policy including supportive studies and licensing process authorizing construction and operation of grid-connected biomass generators.

2.1.3 Characterisation of biomass feedstock samples for energy production by qualified laboratories and institutes.

2.1.4 Strengthening of the in-country technological basis for bioenergy development in Barbados through ?match-making? between Barbadian and foreign experts and institutes. And:

2.1.5 Detailed design and engineering studies for pilot-scale biodigester power plant for appropriately chosen biomass feedstock.

Component 3. Preparation and investment for decentralised renewable energy power systems.

Outcome 3.1 A pipeline of decentralised RE projects (including bioenergy) has been developed and put into operation (GEF: US$ 215,000 (TA) + US$ 475,000 (INV); cofinance: US$ 7,300,000).

65. The objective of this component is to assist the GOB to accelerate RE pipeline development towards the national goal to reach a 100% RE matrix by 2030. To this purpose, the Project will assist MESBE to ensure timely processing of RE licensing applications. The Project team will further liaise between RE project stakeholders, MESBE and other relevant authorities to identify bottle-necks during project development to ensure a due diligence process is followed.

66. As a template for project developers, the GEF project will carry out a series of pre-feasibility studies for relevant RE project cases, focussing on bioenergy power systems. These case studies will help project proponents to develop bankable proposals compliant with applicable regulation and safeguards and eligible for the electricity generation licence. Identified business cases that may be developed under the Project?s time horizon include among others sugar cane co-generation, biogas generation from wastewater, and small-scale biodigesters in the hotel sector. The PPG will further analyse potential business cases in engagement with national stakeholders (3.1.2).

67. In support of bioenergy power plants in Barbados, the Project will offer training of (candidate) operators and technicians in collaboration with national training institutes and technology suppliers. Business managers will need to be trained on operational aspects including feedstock logistics, compliance with safety procedures and regulation, and financial aspects of plant operation. UNDP will strive at enhancing impact by mobilising its partners to build human resources at the regional scale. (3.1.3).

68. The RE project pipeline shall result in investment in grid-connected power systems. The GEF project will focus on smaller systems (500 kW-10MW), which are considered distributed generators and are eligible for the FIT. Some GEF funding is available for co-investment in public RE systems to complement cofinance resources. Opportunities will be sought to use GEF funds for highlighting a relevant energy nexus and make the difference enabling posterior replication of a given business case (3.1.4).

69. GEF funding will be available for procurement of a biodigester pilot plant in the range of 100-250 kW electric capacity. This size is deemed appropriate to obtain useful results while keeping feedstock needs within reasonable limits. A 250-kW commercial system based on advanced technology may cost US$ 1.5 million in Europe but in a tropical climate costs are expectedly lower. Since GEF funding

alone will likely be insufficient to cover all capital expenditures, a cost-sharing agreement is sought. Technological choices and opportunities for co-funding will be assessed with national stakeholders during the PPG phase.

70. The Project team will invite international biogas experts and national stakeholders to execute a test programme to evaluate operational conditions and design parameters, and gradually work towards commercial exploitation. The Project will seek synergies with agencies involved in biogas in the Caribbean, notably CCREEE, GIZ and UNIDO. Key national partners including UWI, BNOCL, BAMC, BSIL, and BBA. Among other options, the Hospitality Institute at the Barbados Community College has been identified as a suitable pilot location as it is owned by the GOB and has a steady supply of organic waste. Experiences from this pilot will be used to update the bioenergy licencing terms. The assessment of financial parameters will serve as input for adjusting the FIT for biogas installations (3.1.5).

71. The following outputs are foreseen under this component:

3.1.1 Technical assistance to MESBE to accelerate RE pipeline development including authorisation of permits and licenses.

3.1.2 Pre-feasibility studies implemented for bioenergy business cases to promote circular use of organic resources in Barbados (envisioned: sugar sector; hotels and tourism, agro-industrial residues; and wastewater).

3.1.3 Training of bioenergy plant operators on process monitoring, safety and operational aspects, feedstock logistics and technical and financial optimization.

3.1.4 (INV) Investment in resilient, decentralised RE power plants by public and private investors. And:

3.1.5 (INV) Procurement and operation of first-of-a-kind biodigester power plant (100-250 kW electrical power) at a selected host institute.

Component 4. Knowledge management, monitoring and evaluation.

Outcome 4.1 The Project's Knowledge Management (KM) and Monitoring & Evaluation (ME) Plans have been implemented (GEF: US$ 123,942; cofinance: US$ 60,000).

72. This project component will establish the Project?s knowledge management framework (KM) and assist the GOB in establishing project oversight and monitoring systems, including the Environmental and Social Management Framework (ESMF) and resulting Management Plans (if required), the Gender Action Plan (GAP), the Mid-Term Review (MTR), and the GEF Terminal Evaluation (TE). The KM framework will define aspects such as: capture of lessons learnt; access to Project results by external

stakeholders; strategies for transfer of knowledge and tools; project exit strategy; and the identification of gaps in the stakeholder engagement, in particular concerning vulnerable people and informal groups. Specific outputs under the KM include the collation and dissemination of lessons learned (4.1.1) and contributions to the regional and global peer community and knowledge base (4.1.2).

73. Output (4.1.3) will assist MESBE during the start-up phase of the Project to operationalise management tools including the M&E Plan, project Risk Log, preparation of the first Annual Work Plan, streamlining with GOB procedures, documenting of processes in a Project Operations Manual (POM), and finalisation of terms of reference for project staff and consultancies. This support shall prevent potential start-up delays and keep the project on track.

74. This component further encompasses preparation and implementation of the Midterm Review (MTR) and GEF Terminal Evaluation (TE). While not mandatory, an MTR process is deemed appropriate to corroborate adaptive management decisions and strengthen coordination with parallel initiatives. The MTR and TE will be carried out by a team of independent national and international consultants (4.1.4).

75. The following outputs have been identified:

4.1.1 Collation and dissemination of operational experiences, lessons learned and recommendations for value chain development.

4.1.2 Scientific, technological, engineering, and social experiences with bioenergy development in Barbados, shared nationally and within the Caribbean region.

4.1.3 Formalization of stakeholder agreements and delivery criteria during inception phase, periodic monitoring and reporting. And:

4.1.4 Project MTR and TE carried out and findings shared with stakeholders.

4) Alignment with GEF focal area and/or Impact Program strategies.

