Energy Efficiency through the Development of Low-carbon RAC Technologies in Trinidad and Tobago

Part I: Project Information

GEF ID
9789

Project Type
FSP

Type of Trust Fund
GET

Project Title
Energy Efficiency through the Development of Low-carbon RAC Technologies in Trinidad and Tobago

Countries
Trinidad and Tobago

Agency(ies)
UNDP

Other Executing Partner(s):
Ministry of Planning and Development (MPD)

Executing Partner Type
Government

GEF Focal Area
Climate Change

Taxonomy
Focal Areas, Climate Change, Climate Change Mitigation, Energy Efficiency, Technology Transfer, Strengthen institutional capacity and decision-making, Influencing models, Convene multi-stakeholder alliances, Demonstrate innovative approache, Transform policy and regulatory environments, Deploy innovative financial instruments, Capacity, Knowledge and Research, Learning, Capacity Development

Rio Markers
Climate Change Mitigation
Climate Change Mitigation 2

Climate Change Adaptation
Climate Change Adaptation 0

Duration
48In Months

Agency Fee($)
489,477

A. Focal Area Strategy Framework and Program

Objectives/Programs	Focal Area Outcomes	Trust Fund	GEF Amount($)	Co-Fin Amount($)
CCM-1_P1	Outcome B. Policy, planning and regulatory frameworks foster accelerated low GHG development and emissions mitigation.	GET	5,152,392	21,126,252
		Total Project Cost($)	**5,152,392**	**21,126,252**

B. Project description summary

Project Objective

To promote the adoption of low-carbon technologies for Refrigeration and Air Conditioning (RAC) end-use.

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing($)	Confirmed Co-Financing($)

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing($)	Confirmed Co-Financing($)
I. Enhance national policy, regulatory and institutional frameworks for sustainable end-use of RAC technologies.	Technical Assistance	1.1 The national policy, regulatory and institutional frameworks for Energy Efficiency (EE) gains for RAC technologies have been strengthened.	1.1.1 Improved inter-governmental coordination for integrated policy-making of environmentally-friendly approaches among national public institutions. 1.1.2 Strengthened a national planning and policy framework for market development of EE gains for RAC end-uses. 1.1.3 Standards & Labeling (S&L) regulations for RAC technologies developed, approved and ready for enforcement by the T&T Bureau of Standards (TTBS), including enhancement of technical capacities of public officers to assure S&L compliance. 1.1.4 Guidelines and model documents for mainstreaming the public procurement of RAC EE equipment, including considerations for not-in-kind technologies and natural refrigerants, implemented. 1.1.5 Fiscal instruments and economic incentives for the import of high EE rating RAC equipment with natural refrigerants where applicable, developed. 1.1.6 Strengthening technical capacities in the formal academic	GET	710,000	1,933,923

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing($)	Confirmed Co-Financing($)
II. Accelerate RAC market transformation towards less energy intensive and low-GWP technologies.	Technical Assistance	2.1 Investment path along the RAC market chain enhanced.	2.1.1 Market analysis for RAC replacement initiatives and impacts at the national level carried out. 2.1.2 In-country technical capacity and backstopping for assembling energy efficient RAC systems has been improved. 2.1.3 A structure for ensuring that RAC equipment meets international energy efficiency standards through the TTBS established. 2.1.4 Capacities for project investment analysis and customized financing mechanisms in the financial sector to support market change for energy efficient RAC systems strengthened.	GET	1,020,000	5,114,458

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing($)	Confirmed Co-Financing($)
II. Accelerate RAC market transformation towards less energy intensive and low-GWP technologies.	Investment	2.2 Investment portfolio on replacement of energy intensive technologies implemented.	2.2.1 District Cooling technical and financial performance feasibility study completed; aiming at the installation of two District Cooling Zones, including potential developers and end-users (Piarco Intl. Airport and the University of T&T in the Island of Trinidad). 2.2.2 Implementation of District Cooling concept at Piarco International Airport and the University of T&T. 2.2.3 Early-retirement of decentralized, energy-intensive old units and replacement with more energy efficient, centralized-based AC units in two large facilities with high visibility in public facilities installed and operating (Tobago Island Intl. Airport and EMA Building). 2.2.4 Early retirement of low-efficiency, light units (split/window systems) and their replacement with more energy efficient commonly used units in the residential and commercial sectors triggered.	GET	2,520,000	12,000,000

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing($)	Confirmed Co-Financing($)
III. Information outreach and Monitoring & Evaluation (M&E) implemented.	Technical Assistance	3.1 An information strategy to share knowledge gained, lessons-learned and best practices developed.	3.1.1 An awareness raising campaign and information strategy implemented, including lessons learned and best practices dissemination at the national, regional and global levels. 3.1.2 National capacities for the public and private sectors for calculations and monitoring of global impact indicators enhanced.	GET	118,041	287,819

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing($)	Confirmed Co-Financing($)
III. Information outreach and Monitoring & Evaluation (M&E) implemented.	Technical Assistance	3.2 A Monitoring and Evaluation plan and adaptive management applied in response to needs, as per the UNDP/GEF ProDoc procedures and of its environmental progress and impact indicators, has been designed and implemented.	3.2.1 Design and implementation of a module for data collection on GHG and HCFC/HFC emissions by residential and commercial buildings integrated with the national MRV system (including the consolidation of relevant indicators). 3.2.2 Design and approval of a monitoring and evaluation plan, including gender and reporting indicators as well as UNDP Social and Environmental Screening Procedures (SESP). 3.2.3 Monitoring of project progress in compliance with UNDP and GEF guidelines. 3.2.4 Carrying out of project progress report(s), including PIRs, Mid-term Review and a Terminal Evaluation.	GET	539,000	733,750
				Sub Total ($)	**4,907,041**	**20,069,950**

Project Management Cost (PMC)

Project Management Cost (PMC)			
	GET	245,351	1,056,302
	Sub Total($)	**245,351**	**1,056,302**
	Total Project Cost($)	**5,152,392**	**21,126,252**

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

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Amount($)
Government	MPD	In-kind	406,064
Government	MPD	In-kind	2,258,433
Government	TTBS	In-kind	839,458
Private Sector	Energy Dynamics	In-kind	100,000
Private Sector	Edan K. Properties	Grant	1,250,000
Private Sector	Edan K. Properties	In-kind	250,000
Private Sector	SORAC	In-kind	150,000
Private Sector	CABEF	Grant	15,000,000
Others	ARIA	In-kind	420,000
Others	RRRA	In-kind	352,297
GEF Agency	UNDP	In-kind	50,000
GEF Agency	UNDP	Grant	50,000
		Total Co-Financing($)	**21,126,252**

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

Agency	Trust Fund	Country	Focal Area	Programming of Funds	NGI	Amount($)	Fee($)
UNDP	GET	Trinidad and Tobago	Climate Change		No	5,152,392	489,477
				Total Grant Resources($)		**5,152,392**	**489,477**

E. Non Grant Instrument

NON-GRANT INSTRUMENT at CEO Endorsement

Includes Non grant instruments? **No**

Includes reflow to GEF? **No**

F. Project Preparation Grant (PPG)

PPG Required

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PPG Amount ($)

150,000

PPG Agency Fee ($)

14,250

Agency	Trust Fund	Country	Focal Area	Programming of Funds	NGI	Amount($)	Fee($)
UNDP	GET	Trinidad and Tobago	Climate Change		No	150,000	14,250
				Total Project Costs($)		**150,000**	**14,250**

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_2e (direct)	0	450289	0	0
Expected metric tons of CO_2e (indirect)	0	1048244	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_2e (direct)				
Expected metric tons of CO_2e (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_2e (direct)		450289		
Expected metric tons of CO_2e (indirect)		1048244		
Anticipated start year of accounting		2019		
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)		79,200,000.00		

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

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

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

	Number (Expected at PIF)	Number (Expected at CEO Endorsement)	Number (Achieved at MTR)	Number (Achieved at TE)
Female		45		
Male		100		
Total	0	145	0	0

PART II: Project JUSTIFICATION

1. Project Description

1. Activities carried out during the PPG phase were aimed at complementing information and validating the assumptions underlying the Project Identification Form (PIF), as well as defining the role of project counterparts. After an extended participatory process (please refer to Table 10.b of Annex H of the ProDoc: *Main engagement activities carried out to involve stakeholders*), some adjustments were made to the original project strategy (as outlined in the PIF) in order to respond to changes in project institutional context and the identified stakeholders. The Table below shows an overview of stakeholder additions made in alignment between the project design at the ProDoc stage and the original PIF.

Changes in Project's Strategic Results Framework between PIF and CEO ER	
Additional stakeholders integrated at the PPG stage	**Comments / Rational for additions**
Beneficiaries	For the purposes of the project, the beneficiaries are the citizens of T&T; the end-users that enjoy an acclimatized environment for their comfort and demand a cooling load to cope with their daily business activities.
Edan K Properties Limited	This private property management and real estate firm is the owner of the Point Lisas Industrial Business Park. Their proximity to the UTT Point Lisas campus and the TPL Power Plant make it ideal for them to be considered as a potential off-taker of both District Cooling and heating to supply their tenants and customers.
Trinity Power Limited (TPL)	This large private contractor supplies power to T&TEC the singe electric power utility on the Island of Trinidad. It plays a key role in providing relevant information to explore the potential to promote the use of District Cooling in the country.
Energy Dynamics Ltd (EDL)	This is a local engineering firm with experience of District Cooling and absorption technology. EDL is a Trinidad based Energy Service Company (ESCo) with projects and operations undertaken throughout the English speaking Caribbean and the Dominican Republic. It will play a significant role in catalysing the required market change towards energy efficiency in the RAC sector focusing on the development of the District Cooling and Combined Cooling Heating and Power (CCHP) pilot investments.
School of Refrigeration and Air-conditioning (SORAC)	The School of Refrigeration and Air-conditioning (SORAC) is a private institution formed in 1993 with its focus being the training Refrigeration & Air Conditioning (RAC) Technicians at the craft level. The institute provides theoretical & practical training and has trained over one thousand craftsmen in this field. Since this institute has twenty-five years' experience in the educational field they would be a welcomed partner for the development of the capacity building activities of the project with respect to installation and maintenance of DCS technologies.
Caribbean Airlines Limited (CAL)	Caribbean Airline Limited is an airline that operates on the compound of the Airports Authority of Trinidad and Tobago. They occupy bonded areas and offices on the compound, which are cooled with upwards of 120 mini-split units, as quoted by their operations manager. Their proximity to the Piarco Airport main terminal makes them a potential off-taker of the DCS, which would improve their energy consumption, and thus reduce their operations cost.