76. The proposed initiative is aligned with the GEF-7 Climate Change focal area strategy, specifically Objective 1 ? Promote innovation and technology transfer for sustainable energy breakthroughs. Key entry point is 1.1 ? Decentralised renewable power with energy storage. The Project will support Barbados in its effort to transform its electricity sector towards 100% RE and carbon neutrality by 2030 as outlined in the BNEP 2019-2030. Dispatchable generating capacity based on renewable biomass resources, energy storage and intelligent grids are indispensable for attaining this goal. The Project will be instrumental for Barbados to master new technologies (in particular bioenergy technology, smart grids and information and communications technology systems ? ICT) necessary for successful deployment.

77. The Project capitalises on GEF?s comparative advantage to enhance enabling environments and reduce RE project?s risk profiles.[35][35] Private sector equity, alongside committed bilateral and multilateral grants and lending, is sought for investment in the electricity infrastructure, with a focus on national participation as prioritised in the BNEP. The conversion of Barbados? sugar sector is a national priority offering opportunities for the introduction of sustainable and climate-smart land management practices. The Project will make a contribution by introducing the concepts of bio-economy in Barbados in a context of water, soil, and land area constraints. As such, the Project is supportive to the objectives of the GEF-7 Impact Program ? Food Systems, Land Use and Restoration. Also, the mapping of biomass waste streams with a view on their valorisation for energy generation and other purposes, fits in this approach.[36][36]

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

78. The Project builds upon a set of baseline programs, which demonstrate GOB ownership as well as the sustained support by international agencies including the EU and the IDB. (see ?45-?52). UNDP, with GEF-5 support, has contributed to develop the energy-resilience nexus and is committed to continue support to the GOB with the present SMARTER proposal. Starting in 2009, the GOB aims at achieving 100% RE by 2030, which will require a concerted effort by all partners. GEF grant funding will enable GOB to develop a number of actions that are not covered by the concessional loans under the baseline. Moreover, being a SIDS, Barbados faces specific challenges affecting its capacity to undertake the energy transition by itself, notably its constrained human resources, debt position and small market size. GEF funding to strengthen MESBE is expected to make the difference here to ensure swift project appreciation while respecting a due diligence process in compliance with all identified safeguards and best practices. This approach will strengthen Barbados? position as a landmark for the energy transition and create an example to follow for the Caribbean community.

79. Project component 1 seeks to strengthen GOB capacities to lead the energy transition. GEF funding is requested to enhance MESBE?s delivery capacities and upgrade ICT infrastructure and skills (delivery skills) for sector planning and handling of RE project applications. GEF funding is expected to reduce the throughput time of RE investment proposals under the baseline, thereby accelerating the uptake of RE capacity. GEF incremental action is further required to help GOB to extend energy and resilience concepts to sectors beyond MESBE?s mandate, in the understanding that cross-sectorial coordination is still challenging in Barbados. In the absence of GEF funding, this stepping-up is unlikely to happen.

80. Project component 2 aims to enable Barbados to develop, operate and maintain bioenergy projects and promote the circular use of organic waste streams. The GEF project shall enable Barbados to master bioenergy technology and build a supportive ecosystem, which is relevant both from an energy and environmental perspective, with cross-linkages with the tourism (waste management) and agriculture (sugar cane and food production) nexus. The baseline program does not provide funding for technology transfer and the GEF SMARTER project is designed to fill this void. National entities

including BBA and UWI bring in in-kind resources including staffing and office facilities. Yet, bioenergy is receiving attention in the region (e.g., by GIZ and CCREEE). UNDP is committed to build synergies and potentially, leverage additional funding (possibly even co-funding) during the PPG phase.[37][37]

81. Project component 3 is aimed at RE pipeline development and demonstration of bioenergy (biodigester) technology. GEF incremental action will address delivery barriers related to capacity constraints for RE project licensing within MESBE. In response, public and private investment (cofinance) is expected to be mobilised. GEF support further entails a set of studies into bioenergy business cases, which contribute to de-risking project development. Bioenergy operational risks are mitigated by providing training to plant operators and managers. In the absence of a developed biomass energy sector in Barbados, these activities would not take place under the baseline. As such, GEF grant funding is an enabling factor for the GOB to build momentum for dispatchable bioenergy systems. In the same tenor, GEF grant funding is allocated for procurement of a first biodigester power plant interconnected to the grid. Baseline contributions are expected from the host institute and partners but clearly, in the absence of GEF funding, private project developers tend to look into solar PV and wind energy technology currently have a lower risk profile. Successful demonstration of the technology, plus the adoption of a bioenergy policy including linkages to waste management and circular economy approaches, need to be in place to provide a robust environment for bioenergy upscaling in Barbados. The GEF project is designed to build these conditions.

82. Finally, UNDP will provide a cash contribution for project knowledge management and monitoring.

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

83. The Project will deliver global environmental benefits by reducing national GHG emissions from the energy sector compared to the business-as-usual scenario.

84. (i) The Project will directly support the implementation of about 7.5-MW RE projects, for which co-finance is confirmed by GOB. Based on an average energy yield of 1,533 MWh per MW installed[38][38], the total estimated energy production is about 11,500 MWh/yr. The associated annual GHG reductions by replacing thermal-based grid electricity is 10,060 tCO2eq/yr. Over the 20-year lifetime of the systems, the accumulated energy yield is 229,950 MWh and associated GHG reductions are 201,206 ton CO2eq.

85. For the biogas plant, a capacity of 250-kW and 6,000 operating hours would deliver an energy yield of 15,000 MWh and GHG emission reduction of 12,000 ton CO2eq over the expected 10-year lifetime by off-setting fossil-based grid electricity. (This estimate does not consider the GHG benefits (positive) from uncontrolled organic waste under the baseline; nor GHG impact (negative) caused by biomass transport to feed the bioenergy plant). Then, the direct impact over lifetime due to investment under the Project (GEF funding and cofinance) is: (a) energy production 245,000 MWh and (b) GHG emission reduction 213 kton CO2eq.

86. Indirect benefits are expected from the contribution of the GEF Project to bioenergy market development. Acknowledging the BNEP ambition level, it is conservatively assumed that a total of 20 MW grid-connect biomass is brought online post-project (between 2025 and 2029). Assuming 6,000 operating hours per year, total annual energy production would be around 120,000 MWh/yr and associated GHG emission reductions 105 kton CO2/yr. Assuming a 10-year project impact horizon and a GEF causality factor of 20%, the indirect GHG emission reductions attributable to the GEF project, are of the order of 210 kton CO2eq.

87. A more detailed analysis will be prepared during the PPG. The cost-effectiveness of the Project in terms of direct GHG emission reductions, per invested US$ from the GEF, is 7.4 US$/tCO2eq. If indirect GHG emission reductions are taken into account, cost-effectiveness is 3.7 US$/tCO2eq. The direct investments in RE capacity translate into avoided fossil fuel expenditures to the tune of US$ 2.0 million for Barbados? economy annually.[39][39]

7) Innovation, sustainability and potential for scaling up.

88. The Project is innovative for Barbados as it introduces dispatchable bioenergy (notably biodigesters), and information systems for supervision and monitoring distributed electricity generators. Such technological step-up is instrumental for Barbados to transit towards a 100% RE electricity sector by 2030. Barbados can draw on experiences in other countries with high penetration levels of RE generation, Alongside technological aspects to be mastered, business models need to be finetuned to enable sustainable operation. The GEF project further anticipates on circular approaches to biomass valorisation (bioeconomy principles) and strengthening of the integrated nexus energy with agriculture, water and waste management, among others.

89. A decentralised electricity sector brings along a need to collect data for grid operation and settlement of transactions. New opportunities are created for end-users to become ?prosumers? who self-generate and manage energy consumption individually or as part of a smart grid system. Barbados can benefit from its advanced ICT and financial sector to build the required business infrastructure, including for example the use of blockchain technology and other digitalization solutions that will be asses by this project. As such, Barbados? energy transition may bring along new opportunities for economic development through business to business (B2B) services, ICT systems and high-quality job creation in general. Smart energy management solutions are innovative for Barbados and have the potential to induce substantial energy savings and emission reductions through optimisation of operations and behavioural changes.

90. Sustainability of the outcomes of the SMARTER project is deemed highly probably given the strong baseline initiatives and MESBE?s increasing capacity to lead the electricity sector, supported by several multi- and bilateral agencies. Policy instruments, regulation, data collection, and supervision tools will strengthen GOB?s capacity to take control of sector planning, increase cost-efficiency and reduce dependency on fossil fuels. RE systems installed in recent years are operating satisfactorily. Management and maintenance challenges are directly addressed by the proposed SMARTER project to enhance sustainability for existing and future installations and improve technical performance.

91. Challenging for long-term sustainability is the overall cost level of a future, decentralised electricity sector. A recent assessment by the FTC demonstrates that the costs of the FIT scheme are lower than continuation of thermal power. Notwithstanding, energy will continue to make up a substantial part of national GDP and securing financing for investment in the energy transition is challenging given the higher upfront capital costs (CAPEX) of RE technologies. The FTC also highlighted the importance to assure affordability of grid electricity for low-income, vulnerable citizens in the future. With a view on long-term environmental and social sustainability, project activities will pay attention to the social impact of RE systems including opportunities for employment creation along the value chain (bioenergy production, system operation, degitalization solutions) protection of sensitive areas, and opportunities to strengthen the position of women, including access to energy and participation in decision-making processes and consultations.

92. The GOB licencing process, under MESBE?s mandate, shall ensure technical, economic, social and environmental sustainability of proposed RE generators. The GEF project will provide knowledge, data, and criteria to deliver an adequate licencing regime for bioenergy systems. The Project will draw in experiences, technical standards, guidelines and best practices from other countries to be adapted to the local context. Given the incipient status of biodigester technology in the country, the long-term feasibility of such systems cannot be fully guaranteed. However, the Project will determine the boundary conditions for sustainable operation and ensure a due diligence process. The presence of capable stakeholders including CCREEE and UWI are enabling factors for building a robust bioenergy value chain in Barbados.

93. The Project seeks to create enabling conditions for upscaling of investment in RE. Investment will increasingly rely on private stakeholders (including the utility BLPC) to meet the established BNEP target. The investment potential in Barbados is demonstrated by the volume of loan instruments being negotiated by the GOB to expand RE capacity in the country. Studies underpinning the BNEP indicate that the 100% goal is feasible, with an indicative total installed capacity of 685MW RE and 200 MW battery storage. Given the high cost of energy in the country, investment in energy management and EE by households and SME is financially rewarding.

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[1] Source: UN Stats. https://unstats.un.org/unsd/environment/envpdf/Country_Snapshots_Dec_2016/Barbados.pdf

[2] Over 1 million person-visit days annually. Source: Barbados SNC, p.13 (2018).

[3] Barbados? GDP in 2021 estimated at US$16,100 per capita. Source: https://www.statista.com/statistics/533707/gross-domestic-product-gdp-per-capita-in-barbados/

[4] Barbados National Energy Policy 2019 ? 2030, Government of Barbados (2018).

[5] See: https://www.blpc.com.bb/index.php/customer-care/fuel-clause-adjustment. Note that lower-income households benefit from a ?lifeline tariff? up to 150 kWh per month.

[6] Inter-American Development Bank (IADB). 2016. "Achieving Sustainable Energy in Barbados: Energy

Dossier." IADB. August. Accessed April 25, 2019 (https://publications.iadb.org/en/publication/12572/achieving-sustainable-energy-barbados-energy-dossier).

[7] Funded under IDB operation ATN/KK-17697-BA, March 2020.

[8] Barbados National Energy Policy, updated 2019. The milestones and specific targets are as follows: Fossil fuel reduction: 49% (2023) and 100% (2030). Increase in renewable energy: 52% (2023) and 100% (2030). See: http://energy.gov.bb/web/national-energy-policy-for-barbados-2019-2030.

[9] Project ?Disaster Risk and Energy Access Management (DREAM)? GEF ID 5454, CEO Endorsement April 14, 2015, Project Closure December 21, 2019. The Terminal Evaluation was submitted to GOB and UNDP August 31, 2020.

[10] See Barbados? Prime Minister Mia Mottley?s speech at the UN General Assembly: https://www.unep.org/news-and-stories/story/barbados-pm-mottley-leads-charge-against-climate-change

[11] The Electric Light and Power Act (1899-5), Cap. 278 came into force on December 8, 1899. The Act?s Third Schedule extended BLPC?s license period by 42 years from August 1, 1986 to July 31, 2028.

[12] See: https://www.emera.com/companies/regulated-electric/emera-caribbean

[13] 38 See: https://www.ftc.gov.bb/index.php?option=com_content&task=view&id=370

[14] See: https://www.ftc.gov.bb/library/2020-09-29_commission_decision_blandp_feed-in-tariff_1-10MW.pdf

[15] Note: MESBE is used in this PIF as a placeholder for MESBE, its predecessor (MEWR) and the previous Division of Energy and Telecommunications (DoET) under the Prime Minister?s Office.

[16] Developed with support from the Worldwatch Institute, GIZ, and IDB (2015).

[17] Small hydropower is not an option for Barbados given the absence of significant rivers and brooks.

[18] As follows: (1) centralised PV farms: 205 MW; (2) distributed PV: 105 MW; (3) onshore wind turbines: 150 MW; (4) offshore wind farms: 150 MW; (5) biomass and waste-to-energy: 15 MW; (6) centralised storage: 132 MW; and (7) distributed storage: 68 MW.