Caribbean Basin Sustainable Energy Fund (CABEF)	CABEF is a venture capital fund that invests in clean energy and energy efficiency projects and companies in the Caribbean Basin. Sustainable Energy Central America and Sustainable Energy Caribbean (SECA) act as Investment Advisors of CABEF. CABEF has indicated a strong interest in the project and is willing to play an important role in providing investment capital to assist with funding pilot project related activities and fund scale-up actions.
Increase GEBs	The PIF preliminary calculation of total accumulative CO2 emission savings accounted for 584,500 metric tons CO2eq over a 20-year period. The total accumulation of GHG emissions avoided by the project is approximately 1,500,333 tCO2eq; of which 651,896 are *direct* at the project end, 765,351 are *direct post-project* and 284,693 estimated as *indirect.*

A.1. *Project Description*.

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

1. This project is significant because rising global demand for Refrigeration and Air Conditioning (RAC) equipment is very worrisome worldwide -globally speaking the RAC equipment penetration is growing 8-10% annually in developing countries- and Trinidad and Tobago is following this international trend due to its location in the Tropical belt, with an average temperature of 26.5o Celsius and humidity levels above 80% year-round. Moreover, as recognized by the IPCC in its 2013 Report, it is likely that a warmer climate and the growing demand for RAC equipment will put greater pressure on the demand for thermal power generation over the long term. In this BAU scenario, new RAC equipment, both to replace existing ones and to establish a new, expanded installed base, tend to use High-Global Warming Potential (GWP)/Hydrofluorocarbons (HFC) refrigerants used in air-conditioning units and cooling systems, which are likely to generate more CO_2 emissions when compared to existing commercial, low-GWP alternatives worldwide.

2. In accordance with UNFCCC decisions, Trinidad and Tobago presented plans for reducing global GHG emissions through the Nationally Determined Contribution (NDC) in Paris (Aug. 2015), based on a Carbon Reduction Strategy developed for its industrial, power generation and transportation sectors; these being the major emitting sectors of the economy, and consistent with implementing the provisions stated in the National Climate Change Policy (July 2011). The country´s aim is to achieve a reduction objective in overall emissions from these three sectors of 15% by 2030 from BAU, which in absolute terms is an equivalent of one hundred and three million (103,000,000) tons of CO_{2eq}[1][1]. It is expected that by accessing project grants and international support, would help addressing the current high growth in emissions in the RAC sector.

3. This country accounts for only 0.1% of GHG emissions in the global context, but has a relatively high per-capita emission, approximately 23.87 t/CO_2, and the highest in the Caribbean region as a result of having a small population coupled with being a leading producer of oil and natural gas. The country has been moving rapidly towards the use of natural gas, as a relatively clean-burning resource, as its primary means of meeting its growing energy demands; the petrochemical and heavy industry sectors that are the main contributors of GHG emissions, followed by power generation and then the transportation sector. Emissions from power generation have increased from 1,736 gigagrams (Gg) to 2,488 Gg, a growth of 43% over the period 1990-2006[2][2]. The 2005 World Resources Institute report ranked Trinidad and Tobago as the 10th highest per capita emitter of greenhouse gas emissions[3][3].

4. As a Small Island Developing State (SIDS), Trinidad and Tobago is particularly vulnerable to the adverse impacts of climate change such as those related to global temperature increases, changes in precipitation and sea level rise. These effects are aggravated by its small land space, limited human and technical capacity and the challenges of international trade, specifically the economic variations in the price of a barrel of oil. In this regard, it is in the country´s interest to enhance energy security through a low-carbon intensive economy, in particular for power generation.

5. Therefore, the development challenge is to overcome a national context, which leads to a series of institutional, capacity, environmental and financial externalities, including the lack of an integrated management approach linked to an optimal deployment of RAC technologies. This leads to a tendency to increase GHG emissions and the use of ODS refrigerants, contributing to global warming and depletion of the ozone layer, due to the market growth of highly inefficient RAC equipment. (See Figure 1 –Theory of Change - Problem Tree Analysis Diagram)[4][4].

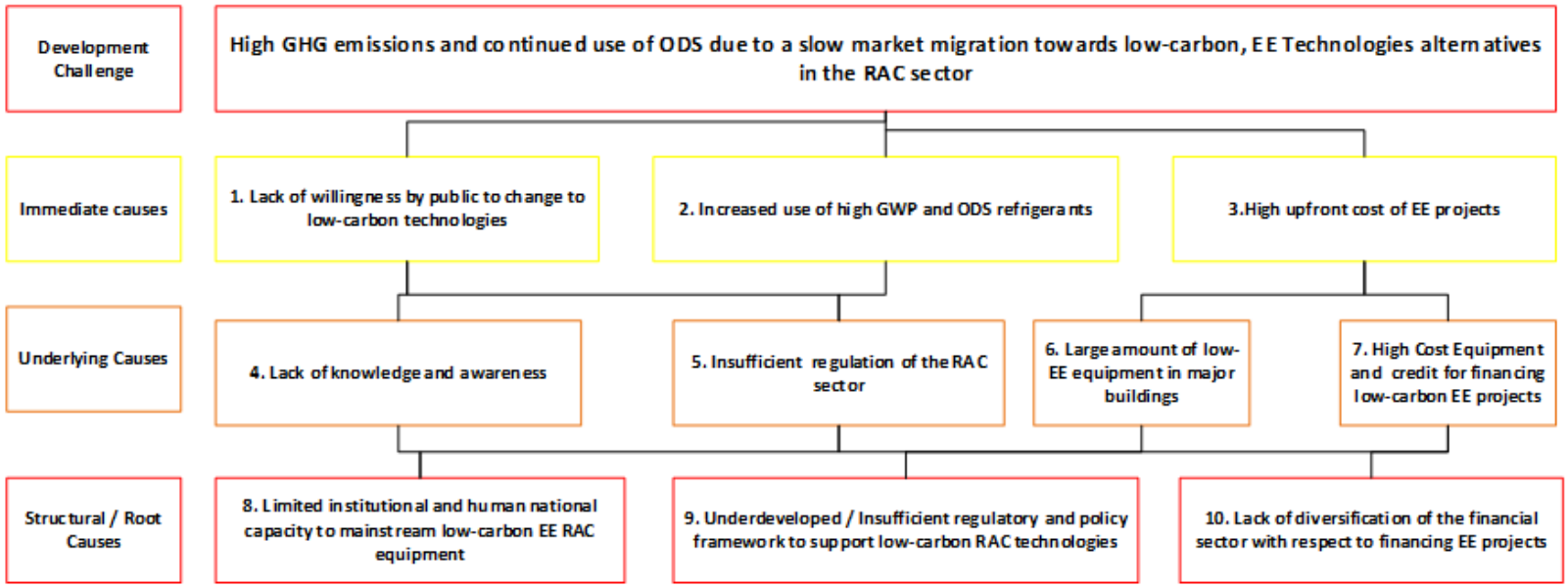

Figure 1: Theory of Change - Problem Tree Analysis Diagram

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[1] "*Trinidad and Tobago. Intended Nationally Determined Contribution (INDC) under the UNFCCC"*, page 01.

[2] *"National Climate Change Policy", Government of the Republic of Trinidad and Tobago, July 2011.*

[3] *"State of the Environment Report 2010",* Environmental Management Authority (EMA).

[4] This is based on the Theory of Change analysis carried out during the PPG.

Barriers to change

6. During the analysis of the development challenge carried out in the preparation of the problem tree (Figure 1), three different levels of causes were distinguished: immediate causes, underlying causes and structural / root causes. The three immediate causes identified were:

- Lack of willingness by the public to change to low-carbon technologies
- Increased use of high GWP and ODS refrigerants
- High upfront cost of EE projects (new installations and conversion and retrofits)

7. Four major underlying causes were also identified as the basis of the immediate causes mentioned above. These were as follows:

- Lack of knowledge and awareness
- Insufficient regulation of the RAC sector
- Large amount of low-EE equipment in major buildings
- High cost of EE equipment and credit for financing low-carbon EE projects

8. The three main structural / root causes identified were as follows:

- Limited institutional and human national capacity to mainstream low-carbon EE RAC equipment
- Underdeveloped / Insufficient regulatory and policy framework to support low-carbon RAC technologies
- Lack of diversification of the financial sector with respect to financing EE projects

9. Based on the Theory of Change analysis, the immediate cause related to a lack of willingness by the public to change to low-carbon technologies, in a country where the cost of energy is highly subsidized is a major barrier to the desired transformation. There is insufficient awareness and sustained communication on the benefits of EE among the public and the private sectors including financial institutions. Generally, people are unable to make sound and informed decisions on energy related products and services because they lack information and education on the types of technologies available and the choices that will bring optimum benefits. This is due to a lack of public awareness and communication about the availability, benefits and incentives related to the adoption of low-GWP, EE RAC technologies. The lack of awareness is also experienced at the level of the technician who needs to have the relevant technical capacities to safely handle and recover refrigerant, but also to effectively advise and influence the consumption of these technologies.

10. On the other hand, an increase in the use of high GWP and ODS refrigerants is due to insufficient regulation of the RAC industry and a lack of technical capacities. The absence of legislative instruments and technical capacities on issues related to the safe handling and use of low carbon technologies to establish the basis for market transformation is apparent. This type of technology, like those using natural refrigerants, pose one or more safety-related issues due to sensitive parameters like high toxicity and high flammability, especially for end-use. Another consideration the knowledge and availability of avenues for effective recovery, recycling and disposal of the ODS refrigerants, which is also tied to technical capacities and awareness.

11. There are no quality standards for EE low-carbon RAC equipment labelling or performance currently in existence in Trinidad and Tobago. The Trinidad and Tobago Bureau of Standards (TTBS) is the sole entity in the country responsible for standards development, testing and certification of these types of products. However, TTBS currently has no developed quality standards for EE RAC technologies and lacks the capacity to test this specific specialized equipment to verify or give an energy savings rating. This also lends to the inability to regulate the sector. This UNDP-GEF project will attempt to build the relevant capacity to enable the TTBS to develop a mechanism for verification of energy efficient devices and develop the requisite labelling and testing standards to ensure the quality of equipment on the market, which would enhance confidence in the use of it.

12. Thirdly, the high upfront cost of EE projects (new installations and conversion and retrofits) is due to a lack of human technical capacities, the large amount of split units and the high cost of financing. Accelerated adoption of EE low-carbon RAC technologies in Trinidad and Tobago, will require an increase in the skill sets for various personnel and companies within the sector. Undertaking installations and retrofits with entities that lack the required capacities can result in high costs due to rework, thus training is required to have more people available to support market growth and to ensure quality delivery of services within the sector. Failure to develop the technical capacity in the country to support a growing EE, low-carbon, RAC market, will result in the loss of job opportunities and slow adoption of the new technologies. It is also recognized that the RAC sector is typically a male-dominated sector and that market expansion should support greater and equal access to opportunities for all.

13. Related to the underlying causes, insufficient policymaking coherence leads to an inadequate regulatory and policy framework that does not support the uptake of EE low-carbon RAC technologies. There is a need for improved coordination between the leading Ministry of Planning & Development (MPD) and other public agencies as it relates to the synergies between Ozone Depleting commitments, actions on Climate Change mitigation and energy efficiency, environmental policy development and implementation, technical regulations, and standards and labelling to achieve additional gains in energy efficiency and lower greenhouse gas emissions.

14. The large number of multi-split and split systems in major buildings is a barrier for the development of EE systems such as District Cooling and other large centralized systems and would increase the upfront cost of retrofits and installations due to extensive building modification required to convert to ducted-centralized cooling and air conditioning systems.

15. The upfront investment cost of purchasing EE technologies and making EE retrofits is either prohibitive for many potential customers or requires them to secure debt financing. Since the lending market for EE is relatively young in Trinidad, many financial institutions lack a full understanding of the risks, opportunities, and paybacks of investments in EE projects. This leads to the structuring of lending terms that are not optimally designed for EE investments. This can lead to high interest rates, collateral requirements or short tenures, which lead many consumers to decide that a loan is not worthwhile, especially in a country with low tariffs on electricity.

2) The baseline scenario or any associated baseline projects,

16. Trinidad and Tobago (T&T), located in the Eastern Caribbean region, consists of two islands (Pop. 1.32 million, 2016) with an extension of 5,128 square kilometres of land; the main island is Trinidad -where the capital, Port of Spain, is located- and most political and economic activity takes place thanks to a growing economy mostly influenced by the petroleum industry where oil and gas account for about 40% of Gross Domestic Product (GDP) and 80% of exports[1], the mainstay of national economic development, while the tourism sector plays a minor role –mostly concentrated on the Island of Tobago- in contrast with most other Caribbean countries. National development policies in place move toward improved sustainable development of the country; this has fuelled an expansion in infrastructure with ongoing plans for the construction of new ports, schools, hospitals, public office buildings and business facilities, spurred by both, public and private developers.

17. Trinidad and Tobago has already started mainstreaming climate change considerations through the development and implementation of a national policy framework for climate change, which includes the National Climate Change Policy (NCCP), Carbon Reduction Strategy (CRS) and Nationally Determined Contribution (NDC). Unfortunately, mainstreaming of climate change at the sectoral level has been limited within the power generation, transport, RAC and industry sectors, which has translated to limited mainstreaming at the organizational level[2]. The CRS is a tool to create the necessary conditions and capacities for multidisciplinary implementation of the NCCP, specifically for the reduction of GHG emissions in the power sector, industry and transport sectors over the 2013-2040 horizon. Specifically, the CRS recognizes the reduction of the energy consumption in the housing, commercial and institutional sectors as a key measure composing the national strategy for GHG mitigation[3] .

Background for Energy Efficiency

18. As an oil-producing country, total energy supply in T&T depends mostly on its domestic production and consumption of natural gas (71%) and crude oil (27%). Final energy consumption in the country stands at 269 kboe/day[4]. The industrial sector accounts for 45 kboe/day, followed by transport with 21 kboe/day, residential with 7 kboe/day, and commercial with 2 kboe/day. Other consumption accounts for the majority of consumption with 194 kboe/day[5][5], the largest due to the high-energy consumption of Trinidad and Tobago's steel industry and energy end-use in public facilities. The country produces all of its electricity from a large installed thermal power capacity of 2,428 MW, split between four electricity producers while the Trinidad and Tobago Electricity Commission (T&TEC) is solely responsible for power distribution in both islands by law.

19. T&TEC's customer base is expected to grow from 468,906 customers in 2016 to 550,303 customers in 2025, with an average annually compounded growth rate of 1.8%. Total energy sales are forecast to grow by 41% from 9,363 GWh in 2016 to 13,215 GWh in 2025 at an average annually compounded rate of 3.9 %, with small and medium industrial energy sales growing at an average annually compounded rate of 3.5 %. System peak demand for 2016 was 1.434 MW and expected 2044 MW in 2025, with an average annual compounded growth rate of 4.0%[6][6].

20. Due to the country's energy-intensive industries, per capita consumption of electricity is among the highest in the Caribbean at over 6,500 kWh[7][7]. The industrial sector represents by far the largest consumer of electricity, accounting for 60 percent of sales (4,825 GWh). The residential sector consumed 29 percent (2,412 GWh) and with an average annual compounded growth rate of 3.6 %. The commercial sector came in as the third largest consumer with 773 GWh, representing 10 percent of power sales, with an average growth rate of about 7% per year. Other end-uses, primarily street lighting, accounted for sales of 109 GWh representing one percent[8][8]. Electricity pricing is controlled by the Regulated Industries Commission (RIC); however, it is heavily subsidized with an average price in the commercial sector to the order of 6.0US$c/KWh being kept since 2011 and at 4.3US$c/KWh for the residential sector[9][9] -the lowest electricity prices throughout the Caribbean where the average is of 33US$c/KWh- a major challenge to the promotion and implementation of energy efficiency programs.

21. Historically, the T&T power sector scheme has adopted a traditional supply-side approach encouraged by the low-cost electricity pricing structure. Specifically, electricity consumption for air conditioning and refrigeration equipment by sector is not officially available. During the PPG stage, the following calculation was approached on the most demanding sectors, as shown in Table 1.

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[1] "*Guidebook for Hydrodynamic Considerations in Coastal and Marine CEC Applications"*, Environmental Management Authority (EMA), August 2011.

[2] *MPD, LECB, UNDP: "NDC Policy Brief Series: Policy Brief No.2", October 2016.*

[3] *Government of the Republic of Trinidad and Tobago. "Strategy for Reduction of Carbon Emissions in Trinidad and Tobago", Page 49, August 2015.*

[4] Thousand barrels of petroleum equivalent per day.

[5] *"Energy Dossier: Trinidad and Tobago*", Interamerican Development Bank, Technical Note No. IDB-TN-938, February 2016.

[6] "*Energy Sales and Peak Demand Forecast"*, TTEC, Page 1, October 1st, 2015.

[7] *"Energy Dossier: Trinidad and Tobago*", Interamerican Development Bank, Technical Note No. IDB-TN-938, February 2016.

[8] *"Energy Dossier: Trinidad and Tobago*", Interamerican Development Bank, Technical Note No. IDB-TN-938, February 2016.

[9] The Regulated Industries Commission (RIC).

Table 1: End-Use of Electricity for RAC Technologies (GWh, Year 2016)

Sector/RAC System	Refrigeration	Air Conditioning	Total
Commercial (Rates A1 and B1)			
Light	248	166	414
Centralized	373	248	621
Residential (Rates A and B)			
Light	177.6	266.4	444
Total			1479
Source: Statistical Data from footnote #10 for 2016 and PPG market assumptions.			

22. Within the commercial sector (49,860 customers), the highest end-users of electricity include *hotels and restaurants*, *services facilities* (mainly hospitals and offices), and *retail stores*. Electricity end-use for refrigeration with light systems is made up mainly of medium and small enterprises with an average monthly consumption of 20.66 GWh, for a total consumption of 248 GWh, while centralized units are commonly used in large facilities with areas larger than 500 square meters (373 GWh) and are imported into parts to be installed on-site; average monthly consumption in these sorts of facilities –for example large retail stores and supermarkets– accounts for 621 GWh and operate either with HCFC-22 or HFCs. Both end-uses also have in operation self-contained units for medium and low refrigeration, which are assembled locally or imported as single units. In addition, both subsectors have also installed air conditioning units for acclimatization ranging from 7 tons of capacity up to 50 tonnes, depending on the size and use of the facility, with an annual consumption of 1035 GWh, for the reference year, as indicated in Table 1.

23. In the residential sector (415,360 customers), electricity end-use for refrigeration with light systems depends on the operation of standard self-contained household single units, with an average size of 25 cubic feet and a household penetration rate of 18%[1] nationwide. This consumption represented, for the year 2016, 177.6 GWh. In addition, there is a growing penetration of air conditioning light units in this sector using mostly HCFC-22 of the conventional split-type with quite ample ranges of energy efficiency, which are imported with an average cooling capacity of 12000 - 18000 BTU, and a consumption of 266.4 GWh for the reference year, as indicated in Table 1.

24. In Trinidad and Tobago, the District Cooling technology has been very slowly introduced even though the demand for cooling has increased at a steady rate of 15% due to the growing economic development of the country, as a result of high oil and gas prices coupled with an increase in temperature as observed at 0.29 degrees Celsius[2] per year, over the last decade. The conventional technologies to support cooling demand are isolated chiller systems running on natural gas, with an average capacity of 1000 tons and using mostly R-134A. There have been several attempts in the past to develop District Cooling systems, like the planned District Cooling for the financial district in downtown Port of Spain, which was plagued by installation and configuration issues.