[19] Source: BRA.

[20] Presently, there are 1,923 distributed renewable energy systems (primarily solar PV) selling electricity to the public grid and to date the BLPC has facilitated 33 MW of installed capacity of renewable energy to the grid, of which 10 MW is from the BLPC?s solar photovoltaic (PV) farm.

[21] Source: DREAM Project Terminal Evaluation, 2020.

[22] Reportedly, sugar production has fallen from over 200,000 tonnes to 7,000 tonnes annually by 2016. The decline was accelerated by the ending of the preferential treatment of Caribbean nations by Europe (1975 Lom? Convention). During the phasing out period (2009-2015), revenues drastically decreased and, in many cases, fell below the cost of production. This has led to subsidisation of the sector by the Barbados Government (estimated above US$25M annually) and a significant decline in local sugar production.

[23] Two wastewater treatment plants are operational in Barbados.

[24] https://barbadostoday.bb/2019/05/17/wasted-energy-potential-expert/

[25] See, for example: https://www.barbadosadvocate.com/news/shift-renewable-energy

[26] See: Green Paper on the 2020 Water Protection and Land Use Zoning Policy, proposed by the Ministry of Energy and Water Resources in collaboration with the Barbados Water Authority, Barbados, 2020. The current zoning system was created in 1963.

[27] An initial exploration of biomass potential in Barbados can be found in: ?Preliminary Assessment of Bioenergy Production in the Caribbean?, by Danielle Evanson, UNDP, Barbados and the OECS, 2009.

[28] See for reference, for example: Gomez San Juan, M., Bogdanski, A., Dubois, O. 2019. Towards Sustainable Bioeconomy ? Lessons learned from case studies. Rome, FAO, 132 pp. License: CC BY-NC-SA 3.0 IGO. (http://www.fao.org/3/ca4352en/ca4352en.pdf).

[29] The IDB has provided an estimate for the combined CARICOM countries, amounting to US$ 10.9 bn over a 10-year period, of which US$ 3.3 bn in RE generation and US$ 4.1 bn in system resilience. The economic benefits (net present value) over 20 years were calculated at US$ 16.1 bn (2018 estimate). Source: Sustainable Energy Paths for the Caribbean, Malaika Masson e.a., IDB (2020), p.12-13.

[30] Including Jamaica, St. Vincent and the Grenadines, St. Eustatius, Bonaire, and Martinique.

[31] See, for example: (1) https://www.un.org/development/desa/dspd/wp-content/uploads/sites/22/2021/05/ NURSE_Presentation.pdf; and (2) https://publications.iadb.org/publications/english/document/Caribbean-Quarterly-Bulletin-Volume-10-Issue-1-May-2021.pdf

[32] Coined as ?building back better? or ?building forward better?.

[33] See: https://www.iadb.org/en/news/idb-supports-modernization-barbados-regulatory-framework

[34] See: https://www.eu-cif.eu/en/news/european-union-and-inter-american-development-bank-sign-two-contracts-support-caribbean-partner

[35] GEF Programming Directions par. 121.

[36] Ibidem, par. 163.

[37] Among other options, the C-SERMS Platform Thematic Working Groups on Finance and Technology may serve as a conduit to leverage resources and address technology transfer in a regional context.

[38] Source: Data provided by GEF-5 DREAM project. Typical daily energy production (solar PV) 4.2 kWh/kWp. Grid carbon intensity 0.87 kg CO2/kWh. A baseline shift is likely to occur due to the increased share of RE generation in the energy mix. The PPG will aim to make a prediction of the growth of RE capacity during the Project?s impact horizon.

[39] Annual energy production of 11,500 MWh (cofinance solar PV) plus 1,500 MWh (biogas plant), at a reference cost of 150 US$ per MWh. At November 2021 oil and gas prices, annual savings for the economy would be twice as high.

1b. Project Map and Coordinates

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

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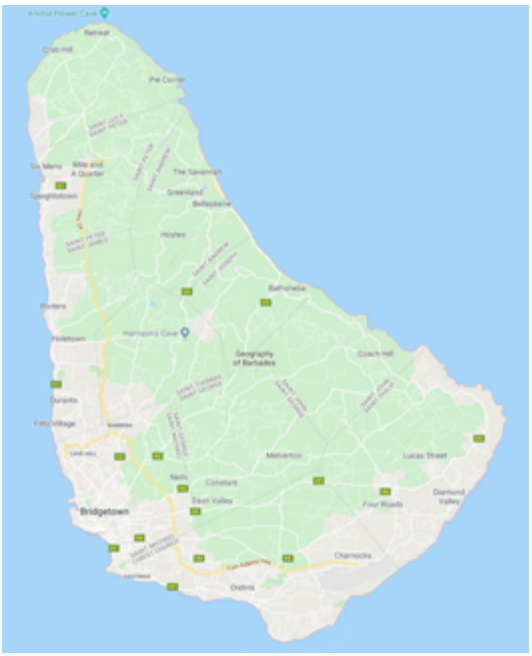
Please provide geo-referenced information and map where the project interventions will take place.

1. The Project?s intervention area in principle covers the whole mainland of Barbados which is situated within a rectangle with coordinates (13.33 N, -59.66W; 13.04N, 59.42W). Barbados is located in the Caribbean in the Western Hemisphere, North of the Equator.



Map of Barbados (Source: Google Maps)

2. Stakeholders

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

Indigenous Peoples and Local Communities

Civil Society Organizations Yes

Private Sector Entities Yes

If none of the above, please explain why:

1. In1. The table below identifies relevant stakeholders and identifies their role as a partner or beneficiary. The Project will be implemented by the MESBE under National Implementation Modality (NIM). Engagement will continue during PPG for further problem tree development as well as consultation and validation of the final Project Design. The Project will take benefit from formal consultation mechanisms as exist is Barbados.

Stakeholder	Role in the project
Ministry of Energy, Small Business and Entrepreneurship (MESBE)	MESBE will be the Project?s Implementing Partner. This includes activities such as overall planning and strategy, coordination with stakeholders, procurement of goods and services, execution of activities, M&E.