25. The PPG prepared an analysis with cost minimizing perspective, and with focus on bankability and financial performance of the District Cooling. The objective of this analysis is to create a viable, reliable District Cooling product that is in line with international and local market expectations, energy efficiency improvements and refrigerant (HFC) phase-out. The following calculation was approached on the most demanding end-uses for this alternative in the country.

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[1] *A Unique Approach for Sustainable Energy in Trinidad and Tobago, Natacha C. Marzolf Et al*

[2] *https://www.metoffice.gov.tt/Climate*

Table 2: District Cooling Market Potential in Trinidad And Tobago (in kW)

Market Demand	2020	2021	2022	2023	2024
Piarco Airport	3,500	4,000	4,500	4,900	4,900
TT Post	600	600	600	600	600
Regent Hotel	600	600	600	600	600
Aero Business Park	0	0	1,500	1,500	2,000
UTT	1,500	1,500	1,500	1,500	1,500
Industrial Park	0	700	700	700	700
Total	6,200	7,400	9,400	9,800	10,300

Ref.: Draft Report. UNDP Trinidad and Tobago. "District Cooling Pilot project – Business Management Reports #1 and #2"

26. The baseline scenario shows that Trinidad and Tobago's hydrocarbon resources are critical for long-term economic growth and development. The country is a net exporter of petroleum products while the oil and gas industry is the most significant contributor to domestic growth. The growth of the local natural gas-based industry has been remarkable, achieving international and national prominence in the shift towards its use as the primary means of meeting its growing energy demands and the need to utilize a cleaner energy source. Local energy production and consumption have grown significantly in the last few decades and so, despite the increase in the focus on natural gas, local emissions of GHGs such as carbon dioxide continue to grow, with the energy sector being the leading contributor followed by power-generation and transportation. Notwithstanding the continued importance of the country's petroleum resources, the Government recognizes that renewable energy, clean energy production and the maximization of energy efficiency are critical elements of the drive for sustainable development[1].

27. In light of the barriers to renewable energy development, in particular, high up-front costs, it is critical to foster energy efficiency over the short to medium term. Increasing energy efficiency would have a spill over effect on savings in power generation and utility costs. This project is also seen as a way to introduce not-in-kind technologies[2] with substantially improved energy efficiency gains like the District Cooling technology, which can use local sources for cooling such as ground water, seawater, waste heat or solar heat. Of relevance, there is a group of existing compulsory standards for labelling of refrigerant cylinders and work in progress on standards for household refrigerators, freezers and air conditioners which are focused on the compliance of technical specifications but without the appropriate focus on the compliance of minimum energy performance standards and energy consumption labelling to promote the recognition and use of energy efficient appliances, in tune with the Framework for the Development of a Renewable Energy Policy for Trinidad and Tobago (January 2011).

28. As a specific energy policy, the country has the foresight and ambition to implement energy efficiency standards necessary to support renewable energy and energy efficient technologies and to reduce the Government´s fuel subsidy liability over time. Under the aegis of the Ministry of Trade and Industry, the Trinidad and Tobago Bureau of Standards (TTBS) is the designated national authority to ensure adherence to standards for goods produced or used in the country. As a "Standards Taker" player in terms of energy efficiency

standards and labelling aspects of RAC equipment, the TTBS has nowadays some limited action in the area of Standardization, Verification and Certification of RAC systems. A set of barriers in institutional and technical capacity have been identified that could enable the country to undertake more proactive action in this area, based on the lack of a proper laboratory facility, certified professionals and EE specific national standards that could handle this new generation of low-carbon, EE RAC technologies and their environmentally-friendly refrigerants. However, RAC EE ratings continue to be established in the international setting and they are mainly geared to manufacturing countries in a different type of climate (with different technical skills) and, therefore, not completely adequate to the Trinidad and Tobago weather setting. Table 3 shows the existing standards and the status of enforcement.

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[1] "*Framework for Development of a Renewable Energy Policy for Trinidad and Tobago",* Ministry of Energy and Energy Affairs, January 2011.

[2] The term of not-in-kind (NIK) cooling technologies refers to any alternative cooling systems other than the vapour compression cooling systems that are most commercially dominant today. An example is absorption/adsorption cooling which uses the heat to drive the cycle instead of compressors in vapour compression systems. *"International Journal of Refrigeration 62 (2016)"*, 177–192.

Table 3: Status of Enforcement of Existing RAC Compulsory Standards

Compulsory Standards related to RAC Sector	Status of Enforcement
TTS 76: Part 2: 1994 – Requirements for Labelling – Part 2: Labelling of Pre-packaged Goods	Currently Enforced
TTS 76: Part 20: 2015 – Requirements for Labelling – Part 20: Labelling of Refrigerant Containers	Currently Enforced (under IS0/IEC 17020 Accreditation)
TTS 76: Part 13: 2016 – Requirements for Labelling – Part 13: Labelling for Electrical Appliances (3rdRevision)	Currently Enforced
TTS/UL 984: 2008 – Hermetic Refrigerant Motor-Compressors	Partially Enforced (Labelling)
TTS/UL 250: 2009 – Household Refrigerators and Freezers	Partially Enforced (Labelling)

Ref.: TTBS, Implementation Division, Pre-Packaged Good Unit.

29. Energy efficiency development in Trinidad and Tobago is currently at a rudimentary stage, as mentioned before due to the high level of subsidies to the price of electricity for all customers. A few initiatives and research projects have been undertaken, such as energy efficiency and green design into new residential and commercial developments incorporated by several local architects and the ongoing capacity building in the tertiary education sector through incorporation of renewable energy and energy efficiency into the academic

programs of institutions such as the University of Trinidad and Tobago (UTT) and the University of the West Indies (UWI). Of relevance, is the role of the Air Conditioning and Refrigeration Industry Association (ARIA), a not-for-profit organization established in 1998 devoted to promoting professionalism, integrity and environmental awareness in the Air Conditioning & Refrigeration Industry. As a key player for this project, ARIA offers training programs to enhance knowledge and skills for technicians in the RAC industry through the ARIA Technical Institute Ltd (ATI), with support from the Environmental Policy and Planning Division (EPPD) of the Ministry of Planning and Development (MPD), The United Nations Development Programme (UNDP) and the Ministry of Trade and Industry.

30. In Trinidad and Tobago, there are no manufacturers or assembly facilities for RAC equipment. As in many other Caribbean countries, there is a national capacity in the private sector to provide support for the design of conventional systems and for the provision of maintenance services, made up by well-trained engineering support firms, RAC equipment suppliers of most world-commercial brands as well as formal and informal small companies that provide regular maintenance to the installed systems.

Background for Ozone-Depleting Substances

31. T&T is a signatory of the Montreal Protocol (MP) on substances that deplete the ozone layer under a Multilateral Environmental Agreement (MEA), which aims to phase-out the consumption of Ozone-Depleting Substances (ODS). As a country working under the Article 5 of the Montreal Protocol, for Trinidad and Tobago the Montreal Protocol has set specific phase-out targets for consumption of Hydrochlorofluorocarbons (HCFCs), which must be eliminated through a staggered reduction approach as follows: 2015 (10%), 2020 (35%), 2025 (67,5%), 2030 (97,5%) and 2040 (100%).

32. Trinidad and Tobago does not produce refrigerant therefore all cooling substances, including ODS alternatives in the country, are imported. HFC-134a and R-410A are the main HFC refrigerants imported, used predominantly for servicing refrigeration and air-conditioning (RAC) equipment; some other alternatives used are hydrocarbons and carbon dioxide. The importers retail refrigerants on the local market and export to neighbouring islands such as Barbados, Grenada, St. Vincent and St Lucia.

33. In this regard, T&T is subject to the environmental challenge of moving away from high demand of ODS substances. The country, through the National Ozone Unit (NOU), carried out in 2009 the inventory of consumption and use of HCFCs, which identified an estimated charge of refrigerant of about 745 tons of these refrigerants. This study identified that the use of HCFC-22 represents the largest annual consumption (97%), while HCFC-123, HCFC-141b and HCFC-124 the remaining[1]. The EPPD of MPD is seeking now opportunities and leading the path to introduce low-GWP alternatives with more efficient technologies to deviate from the projected business-as-usual (BAU) scenario, which is the substitution of HCFCs by HFCs. With the adoption of the Kigali amendment at the 28th Meeting of the Parties to the Montreal Protocol in 2016, the Multilateral Fund of the Montreal Protocol (MLF) will fund the phase down of HFCs.

34. Due to the commitment of Trinidad and Tobago in Phase I under the Montreal Protocol for the elimination of HCFCs, HCFC-22 most likely will be switched away by a high consumption of HFC refrigerants, typically R-134a, R-404A, R-410A and R-507C, substances that have a lower market price but a higher GWP. The main cause for this situation is that market suppliers of cooling refrigerants have promoted compliance with effective Montreal Protocol enforcement without giving proper attention to climate change, mitigation impacts and the limited availability of updated, more global climate-friendly cooling technologies. The following table shows from the 2010 Survey Report that the total charge of HCFC-22 refrigerant in the servicing sector (723 tons), where the residential and small commercial consumption accounts for 77% of total demand (563 tons), followed by commercial refrigeration and air conditioning (12%), industrial refrigeration (7%), and chillers, marine and transport, the remaining 4%[2].

[1] Trinidad and Tobago: *Ozone Depleting Substances: 2010 Survey Report*.