Ministry of Transport, Works and Water Resources (MTWW)	MTWW has responsibility for the maintenance of government-owned buildings, lands and roadways. The Government Electrical Engineering Department (GEED) falls under their purview. MTWW provides engineering designs and project management services in building and construction.
Government Electrical Engineering Department (GEED)	GEED is responsible for design approvals and inspections of all RE installations in Barbados to ensure safety and compliant with relevant codes and standards. GEED also maintains electrical systems in government owned buildings, where PV systems have been installed.
Ministry of Environment and National Beautification (MENB)	MENB has the overall responsibility for environment impact in Barbados, which is a key aspect to be considered in bioenergy feasibility studies. The Environmental Protection Department (EPD) and the Sanitation Services Association (SSA) fall under their purview.
Fair Trade Commission (FTC)	FTC is the economic regulator of the incumbent utility, responsible for setting tariffs and rates of RE electricity including bioenergy technology. FTC is further responsible for consumer protection and rights.
Barbados Light and Power Co. Ltd (BLPC)	BLPC is the incumbent utility, owner and operator of the electricity grid in Barbados and acting as the electricity system operator. BLPC is a key stakeholder in new generation technologies, policies and procedures being introduced.
Barbados National Standards Institute (BNSI)	The BNSI sets and regulates the standards in Barbados. It is an important stakeholders for setting the standards for biomass and biofuels.
Barbados National Oil Company (BNOCL)	BNOCL is responsible for all fuel imports into Barbados. It is envisaged that biofuels will eventually replace fossil fuel as Barbados strives to become 100% fossil fuel free and as such the BNOCL would be required to adapt.
Ministry of Agriculture and Food Security (MAFS)	The MAFS is responsible for the agricultural sector and agricultural lands and is therefore an important stakeholder in the development of the bioenergy sector. MAFS? input is relevant and necessary in the development of policy and regulations as well as the locations for bioenergy production.
Barbados Agricultural Management Corporation (BAMC)	BAMC falls under the purview of the MAFS and is responsible for the management and commercialization of the products produced by the proponents of the agricultural sector. Ensuring feasible business cases in the bioenergy field is necessary for sustainability of the sector.
Barbados Sugar Industry Limited (BSIL)	BSIL has proposed a Biomass to Energy Project to valorise sugar cane biomass and create new revenues for the industry. Involvement of RE project developers will contribute to generate momentum for bioenergy in Barbados.
University of the West Indies (UWI)	The UWI is currently carrying out research into various biofuels. Their expertise can support the project in terms of analysis and R&D that will be required in the pre-feasibility studies and pilot.
Barbados Renewable Energy Association (BREA)	BREA is a CSO which represents RE private sector stakeholders in Barbados and is an appropriate conduit to mobilise its members, as well as for outreach, consultation, and promotional activities by the Project.
Barbados Biogas Association (BBA)	BBA is a CSO founded with the objective to promote the development of a biogas sector in Barbados. It is instrumental in improving communication between the public and private sectors.

In addition, provide indicative information on how stakeholders, including civil society and indigenous peoples, will be engaged in the project preparation, and their respective roles and means of engagement

3. Gender Equality and Women's Empowerment

Briefly include below any gender dimensions relevant to the project, and any plans to address gender in project design (e.g. gender analysis).

1. Economically, women and youth face structural inequalities related to access to capital and other resources, and the persistent gender pay gaps and highly unequal distribution of unpaid care work . This inequality, and the region?s heterogeneity, are reflected in Barbados ranking 56 of 162 countries in the Gender Inequality Index. Barbados scored 7th out of 156 countries for Gender based Economic Participation and Opportunity second only behind the Bahamas in the entire LAC region. 1. The Project will seek gender equality with respect to participation in decentralised RE project development and ownership. Also, control of women over biomass waste and agricultural residues may be relevant, especially in relation to smallholder families. While access to electricity services is virtually 100% in Barbados, the evolution of the electricity tariff deserves further analysis to ensure inclusiveness and gender equity as already highlighted in the BNEP. Finally, RE projects receiving technical assistance from the GEF project will be selected based on transparent criteria, among others to ensure equitable benefits in terms of geographic location and type of beneficiaries.

Potential gender gaps and corresponding actions will be further assessed during the PPG with a detailed gender assessment and the definition of a Gender Action Plan. The gender analysis will undertake an initial screening of the state of art of gender considerations in the sector and point out specific outputs and activities needed to 1. gather and identify the basic data on gender in the bioenergy sector and 2. Define key strategic activities that will place woman as strategic agents of change and not only beneficiaries of project activities

2. Given the lack of reliable and updated data on gender and bioenergy sector (and the energy sector in general) in Barbados, the project has defined under component 1 - Institutional strengthening for resilient, low-emission energy planning ? a specific output focused on reviewing relevant sector policies to identify opportunities for incorporation of gender aspects in the integration and strengthening the energy-water-agriculture-health nexus in the Bioenergy sector. This upstream activity will implement a focused assessment to define policy actions to tackle gender gaps in access to and control over natural resources aiming to increase women?s participation and decision-making and amplify socio-economic benefits in the different sectors interrelated to Bioenergy. A consultive approach will be thoroughly applied as social, cultural and gender issues could adversely affect the adoption of

centralised and decentralised RE systems by the project (identified as a moderate risk), a well-known problem in many countries often referred to as the ?not in my backyard? (NIMBY) syndrome.

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

closing gender gaps in access to and control over natural resources; Yes

improving women's participation and decision-making; and/or Yes

generating socio-economic benefits or services for women. Yes

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

Yes

4. Private sector engagement

Will there be private sector engagement in the project?

Yes

Please briefly explain the rationale behind your answer.

1. The Project will engage with entrepreneurs including private companies, as well as mixed-capital and public sector enterprises. An important actor is the electric utility BLPC, which is privately owned (Emera Inc.). Other private companies include RE project developers and investors, owners of biomass waste material including agro-industries and the tourism sector (restaurants, hotels, resorts and cruise ships). The Project seeks ? in collaboration with these actors - to enhance momentum in the market, accelerate the mobilisation of investment capital and reduce the throughput time of RE projects towards completion.

5. Risks to Achieving Project Objectives

Indicate risks, including climate change, potential social and environmental risks that might prevent the Project objectives from being achieved, and, if possible, propose measures that address these risks to be further developed during the Project design (table format acceptable)

1. The Project is subject to a number of risks as described in the following table. External factors in particular related to policy, streamlining of RE project processes, and investors? appetite, are beyond direct control of the Project. By consequence, the attainment of the overall goal may become delayed and the envisioned Project outcomes may not be fully and timely delivered. Social, gender and environmental aspects exist but are not expected to translate into significant risks if due diligence procedures are followed throughout the Project. The overall risk profile of the Project is therefore assessed as moderate. Related to social and environmental risks (safeguards), the project has a range of potential moderate risks that require further assessment during PPG, and collectively make the project Substantial Risk at this early stage. During PPG tadgeted analysis will be undertaken to define a series of risk management plans, according to the final design of the project activities.