[2] *A Unique Approach for Sustainable Energy in Trinidad and Tobago, Natacha C. Marzolf Et al*

Table 4: Consumption of HCFC-22 in the Services Sector, Trinidad & Tobago, 2009

Sector	Total number of units	Total charge of refrigerant (tonnes)	Service frequency per annum	% of equipment requiring charge annually	Average recharge amount (kg)	Services demand (tonnes)	
						mt	ODP
Residential & Small Commercial	375,000	562.50	2	30	2	168.75	9.28
Transport	60	90	1	10	2.5	0.02	0
Commercial Refrigeration	12,235	18.35	1.5	25	20	61.18	3.36
Commercial Air Conditioning	49,440	74.16	1.5	10	50	247.2	13.6
Marine	30	45	1.5	25	3.75	0.03	0
Industrial Refrigeration	35,000	52.50	1.5	20	4	28	1.54
A/C Chillers	10,390	15.59	1.5	10	180	187.02	10.29
TOTAL DEMAND	482,155	723.23				692.2	38.07

Ref: Trinidad and Tobago, HCFC Phase-out Management Plan (HPMP), 2011

35. In T&T, the supply chain of electro-mechanical parts, refrigerants, equipment installation and post-sale servicing for commercial refrigeration is made up of a complex network of manufacturers, suppliers, maintenance companies and service technicians. This market condition, from the supply side, needs to be integrated into the project with a holistic approach, including training, implementation of energy efficiency standards and labelling, safe handling and disposal of refrigerants, among other issues, in order to trigger an alternative low-carbon market, such as the use of natural refrigerants which are more energy-efficient, like Hydrocarbons (HC), Carbon Dioxide (CO_2) and Ammonia (NH_3) that offer alternative solutions and the possibility to promote greener businesses.

36. There is also a need to assist in the establishment of a structure for ensuring that the equipment being imported into the country in the RAC industry meets international standards from an energy efficiency perspective. This is specifically crucial given that the ratings on the equipment is usually derived in countries with vastly different weather conditions and operating temperatures and are therefore inaccurate for application locally. Compounded with this is the need for a labelling scheme to ensure proper testing of the equipment for an energy-consumption rating perspective. With regard to the refrigerant disposal, at present Trinidad and Tobago where possible, engages in the recovery and recycling of refrigerant during the servicing and regular maintenance of the RAC equipment. There is currently no solution to the final disposal of spent refrigerant; however, this issue is now being addressed through activities of the Refrigerant Recover and Recycling Association (RRRA). The RRRA is a non-profit organisation set up at the national level, which is involved in devising refrigerant management plans for companies as well as is exploring possibilities for final disposal of refrigerants and end of life RAC equipment.

37. In the policy field, the Ministry of Planning and Development (MPD) is responsible for the alignment of the activities of the Government's thrust towards national development by focusing on restoring growth, diversity and confidence. The Environmental Policy and Planning Division (EPPD) falls under this Ministry and has under its purview the following:

(a) National Ozone Unit (NOU), which acts as the focal point for Montreal Protocol issues and is responsible for the national implementation of programs and projects related to the Ozone layer.

(b) Multilateral Environmental Agreements Unit (MEAU), which ultimately oversees all other multilateral environmental agreements. This Unit addresses climate change matters and supports governmental policy and planning on the related issues.

38. From the operational point of view, the baseline scenario for Ozone-Depleting Substances is composed of a set of programs, policy initiatives and studies driven by the NOU, which carries out a series of associated baseline projects being implemented. The MEAU oversees the baseline studies for climate change and to some extent energy efficiency. The key challenge for the national public interest is to transform policy instruments and energy saving targets into actions at the ground level. Government initiatives and programs under the baseline scenario include:

(a) The HCFCs Phase-out Management Plan (HPMP) funded by the Multilateral Fund for the Implementation of the Montreal Protocol United Nations Development Program (UNDP), which is delivering technical assistance to reduce the consumption of HCFCs in the country by 35% by 2020. These actions are based on a series of baseline activities to support the adoption of proper safe handling of toxic and flammable low-GWP alternatives for HCFCs. Technical training is mostly focused on the end-user groups who handle RAC equipment on a daily basis, and therefore are the ultimate persons responsible for the safety of such systems, but currently without any consideration to energy efficiency measures and best practices. This global policy was recently strengthened with the approval of the Kigali amendment to the Montreal Protocol Treaty. This

UNDP/GEF project will serve as co-finance and will deal with the safe handling and operation of equipment with natural refrigerants. This project would also put the country on track of its commitment under the Kigali amendment with respect to GWP reduction and the potential global environmental benefit.

(b) The Government of the Republic of T&T (GORTT) and the European Union (EU) signed a financing agreement for an EU Environment Programme on May 17, 2013. Under this agreement, the Government will be assisted with the following: i. T&T becoming an Extractive Industry Transparency compliant country, ii. Establishment of a new protected areas system, and iii. Mitigation of greenhouse gases in the medium term through the introduction of clean technologies, such as the conversion of public buses into Compress Natural Gas (CNG). Aligned with this UNDP/GEF project, this EU initiative will strengthen the institutional framework and provide clear strategic elements for reducing carbon emissions.

(c) The Government, in collaboration with UNDP, has initiated a 3-year project entitled "Low Emission Capacity Building Programme (LECB) for Trinidad and Tobago." The LECB Programme will support and complement other climate change projects of the Ministry of Planning and Development namely the (ongoing) Carbon Reduction Strategy and the (completed) IDB Technical Cooperation Project: "Mainstreaming Climate Change into National Development in Trinidad and Tobago", specifically to assist in the implementation of the National Climate Change Policy (NCCP). The LECB Project will also support the capacity required in various emitting sectors, including Government, industry, academia and the private sectors, to conduct and report on GHG inventories in order to facilitate the Third National Communication and first Biennial Update Report (BUR) reporting under the UNFCCC as well as to develop the respective Measuring, Reporting and Verification (MRV) systems. Additionally, the LECB project will support the identification and formulation of Nationally Appropriate Mitigation Actions (NAMAs) based on the outputs of the Carbon Reduction Strategy.

(d) The Government, also in collaboration with UNDP, has initiated the preparation of the National Cooling Plan (NCP). This Plan mobilizes the research, technical, market and financial resources to develop a sustainable and efficient cooling strategy for the country by establishing a national strategy to address country's needs in the RAC (develop the food cold chain, support greater comfort and productivity for building occupants). The plan also considers driving a rapid transition to high performance cooling equipment, linking the Montreal Protocol to climate protection efforts, taking into consideration energy efficiency and HFC phase down (Kigali Amendment) in order to mitigate greenhouse gas emissions, and support country's sustainable development goals.

39. In the baseline scenario for ODS, other independent interventions funded by the Montreal Protocol will continue to have limited focus on specific technical assistance to small scale end-users, in order to phase-out HCFCs-based equipment. Although Decision XIX/6 – from the Parties of the Montreal Protocol – had urged that "low carbon technologies should be prioritized in the process", there are institutional, technical, economic and financial barriers that block a wider adoption of such advanced technologies in this country. Moreover, the Montreal Protocol focuses its actions on the consumption of ODS (production + import - exports), and not on emissions of the stock equipment already in place or to be installed.

40. More specifically, the implementation of energy efficiency and ODS programs are also effected in conjunction with several government stakeholders such as the Ministry of Finance (Customs and Excise Division), the Ministry of Energy and Energy Industries, and the Ministry of Trade and Industry (Trade Licensing Unit and the Trinidad and Tobago Bureau of Standards). However, due to several issues, including a separate source of public funds, separate administrative controls by various ministries, and national priorities given

different national plans and policies, it is difficult to apply joint/synergistic work on cross-cutting themes as championed through the MEAU and the NOU throughout the entire Government. The lack of inter-governmental coordination is particularly evident in matters that are under another Ministry`s authority, such as issues related to energy (with the Ministry of Energy) or fiscal barriers (Ministry of Finance), and this has been considered a stumbling block to any eventual holistic approach to promote the adoption of a sustainable market trend for low-carbon, ground-breaking technologies for RAC end-use.

41. In the prevailing institutional context of the Republic of Trinidad and Tobago and its global commitments with the UNFCCC and the Montreal Protocol, this project will make a significant change in the existing consumption of inefficient technologies for refrigeration and air conditioning, mostly in the commercial and residential sectors, but with ample opportunities to expand the global impact into other sectors of the national economy, like the growing and large industrial sector due to its role in the national economic development. During the PPG stage, UNDP in close collaboration with the Environmental Policy and Planning Division of the Ministry Planning and Development used a participatory approach with other policymakers, national and international private market actors and Civil Society Organizations (CSOs), to identify those structural barriers that limit the potential for establishing an innovation-friendly, market approach for the adoption of low-carbon technologies for RAC end-use and other large-scale, market-driven alternatives like District Cooling and Combined Cooling Heating and Power (CCHP).

42. Without a proper coordination mechanism that can filter, evaluate, define priorities, monitor and guide holistic approaches and interventions, such baseline projects, programs and national policies may continue to have limited reach and may not be properly systematized and disseminated in an optimal manner. Moreover, without the appropriate roots for an enabling policymaking environment, private sector participation is limited to changing the current paradigm.

3) The proposed alternative scenario, GEF focal area[1] strategies, with a brief description of expected outcomes and components of the project,

43. The project's vision is to create a sustained market change toward the adoption of low-carbon RAC technologies in Trinidad and Tobago, which will deliver multiple benefits at local and global levels- through the integration of energy efficient technologies that would reduce the use of high GWP and ODS refrigerants. The country´s aim is to achieve a reduction objective in overall emissions of 15% by 2030 from BAU, which in absolute terms is an equivalent of one hundred and three million (103,000,000) tons of CO2eq, while achieving economic and social benefits from lower carbon development and increasing the country's economic competitiveness. The project also aims at introducing an innovative approach and business model for District Cooling development, which will be a major breakthrough deployment for air conditioning not only in Trinidad and Tobago but also for all Eastern Caribbean countries.

44. This vision is achieved by direct interventions on the immediate, underlying and root causes identified in the previous section. The project will provide institutional and capacity-building support, incorporating a break-through experience for UNDP in Trinidad and Tobago by contributing to the severe development challenge – that of increasing the use of low-GWP energy efficient technologies in support of the UNFCCC and the MP.

45. As summarized from the Theory of Change analysis, Figure 2 shows that the alternative path proposed by the project (entries) is geared at:

i. Strengthening the policy and regulatory framework in support of low-carbon EE, RAC technology end-use.

ii. Fostering an Energy Efficiency culture by building the capacity of the human capital in the RAC sector on matters of design, installation and maintenance of low-carbon technologies and increasing the awareness of the benefits of using low-carbon technologies at the corporate and consumer levels, through targeted outreach with local stakeholders.

iii. Developing and promoting successful pilots that can serve as an example for financial institution to adjust their risk and lending models for fiscal investments into similar EE initiatives and for scale-up projects in not only Trinidad and Tobago but also the Caribbean region.