Table of Identified Risks at PIF Stage

Description	Type of Risk	Risk Level		Mitigation Measures
		Probability	Impact	
1. The establishment of a conducive sector framework for decentralised RE power generation would be delayed.	Low (Governance and public policy)	2	3	Changes in political context or priorities cannot be excluded and are generally beyond control of a GEF project. However, Barbados? policy framework towards a low-emission, sustainable electricity sector is well-established (with support from the IDB since 2009) and significant progress is being made towards sector liberalisation and strengthening GOB governance. Multi- and bilateral technical assistance and investment programmes will accompany the GOB over the next years. As such, a move away from the established policy seems highly unlikely. Notwithstanding, Government capacities are limited and political processes and consensus building may take more time than anticipated. Immediate issues, social demands and economic shocks triggered by the COVID-19 pandemic may absorb Government capacity in detriment of the energy agenda. As a result, Project progress may become delayed. This risk is partly mitigated in the Project design as most activities are positioned at a technical rather than political level and can be completed awaiting formal Cabinet decisions.

Table of Identified Risks at PIF Stage				
Description	Type of Risk	Risk Level		Mitigation Measures
		Probability	Impact	
2. The Implementing Partner would face limitations to prepare and implement project activities in accordance with annual work plans.	Moderate (Fiduciary)	4	3	The Ministry (MESBE) has extensive experience working with international cooperation agencies and projects, including the UNDP/GEF DREAM project. This provides a solid basis for the SMARTER proposal. Notwithstanding, work plans are inevitably exposed to external factors including Government decision-making and the need to align agendas and timeframes across multiple stakeholders. While implementation delays cannot be discarded, these will have little impact on the quality of the envisaged outputs and outcomes. The DREAM project has demonstrated that sufficient staffing is critical for timely execution of project work plans.
3. Bioenergy systems would not attain technical and operational maturity within the Project?s timeframe.	Moderate (Technology; sustainability)	3	2	The sustainability of bioenergy in Barbados depends on a supportive value chain (ecosystem) including skilled operators. Especially biodigester technology requires strict operating conditions to maintain biochemical processes within the established parameters. While bioenergy is successfully deployed in several industrialised countries, there is little experience in Barbados so far. The presence of local counterparts including UWI, BBA, and CCREEE are enabling factors for building a local (or regional) ecosystem. GEF action under this project is oriented towards strengthening the bioenergy value chain and support the local partners.

Table of Identified Risks at PIF Stage				
Description	Type of Risk	Risk Level		Mitigation Measures
		Probability	Impact	
4. Co-financing of investment in public RE systems would not materialise.	Moderate (Finance)	1	4	This risk is deemed low given the access of GOB to concessional loan facilities including the IDB/EU Energy Smart Fund-II, the IDB Sustainable Energy Framework Barbados (SEFB) and the increased coordination to leverage financing under the Caricom C-SERMS Platform, of which Barbados is a member. Barbados? lending capacity has improved over recent years and the GOB is committed to maintain a solid fiscal policy. Under the PSSEP, the GOB continuous its efforts to implement RE and EE technologies in the public sector (including the introduction of electric vehicles) to cut recurrent energy expenditures and improve resilience of critical public functions as part of the national disaster response strategy. However, one cannot exclude that external factors (including the COVID-2019 pandemic) may delay investment programmes.
5. Poor appetite from private investors would limit the uptake of RE and battery storage systems in Barbados .	Moderate (Finance)	3	3	Although the investment climate in Barbados has not changed, the COVID-19 pandemic has made the global investment climate volatile. Eventually, changing capital costs or consolidation of business activities, may cause private parties to refrain from entering Barbados? energy market. This risk cannot be discarded in the medium term and may lead to a delay of needed investments Although there is a solid business case for grid-connected RE systems in Barbados, the risk profile of investments can be further reduced. The FIT is an important step into this direction. Other steps include a first batch of decentralised RE systems to create confidence in the market model; and strengthening of local supply chains including O&M services. The Project will make a contribution by collecting lessons learned and best practices and prepare business cases for sharing with stakeholders.

Table of Identified Risks at PIF Stage				
Description	Type of Risk	Risk Level		Mitigation Measures
		Probability	Impact	
6. Social, cultural and gender issues would adversely affect the adoption of centralised and decentralised RE systems.	Low Development	2	2	Rejection of RE power plants is a well-known problem in many countries often referred to as the ?not in my backyard? (NIMBY) syndrome. This occurs in particular in densely populated areas with combined land uses. Careful spatial planning and a good understanding of the value (and opportunity cost) of land can help improve acceptance. An important incentive for acceptance is local participation in energy projects so people will see the inconveniences and nuisance compensated by financial benefits. Social and gender aspects may be present at the local level and should be addressed in compliance with the safeguards. Barbados has recently updated its land use zoning policy considering solar and wind energy uses, which was submitted to public consultation.
7. The performance and sustainability of installed energy systems would be affected by the impact of climate change and extreme natural events.	Low (Climate)	2	2	The GOB views decentralisation of the electricity infrastructure as a key measure to increase climate resilience. The vulnerability of specific RE projects will be assessed during design and engineering and best practices for resilience will be applied Specifically, the impact of extreme winds, heavy rainfall and landslides will be taken into account during PPG . Projects risks not addressed by design can be covered through contractual clauses and insurance. The Project will draw upon the lessons learnt through procurement by GOB under the PSSEP, ESF and DREAM project. In the long-term, climate change may have a minor impact on the capacity factor of installed RE systems. This effect is expectedly small (of the order of 5%) and may be upward or downward. The impact of climate change on bioenergy systems in Barbados will be assessed as part of the envisioned mapping of biomass streams under the Project.

2. Climate Risk assessment for the Renewable Energy Sector[1]:

1) Hazards: Barbados has not experienced a major climate shock since Hurricane Janet in 1965, and nothing on the scale of the catastrophic events that its neighbours have experienced in recent years. It has, however, been affected in recent decades by various climatic shocks including Hurricane Tomas in 2011 which damaged approximately 1,500 houses, caused interruptions to 80% of the island?s electricity supply and

resulted in approximately USD1.85m (BBD37 million) worth of damages (Grainge 2017). Hurricane Matthew in 2014, and a tropical depression in 2016 have led to flooding throughout the island (Robinson and Rogers, 2018).

2) Assessing vulnerability and exposure and rating the risks: According to Grainger (2018), ?between 1972 and 2010, approximately 70% of damages to infrastructure caused by storms and hurricanes in the Caribbean were to the transport sub sector, while 25% was to the energy subsector and the remainder to the water and sanitation sub sector?. With the integration of more renewable energy sources, it is important to ensure that the existing and future energy generation and transmission/ distribution infrastructure is climate resilient. In the case of a climatic shock, the power sector is highly exposed, but it is generally the transmission and distribution infrastructure that presents systemic risks. As Bioenergy is not a relevant part of RE transition in Barbados yet, a further analysis of vulnerability and exposure of project locations and GEF financed interventions will be undertaken during PPG phase.