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[1] For biodiversity projects, in addition to explaining the project's consistency with the biodiversity focal area strategy, objectives and programs, please also describe which Aichi Target(s) the project will directly contribute to achieving..

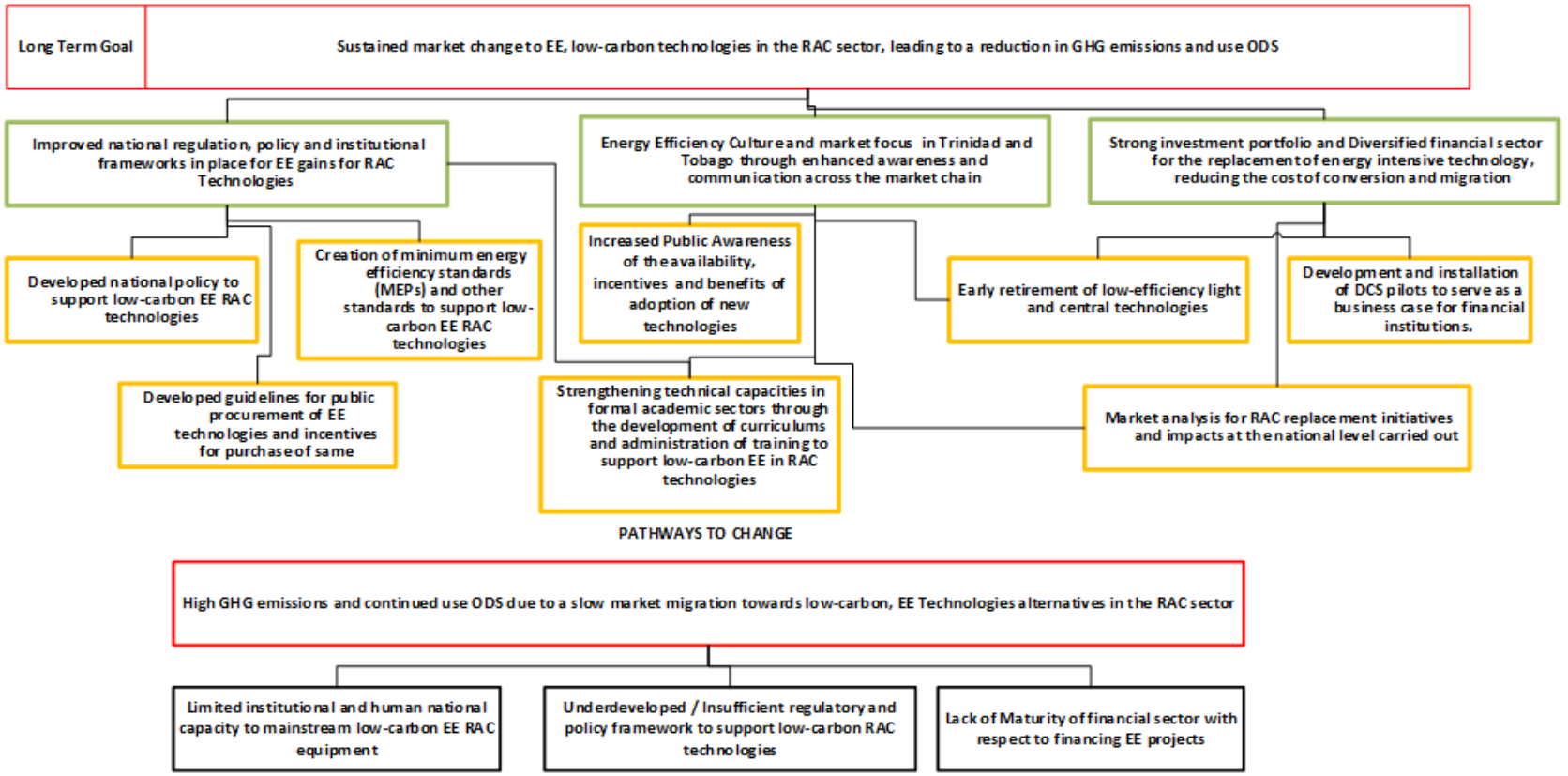

Figure 2: The Theory of Change Diagram

The project approach

46. As indicated in Figure 2, the objective of this project is to create a sustained market change toward EE, low-carbon technologies in the RAC sector, leading to a reduction in GHG emissions and the use of ODS. This impact is clearly linked to UNDAF/CPD Outcome 28 *"Communities and key sectors develop and increase energy efficiency and the use of*

renewable energy". Additionally, the project is aligned with UNDP Strategic Plan Output 1.5 "*Inclusive and sustainable solutions adopted to achieve increased energy efficiency and universal modern energy access (especially off-grid sources of renewable energy)*".

47. This project has three major components. The first one aims at enhancing the policy, regulatory and institutional dimensions needed to reach the proposed structural change with regard to low-carbon for the use of RAC systems in the country. The second component strengthens technology implementation over the long-run and customer confidence through the implementation of pilots as an effective way to remove the presence of systemic barriers and to change the existing highly subsidized electricity pricing landscape based on thermal power generation as well as on the lack of successful business cases by triggering investments and private sector involvement. A third component aims at collecting the lessons learned from the pilots as input for enhancement of technical regulation, for improving standards and labelling, learning from experience, and sharing a learning curve with similar contexts in the Caribbean as well as a full-fledged compliance verification of global environmental indicators that will take place during project execution under the supervision of UNDP.

48. A strengthened national policy, regulatory and legislative environment for EE RAC technologies in Trinidad and Tobago would provide an atmosphere that promotes and enables the use of low-carbon RAC technologies, creating more coherence between policy makers, regulators, importers and consumers. The project through its Component I, would explore the development of specific policies, regulations, and standards supported by incentives to promote the importation of quality equipment that meet international standards with benchmarked public procurement guidelines, ensure proper installation, and create a sustainable market for EE, low-carbon RAC technologies. Outcomes under this component would directly attack causes 1, 2, 5, 6, 8 and 9 as indicated in Figure 1: The Theory of Change – Problem Tree Analysis Diagram.

49. The project seeks to catalyse an accelerated market transformation in the RAC sector towards energy efficient and low-carbon / GWP technologies, building upon a collaborative approach to problem solving that focuses on the analysis of the RAC market for replacement initiatives, technical capacity building, customize financing mechanisms in the financial sector to support the required market change, through engagement and continuous interaction with the project stakeholders.

50. Under Component II, as part of the accelerated market transformation, the project foresees to design and implement at least two District Cooling system (DCS) pilots building upon technical and financial performance feasibility studies conducted in Trinidad and Tobago. Table 5 show the DCS project pilot matrix used to prioritise the most feasible sites for the DCS pilots. These DCS projects would serve as a business case and evidence for climate change mitigation actions, which will assist with the design of financing strategies in support of low-carbon, energy efficiency initiatives in the RAC sector. The project through the initiatives identified above will catalyse the migration towards the early-retirement of decentralized / and light low-efficiency technologies in the commercial and residential RAC sectors in Trinidad and Tobago. The project will also seek to provide a business/risk model for use by financial institutions when reviewing EE project applications for financing and provide capacity development to transition these instructions to a higher level of diversification with respect to the creation of financial instrument for lending in EE projects. Outcomes for Component II would remedy causes 3, 6, 7 and 10.

Table 5: DCS Project Pilot Matrix

#	Pilot project	Energy efficiency improvements	Refrigerant use reduction	CO2 emission	Capex range (MUSD)	Priority DC	Prioirity Centralization	Remarks
1	Piarco International Airport	High	Medium but with low/no GWP	High	13 - 15	1		Recommended as pilot for DC. Capex indicates fully built-out system including the airport and potential off-takers outside the airport.
2	UTT Couva	High	High	High	3 - 4	1		Recommended as pilot for DC.
3	Downtown area Port of Spain	Medium	Medium	Medium	16 - 18	2		Good potential for DC but higher complexity due to technical and construction challenges. Involvement of large amount of stakeholders.
4	ANR Robinson International Airport	High	Medium	Medium	0,5 - 1	2	1	Recommended as pilot for centralization of building system as a first stage.
5	University of West Indies	Medium	Low	Low	N.A.	3		Centralized system in place.
6	Environmental Management Authority	High	High	High	0,2 - 0,3	3	1	Recommended as pilot for centralization of building system as a first stage.

51. Finally, under Component III, the project will capture lessons-learned, monitor the project´s activities and provide the required feedback, through an awareness-raising campaign and information strategy, which includes dissemination at the national, regional and global levels. Annual workshops will be organized to create awareness, allow a request for and capture of feedback. Information on the benefits of EE technologies, its benefits and available technologies would also now reach stakeholders and the general public through information and outreach, acting directly on causes 1, 2 and 4.

Key assumptions

52. The project's approach is based on various assumptions that will be critical for achieving the expected changes as per the Theory of Change analysis:

- A collaborative approach to policy making that is sustained and continuously improves, integrating gender related issues across the implementation of the proposed activities.
- Collecting the lessons learnt would foster continuous improvement during the implementation phase and assisting in the development of a commercial-driven model for other similar implementations after the project´s completion.
- Enhancement along the market chain through the creation of barriers to the import of low EE and high GWP technologies will open opportunities for market growth in the EE, low GWP RAC industry.
- The creation and implementation of Minimum Energy Efficiency Standards (MEPs), combined with regulation at the ports of entry would boost the EE market within Trinidad and Tobago for RAC technologies.
- Successful pilots demonstrating the potential of EE, low-GWP RAC technology would attract an investment portfolio on replacement of energy intensive technologies.
- Increased attention to gender and social equity in the RAC sector, since there is a growing concern regarding fairness and opportunities for marginalized groups in society.