3) Possible measures to manage the risk: The potentially catastrophic nature of climate risks in the Caribbean, particularly in the context of climate change, means that risk transfer is likely to play an important role in building resilience. This is enabled by the design of appropriate financial instruments, including insurance. Currently there are significant barriers to risk transfer in the renewable energy sector.As the client of IPPs, and sole distributor of electricity on the island, BL&P bears the risk of supply interruptions. Going forward, as it signs more power purchase agreements with IPPs, it may be important to include contractual clauses that require IPPs to implement similar risk management procedures to their projects. Barbados? bioenergy policy shall address the impact of climate change on the availability of land and marine biomass resources in Barbados.

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[1] MCII & GIZ (2019). Roadmaps for Integrated Climate Risk Management: Climate Risk in Barbado?s Renewable Energy Sector. Report. Bonn/Eschborn: United Nations University Institute for Environment and Human Security (UNU-EHS) / Deutsche Gesellschaft f?r Internationale Zusammenarbeit (GIZ) GmbH. https://www.preventionweb.net/publication/roadmap-integrated-climate-risk-management-climate-risk-barbados-renewable-energy

6. Coordination

Outline the institutional structure of the project including monitoring and evaluation coordination at the project level. Describe possible coordination with other relevant GEF-financed projects and other initiatives.

. 1. The Project will be nationally implemented (NIM) through the Project Executing Unit (PEU) within the MESBE. To ensure effective coordination and build-up of knowhow, a technical working group comprising experts from MESBE and other sector Government stakeholders is devised. With guidance of the UNDP Multi-Country Office (MCO) in Barbados, the PEU will be responsible for project management; drafting of Terms of Reference; follow-up on contracted services, consultancies and procured goods; supervision of

activities; internal work including coordination and liaison; technical studies; engagement with stakeholders, and supportive activities towards the Project?s outcomes. Consultations with civil society and public sector will follow nationally defined processes where available and appropriate and in adherence with UNDP and GEF policies and guidelines. A Technical Advisor will be recruited to support MESBE and the Project Manager.

2. The PEU is strategically positioned in MESBE , from which parallel programmes including PSSEP and ESF-II are implemented. Communication lines MESBE?s Permanent Secretary and Cabinet are short avoiding doubling of efforts and ensuring optimum use of funding resources. Coordination with other agencies will also be assured by UNDP through inter-agency meetings, notably with IDB, EU, CDB, IRENA and bilateral agencies. Project-level reviews will be held to enhance momentum and avoid duplication of efforts,

3. Relevant GEF projects include: (1) the Strategic Platform to Promote Technology Innovation, Industrial Development and Entrepreneurship in Barbados (GEF-6. UNIDO, GEF ID 9648); and (2) CReW+: An Integrated Approach to Water and Wastewater Management using Innovative Solutions and Promoting Financing Mechanisms in the wider Caribbean Region (GEF-6, IDB/UNEP, GEF ID 9601). Relevant, non-GEF initiatives include the mentioned baseline programmes ESF-II (IDB/EU), SEFB (IDB), REEP (CDB), and Smart Energy Buildings Technical Cooperation (Republic of Korea). Worthwhile mentioning is further the CARICOM/GIZ Technical Assistance for Sustainable Energy in the Caribbean initiative (TAPSEC).

7. Consistency with National Priorities

Is the Project consistent with the National Strategies and plans or reports and assesments under relevant conventions?

Yes

If yes, which ones and how: NAPAs, NAPs, ASGM NAPs, MIAs, NBSAPs, NCs, TNAs, NCSAs, NIPs, PRSPs, NPFE, BURs, INDCs, etc

1. The Project is aligned with Barbados? priorities and reports under the UNFCCC including its Second National Communication (SNC, 2018) and the Nationally Determined Contribution (NDC, 2015). The SNC explicitly mentions that ?Barbados is dedicated to the implementation of sustainable energy technologies, including wind, solar, cogeneration and waste-to-energy strategies?.[1] Barbados has not submitted a Biennial Update Report (BUR) as yet, neither has it participated in a Technology Needs Assessment (TNA) cycle.

2. The SMARTER initiative is closely aligned with Barbados National Energy Policy (BNEP 2019-2030) and its Implementation Plan (2018). It is also supportive to the Barbados Physical Development Plan (PDP, amended 2016), specifically Chapter 3 ? Land Use and Built form Policies; the draft National Agricultural Policy (NAP, 2013) and the sugar sector strategy; and the 2020 Water Protection and Land Use Zoning Policy. The Project is also aligned with the National Climate Change Policy Framework which is monitored by the National Climate Change Committee of the Ministry of Environment and National Beautification (MENB).

[1] Barbados Second National Communication (SNC) 2018, p. ix-x.

8. Knowledge Management

Outline the knowledge management approach for the Project, including, if any, plans for the Project to learn from other relevant Projects and initiatives, to assess and document in a user-friendly form, and share these experiences and expertise with relevant stakeholders.

1. Anchoring of knowledge and expertise to support upscaling of RE systems is a core aspect of the Project strategy. Three clusters of stakeholders are discerned, i.e.: (1).Government and sector entities ? policy development and management strategies for performance optimisation of a decentralised RE-based electricity grid; (2) Project developers, CSO stakeholders and lower authorities - RE project development processes and synergies with other sectors; and (3) Technological institutes and suppliers ? bioenergy product and system development, and related services such as biomass characterisation.

2. It is envisioned to structure the KM process as part of Quarterly Report preparation allowing short feed-back times for learning and adaptive management, if needed. To this purpose, information, insights and experiences shall be collected and analysed systematically, a task to be assigned to the Project coordinator or consultants. UNDP will provide technical backstopping through the CO and the regional technical adviser (RTA) and is committed to share the experiences and lessons obtained from the SMARTER initiative with other projects in the region and across the GEF CCM portfolio, and with relevant peer agencies and initiatives.

9. Environmental and Social Safeguard (ESS) Risks

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

Overall Project/Program Risk Classification*

PIF	CEO Endorsement/Approval	MTR	TE
High or Substantial			

Measures to address identified risks and impacts

Provide preliminary information on the types and levels of risk classifications/ratings of any identified environmental and social risks and potential impacts associated with the project (considering the GEF ESS Minimum Standards) and describe measures to address these risks during the project design.