Expected Results*:*

53. Trinidad and Tobago, and its capital city in particular, Port of Spain, offers great prospects for successfully demonstrating how a growing metropolitan region in the Caribbean could make the shift in the current paradigm due to the conventional use of RAC technologies, with the implementation of an alternative path based on more sustainable means of air conditioning and cooling servicing. In accordance with its national policy indicated in the provisions stated in the "*National Climate Change Policy",* the contributions expected from this UNDP/GEF project should facilitate the implementation of this Policy by taking action in two stages.

54. The first stage will focus on fostering a more resilient policy environment by adopting an integrated approach and coherent strategy for market development of EE gains for RAC end-uses; over the long-run enhancing global environmental benefits and socio-economic co-benefits. This will be done by improving institutional capabilities and inter-governmental coordination, empowering stakeholders, both in the public and private sectors, updating the current regulation for RAC technologies regarding Standards and Labels (S&L), mainstreaming the public procurement of RAC EE equipment and the creation of fiscal instruments and economic incentives.

55. The second stage is to accelerate RAC market transformation towards less energy intensive and low-GWP technologies. The approach will be based on the execution of innovative pilot interventions to demonstrate progress for a change over the business-as-usual paradigm, for policymakers, national power and environmental regulators, project developers, investors and end-users. This alternative path includes more energy efficient RAC systems conventionally used and the innovative District Cooling system (DCS)[1]. The

latest is based on central production of cold water, which is distributed to customers (usually a large facility), in a closed loop pipe network. At the customer end of the system, the cooling is transferred to buildings in Energy Transfer Stations (ETS).

56. The project's strategy is based on three principles: (i) an integrated approach, creating synergies among the otherwise poorly coordinated decisions of national policy-makers (ministries of the Central Government and power and environmental regulators), and actions at the operational level (project developers, investors and consumers); (ii) encouragement of reliable innovation, accompanying decision makers to foster the necessary structural changes in public policies and among key stakeholders and practitioners (for instance, increase the institutional capacity for DCS); and (iii) the implementation of pilot programs as an effective way to remove barriers to change, to learn from experience, to accelerate the adoption of innovative, low-carbon/HCFC phase-out RAC technologies and best practices at all levels, from regulators to operators to end users over the long-run.

57. The project has three substantive components aligned with five main outcomes, embracing the institutional, regulatory and technological dimensions needed to reach the proposed structural change with regard to promote the adoption of low-carbon technologies for Refrigeration and Air Conditioning (RAC) end-use.

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[1] District Cooling System (DCS) means a system in which chilled water is supplied from one or more central chiller plants to user buildings within the area served by the system through a network of pipes for air conditioning in the buildings.

Component I: <u>Enhance national policy, regulatory and institutional frameworks for sustainable end-use of RAC technologies.</u>

58. The heart of this component is to strengthen the national policy, regulatory and institutional frameworks in order to make the transition to a more energy efficient environment for RAC technologies in which market-oriented goals govern policy, planning, and investment decisions, for both, the short and long term.

59. Outcome 1.1 *"The national policy, regulatory and institutional frameworks for Energy Efficiency (EE) gains for RAC technologies have been strengthened"*. This outcome will follow best industry practices in relevant aspects of policy implementation. Accordingly, the government will enforce this policy through the incorporation and integration of a variety of stakeholders and drafting and amendment of relevant legislation. The implementation of this policy should be aligned with the multilateral environmental agreements to which T&T is a signatory, particularly the UNFCCC and the Montreal Protocol.

60. The rationale to explain this outcome and the following six closely interrelated outputs is that without the GEF, the technological transition to low-carbon/HFC phase-out will probably progress at a much slower rate. Effectively improving the promotion of commercially driven, alternative technologies in T&T demands appropriate regulations and technical measures necessary to implement innovative EE demand management measures that are foreseen in the following outputs. Developments related to District Cooling technologies cultural change in policy makers and regulators, decision maker behaviour as well as in developing national capacities, would not happen at the desired speed without GEF resources due to policy fragmentation and the lack of technical knowledge.

61. Output 1.1.1: *"Improved inter-governmental coordination for integrated policy-making of environmentally-friendly approaches among national public institutions"*. Only with synergies between government policy makers, would there truly be advancement of the various initiates with respect to protection of the ozone layer and climate change mitigation; in response to one of the critical barriers identified in the overall governance for triggering more sustainable RAC markets in T&T.

62. The following activities will be carried out to achieve Output 1.1.1:

i. Development of a national policy that synergises the MP, NDC, and CRS engaging all parties from public and private sector regarding decision-making, and propose, as needed, reflecting gender impact guidelines.
ii. An analysis of the current building regulations for public and private structures with a view to upgrade them to ensure that building designs are aligned to national standards and practices and thereby promote energy efficiency and to identify any barriers that may need to be addressed to facilitate implementation of RAC energy efficiency applications in public buildings; and a study on the outlook for power market subsidies in T&T on electricity tariffs (commercial, residential), their impact on investment and financial returns for energy efficient RAC applications, and recommendations to improve market development and financial sustainability.

63. Output 1.1.2: *"Strengthened national planning and policy framework for market development of EE gains for RAC end-uses"*. Three AC technologies are being used, all using HCFC/HFC, i.e.: centralized systems, split systems and multi-split systems for major buildings, using HCFC and HFC as circulating refrigerants. The project will support an alternative framework that will lead in twofold: i. assist policy makers in structuring a low-carbon path for RAC technologies, and ii. steer a new market for a very efficient/HFC free zones.

64. The following activities will be carried out to achieve Output 1.1.2:

i. Develop a national policy for the development of RAC sustainable markets based on high EE rating and low GWP as a core element of the National Cooling Plan.

ii. Development of Minimum Energy Performance Standards (MEPs) for RAC equipment, including the review of existing energy efficiency/consumption reduction targets for the RAC sector, description of existing Minimal Energy Performance: requirements, enforcement, national testing procedures, and description of existing labelling system: requirements and enforcement.

iii. Implement an awareness raising campaign for the MEPs developed for the RAC equipment.

65. Output 1.1.3: "*Standards & Labelling (S&L) for RAC technologies developed, approved and ready for enforcement by the T&T Bureau of Standards (TTBS), including enhancement of technical capacities of public officers to assure S&L compliance*". Energy labels and Minimum Energy Performance Standards (MEPS) are recognized by T&T energy and environmental policy makers among the most important ways to influence the market. MEPS are an effective regulatory instrument to drive the increase of product efficiencies. They are very effective policy measures, especially for small RAC appliances, such as refrigerators and air conditioners. The project aimed at implementing the best experience related to the energy labelling of RAC equipment and supporting the proper implementation of a labelling scheme. This goal is in tune with the national policy to enhance the visibility and credibility of the market for labelled products as a means to improve energy efficiency for other end-uses.

66. The following activities will be carried out to achieve Output 1.1.3:

i. Development and approval of national standards and labelling for EE, RAC equipment, including the implementation of procedures for conformity assessment.

ii. Development of technical specifications for installation and connection to DCS.

iii. Establish a Memorandum of Agreement (MOA) for testing, validation and certification of EE RAC equipment, through recognition and partnerships with testing facility duly accredited and authorized for RAC product certification.

iv. Implementing an awareness raising campaign to enforce S&L for EE RAC equipment including technical specifications for DCS.

v. Develop a codified system for certification of RAC EE equipment, systems and products (energy efficient air conditioning system) in Trinidad and Tobago.

67. Output 1.1.4: *"Guidelines and model documents for mainstreaming the public procurement of RAC EE equipment, including considerations for not-in-kind technologies and natural refrigerants, implemented"*. The role of the entire public sector is fundamental to trigger an alternative path; in this regard, the project will promote through this output that all public procurement steps for new RAC equipment should comply with, commercially-drive, the state-of-art high EE, low GWP equipment.

68. The following activities will be carried out to achieve Output 1.1.4:

i. Analysing the current public procurement system for central and split RAC systems.

ii. Preparing a procurement system for high EE, low GWP Refrigeration and Air Conditioning systems in the public system.

iii. Preparing a road map, for making the procurement system mandatory.

69. Output 1.1.5: *"Fiscal instruments and economic incentives for the import of high EE rating RAC equipment with natural refrigerants where applicable, developed"*. This project would catalyse the increased importation of EE RAC technologies by the development and enhancement of existing financial incentives, which promote the usage, and importation of these types of technologies.

70. The following activities will be carried out to achieve Output 1.1.5:

i. Analysing the current tax system (such as import, value-added and sale taxes) and on-going incentives for infrastructure retrofit and electro-mechanical reconversion, in the commercial and industrial sectors.

ii. Develop a tax incentive proposal to promote the low-carbon and low-GWP markets.

71. Output 1.1.6: *"Strengthening technical capacities in the formal academic sector and in the specialized technical CSO (ARIA) to promote market development of energy efficient, low carbon refrigeration and cooling systems, including: design, assembling, installation, operation and maintenance"*. In tune with the national energy policy to deploy energy efficient technologies, this output aims at providing training of the stakeholders involved in the project in order to sustain the market transformation in the future. The project will lead to the generation of a very Energy Efficient/HFC free zone, as the absorption chillers will not need refrigerants, leading to a significant reduction in CO_2 emissions. ARIA, UWI and UTT also, in their training programmes will include the best practices related to maintenance of other type of installed RAC systems to ensure optimum air quality, considering particular gender needs of women, men and children in indoor environments.

72. The following activities will be carried out to achieve Output 1.1.6:

i. Carrying out training programs for officials and practitioners of public and private institutions in EE project development for RAC end-use.

ii. Carrying out training programs for officials and practitioners of public and private institutions in the design, equipment procurement, and technology transfer, handling procedures, and monitoring performance operation for low-GWP, low-carbon RAC technologies for different end-use applications.

iii. Carrying out a training program for bank officers and other financiers on life-cycle costs, financial risk analysis, and cost-benefit analysis for RAC replacement initiatives.

iv. Carrying out a training program for the launch of the District Cooling technology under the leadership of the T&T Air Conditioning and Refrigeration Association (ARIA), called "*training the trainees*". It will be implemented with the assistance of international experts during the execution of the project and will be continued on a regular basis as part of ARIA´s training curricula. The District Cooling program includes the following modules:

- Ø Gathering and analysing data based on technical concepts and the economic and financial model adapted to the country´s capacities.
- Ø Technology Production: compression, absorption and free cooling.
- Ø Storage: seasonal and day-and-night storage.
- Ø Distribution and Energy Transfer Stations (ETS): types of distribution systems and connections to large facilities through ETS.
- Ø District Cooling system design: estimate the cooling demand profile.
- Ø Technical Guidelines for connection to DCS, including specifications, DCS connecting design, testing and commissioning and handover of substations, operation and maintenance.