QUESTION 2: What are the Potential Social and Environmental Risks? *Note: Complete SESP Attachment 1 before responding to Question 2.*	**QUESTION 3: What is the level of significance of the potential social and environmental risks?** *Note: Respond to Questions 4 and 5below before proceeding to Question 5*			**QUESTION 6: Describe the assessment and management measures for each risk rated Moderate, Substantial or High**
Risk Description ***(broken down by event, cause, impact)***	***Impact and Likelihood (1-5)***	***Significance*** ***(Low, Moderate Substantial, High)***	***Comments (optional)***	***Description of assessment and management measures for risks rated as Moderate, Substantial or High***

Risk 1: Stakeholders (in particular marginalized groups) might face restricted access to basic services (electricity) as energy tariffs may become no longer affordable for low-income groups under a 100% RE scenario. Human rights principle: P1.3 & P1.6. Accountability Principle: P13 & P14	I = 3 L = 2	Moderate	The government of Barbados has already set the target of 100% renewables until 2030. This scenario is unlikely to happen as national economy constraints and political pressure will demand a revision of Government policies. In any case, studies underpinning the BNEP indicate that the RE scenario will lead to lower average energy costs.	The PPG team will develop a comprehensive stakeholder engagement plan to guarantee that the perspective of potential excluded groups and right-holders are heard and integrated to project design and implementation. At the technical level the definition of Feed-in tariffs implemented by the project, will internalise the affordability principle. During PPG it will be defined if SESA is needed during implementation for the upstream activities (policy related) that the project will be engaged. In general terms, the activities of the project will contribute to the democratisation of the energy sector encouraging individuals and small businesses to invest in energy production.

Risk 2 . Energy projects may affect livelihoods and access to natural resources and services by woman and man in different ways. Women may not be equally included in decision-making processes regarding decentralised energy projects. Gender Equality Principle 2: P10 and P11 Standard 5. Displacement and Resettlement (Project level): 5.2	I = 3 L = 2	Moderate	Experiences in many countries indicate that women have less decision-making power than men concerning investment decisions. A gender-bias may affect women to participate in decisions. Baseline information concerning the structure of local livelihoods and the type of activities in project areas should be collected, to enable proper assessments and identify positive action	A gender assessment and action plan (to be developed during the PPG) will indicate the entry points in project design and implementation for gender mainstreaming and empowerment. A livelihood assessment and action plan might be additionally undertaken in PPG phase if required by the SES and according to scope of demonstration activities.

Risk 3. Biodiversity values and natural habitats may be endangered by inappropriate planning and design of RE projects. Standard 1. Biodiversity and Natural Resource Management: 1.1, 1.3, 1.9. Standard 3: Community Health, Safety and Security: 3.6	I = 4 L = 2	Moderate	The GEF Project is concerned with bioenergy and will cover mapping of bioenergy potential. Zoning of the land territory is an important instrument for wind energy and bioenergy planning. Barbados has experience with zoning, for example the Barbados Water Protection and Zoning Policy (2020) which identifies 5 zones with increasing restrictive conditions according to local sensitive parameters.	For the upstream activities, the project will be designed to establish criteria for zoning bioenergy potential and shaping the license process for bioenergy projects. To mitigate the potential risk of adverse impacts to habitats on ecosystems and ecosystem services from upstream activities, during PPG the project?s design will indicate the main elements to be taken into consideration during implementation of the project to assess constraints related to biodiversity, soil and water protection, social impact, cultural values, etc in compliance with SES requirements, national legislation, international conventions and best practices. The need for SESA for the upstream activities will be confirmed during the PPG, in which case that requirement would be integrated into the project?s design and noted in the ESMF. For downstream demonstrative activities ESMF will also define if a Biodiversity Action Plan (or more comprehensive forms of management and assessment) is needed during implementation.
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Risk 4. The Caribbean region is susceptible to hurricanes and natural disasters that can impact project outcomes Standard 2. Climate Change Mitigation and Adaptation: 2.1, 2.2.	I=3 L= 4	Moderate	Despite of being located in the Caribbean region, Barbados is not positioned in the most vulnerable area for hurricanes. The energy systems delivered by the Project will increase resilience of the national energy system to natural hazards.	A full climate risk screening will be undertaken during PPG and will define management actions to be included in the ESMF and/or the project?s design.
Risk 5. Inadequate construction practices and operation may lead to occupational health and safety hazards for personnel and nearby persons. Standard 7: Labour and Working Conditions: 7.6	I = 4 L = 2	Moderate	The construction and operation of bioenergy systems brings along potential safety risks and hazards including toxic gas (H2S), suffocation (CO2), explosion and fire (CH4). While work in progress, international standards are being developed. These risks are well controlled if terms of references for installations are designed considering these risks and training and guidelines for operation safety procedures are defined beforehand.	During PPG, when the scope of demonstrative measures will be further detailed, an assessment of the specific risks for labour and working will be defined, for each of the specific technology options. During PPG, specific measures (to be developed and implemented during project implementation) will be developed and included in a targeted management plan or directly in project design. During implementation and as part of the project?s design, international standards and guidelines shall be adapted to the local context and industry safety measures and procedures applied, with adherence to the UNDP SES.

Risk 6: The proposed Project potentially result in the generation of waste (both hazardous and non-hazardous) **Standard 8:** Pollution Prevention and Resource Efficiency Risk: 8.1, 8.2	I = 4 P = 2	Moderate	The battery deployment for energy storage should be supported by an adequate management and disposal strategy. Management of hazardous waste and batteries is also addressed under the parallel IDB SEFB programme. Biogas plants also generate digestates that can be used as fertilizers and compost.	The PPG phase will assess national policies and regulations on hazardous waste management and will address this risk by incorporating battery waste criteria into the project?s design (specifically in the forthcoming licensing regime for grid-connected energy storage facilities). Non-hazardous waste generated by Biogas: The project will increase awareness among key stakeholders and will further seek synergies with peer initiatives in the region to devise appropriate disposal strategies. During the PPG, a waste management plan for the project shall be developed to guarantee the correct disposal of batteries and digestates during the demonstration activities.

Supporting Documents

Upload available ESS supporting documents.

Title	Submitted
6451_SMARTER_ Pre-SESP new template final for PISC_031621	

Part III: Approval/Endorsement By GEF Operational Focal Point(S) And GEF Agency(ies)

A. RECORD OF ENDORSEMENT OF GEF OPERATIONAL FOCAL POINT (S) ON BEHALF OF THE GOVERNMENT(S): (Please attach the Operational Focal Point endorsement letter with this template).

Name	Position	Ministry	Date
Daphne Kellman	Permanent Secretary (GEF OFP)	Ministry of Environment and National Beautification	12/7/2020

ANNEX A: Project Map and Geographic Coordinates

Please provide geo-referenced information and map where the project intervention takes place

See part I