Ø Guideline for utilisation and optimisation of consumer´s air conditioning installation.

Component II. Accelerate RAC market transformation towards less energy intensive and low-GWP technologies.

This component will gear the reduction of GHG emissions resulting from the implementation of low-carbon, cost-effective pilot investments over the short term (4 years) and to sustain the alternative structural change over the long term (20 years). This component will also be implemented under the leadership of the Environmental Policy and Planning Division of the MPD in very close interaction with two key stakeholders, i.e.: mainly with the UNDP CO as the implementing counterpart under the National Implementation Modality (NIM), and the Environmental Management Agency (EMA) to assure that all steps of the investment continuum are in compliance with the national environmental regulation. In order to guarantee technology neutrality, the project will consider the best low-GWP technology in order to support innovation and sustainability of the project. This consideration cannot be limited to only CO2 and hydrocarbons, but must give equal consideration to all potential low-GWP alternatives to HCFCs and HFCs. This component will build upon some actions already underway, mainly institutional programs by TTBS on S&L and the feasibility study for the implementation of District Cooling systems; through two expected outcomes.

73. Outcome 2.1: *"Investment path along the RAC market chain enhanced"*. The rationale for this outcome is that pilots are considered by the project strategy as essential to overcoming current knowledge capacity and cultural behaviour, described above, which make policy-makers and project developers sceptical towards new RAC alternatives. The project will be supporting this outcome, providing the necessary assistance to project developers and investors in the piloting interventions. These pilot interventions in selected public and private buildings will be executed according to the national policy developed in Output 1.1.2. Outcome 2.1 is expected to be achieved through two outputs:

74. Output 2.1.1: *"Market analysis for RAC replacement initiatives and impacts at the national level carried out"*. This output would provide substantive information to sustain a major market transformation for the growing RAC technologies in the commercial and household sectors. For conventional RAC equipment, the project will focus on light and centralized RAC systems in the commercial sector, mostly running on HCFC-22 refrigerant. In the residential sector, it will focus on air conditioning light units also using mostly HCFC-22 of the conventional split-type. For District Cooling systems, it is expected that a market transformation will be triggered, as a result of the project, based on the financial opportunities identified during the execution of the PPG, as shown in Table 2. The ProDoc has planned to carry out a detailed market analysis during year 1 of project implementation (Annex A: Multi-year Work Plan, of the ProDoc).

75. The following activities will be carried out to achieve Output 2.1.1:

i. Formulating a feasibility study for the triggering, nationwide, a major market transformation for the use of low-carbon, low RAC units in the commercial and household sectors.

ii. Preparing a data collection and monitoring plan to evaluate performance over time, energy savings, compliance with the S&L regulations and levels of equipment sales.

76. Output 2.1.2: *"In-country technical capacity and backstopping for assembling energy efficient RAC systems has been improved"*. To mainstream innovative knowledge for low-carbon RAC systems, the involvement of large CSOs, such as ARIA, is necessary. Activities under this output will support fresh knowledge to complement current training efforts for RAC technicians and practitioners.

77. The following activities will be carried out to achieve Output 2.1.2:

i. Development of curriculum for technicians on installation, and maintenance of EE RAC systems.
ii. Carry out training sessions at both the trainer level and the technician level to build capacity.

78. Output 2.1.3: *"A structure for ensuring that RAC equipment meets international energy efficiency standards through the TTBS established"*. The project, through the PMU, will collaborate with the TTBS and the RAC sector to develop and adopt quality standards that would ensure through the activities of the implementation division of the TTBS, that the RAC equipment being imported meet international standards, which by extension would make them more attractive to consumers.

79. The following activities will be carried out to achieve Output 2.1.3:

i. Development an inspection regime for EE standards for RAC equipment.
ii. Sensitization on the new standard through public awareness campaign.
iii. Training of TTBS on implementation of the new standards.

80. Output 2.1.4: *"Capacities for project investment analysis and customized financing mechanisms in the financial sector to support market change for energy efficient RAC systems strengthened"*. The project, through the PMU, will trigger the participation of the financial sector by promoting innovative financial mechanisms for RAC investments, including but not limited to conventional financing, Energy Servicing Companies (ESCOs), shared savings, and guarantee funds; among others. Activities under this output will target both, conventional banking sources and private investment funds actively engaged in green financing at the regional and international level in the Caribbean.

81. The following activities will be carried out to achieve Output 2.1.4:

i. Provide training to staff of lending agencies for a deeper understanding of analysing the financial risks, opportunities, returns on loans and the reality of favourable paybacks of EE investments.
ii. Provide training to project developers, on investment proposal designing.
iii. Development of business cases based on the DCS market approach.

82. Outcome 2.2: *"Investment portfolio on replacement of energy intensive technologies implemented"*. The rationale for this outcome is that pilot investments are considered by the project strategy as essential to overcoming current knowledge capacity and cultural behaviour, described above, which project stakeholders sceptical towards new RAC alternatives. The project will be supporting this outcome, providing the necessary assistance to project developers in the piloting interventions. These pilot interventions in selected public and private facilities will be executed according to the investment path developed in Output 2.1.1. This outcome is expected to be achieved through four outputs:

83. Output 2.2.1: *"District Cooling technical and financial performance feasibility study completed; aiming at the installation of two District Cooling Zones, including potential developers and end-users (Piarco and Couva areas in Island of Trinidad)"*. Effective District Cooling solutions have so far not been introduced in the country. Under this output, this project is seen as a way to introduce non HCFC/HFC with substantially improved energy efficiency with a very innovative approach because energy efficient / HFC free zones currently do not exist in T&T.

84. The following activities will be carried out to achieve Output 2.2.1:

i. Completing the business development phase and preparation of the business memorandum for all stakeholders.

ii. Validating the feasibility study and business case for the development of the demonstrative interventions cooling systems, which includes the baseline energy consumption for identified pilots and defining the actual market cooling demand for the project.

iii. Preparing a data collection and monitoring plan to evaluate performance over time.

85. Output 2.2.2: *"Implementation of District Cooling pilot at Piarco and Couva"*. The Couva pilot project would introduce of District Cooling by using waste heat from power plants located next to their facilities, owned by the Trinity Power Limited (TPL), whilst the Piarco pilot would introduce conventional chillers, with EE and low GWP technologies. Both pilots aim at demonstrating the technical and financial viability of introducing District Cooling systems. The PPG stage has also considered other potential business interventions, as presented in Table 5, in case the financial and technical decision-making process by project developers of the Piarco and Couva sites is not favourable during the project implementation period.

86. Existing power production units, in this case gas turbines located at Trinity Power Plant, generates also heat that is currently wasted. This heat can be used for cooling purposes by adding heat recovery equipment. With the new absorption chiller technique, waste heat from existing sources at the Trinity Power Plant can be converted into cooling energy with only a small supply of electricity. New absorption chillers, cooling towers with auxiliaries for cooling production and heat recovery equipment will supply cooling energy through pre-insulated steel pipes to reach new Energy Transfer Stations (ETS) located in the selected customer buildings for transfer into the building's internal cooling system.

87. Once the two pilot interventions are completed and under operation during the execution period of the project, the scope to accomplish in this Output 2.2.2 is to develop a set of minimum commercial and technical requirements for District Cooling to:

i. Drive efficiency upwards and optimize long-term costs.

ii. Rely on best industrial practice and design standards.

iii. Review and access the market expected cooling demand.

iv. Identify the optimal system configuration for the District Cooling systems based on market sector demand, national context as well as national policies.

v. Estimate the Project Capital Expenditures (CAPEX) due to the equipment needed together with civil, mechanical, and electrical works, management and engineering as well as Operational Expenditures (OPEX).

vi. Prepare the "Project Business Model" with OPEX/CAPEX/Income of the District Cooling system to be developed during the project implementation period.

vii. Based on the Business Model, this exercise will serve to develop standardized procurement strategies as well as the District Cooling tariff in order to mainstream this alternative over the long-run.

viii. Identify key success factors and risks.

88. Output 2.2.3: *"Early-retirement of decentralized, energy-intensive old units and replacement with more energy efficient, centralized-based AC units in two large facilities with high visibility in public facilities installed and operating"*. The rationale for this output is to continue strengthening the nation´s capacities for the RAC replacement considering both, energy efficiency and global benefits of phasing out ODS integrating the different phases of the project continuum targeting both, the public and private sectors.

89. The following activities will be carried out to achieve Output 2.2.3:

i. Formulating a feasibility study for the triggering a major market transformation for large centralized RAC HCFC-based technologies nationwide, including an impact assessment study for RAC replacement nation-wide.

ii. Implementing at least three demonstration projects of intensive RAC end-use in the private sector, such as large hotels, private schools and shopping malls.

iii. Implementing at least three demonstration projects of intensive RAC end-use in the public sector implementing the mandatory procurement of green public goods, such as hospitals and academic facilities.

iv. Enhancing the capacities of the Refrigerant Recover and Recycling Association (RRRA) to support the recovery and recycling of the retired decentralized, energy-intensive RAC equipment.

v. Preparing a data collection and monitoring plan to evaluate performance over time, energy savings, compliance with the S&L regulations and levels of equipment sales.

90. Output 2.2.4: *"Early retirement of low-efficiency, light units (split/window systems) and their replacement with more energy efficient commonly used units in the residential and commercial sectors triggered"*. RRRA is currently attempting to assist with the compliance to the Montreal Protocol for the recovery and recycling of spent RAC refrigerants, in this regard, the project will continue supporting and enhancing current actions to avoid intentional or unintentional release of refrigerants that may occur during the processing and delivery of gases to the point of final use. For waste metals and electronics of light units, the project will convey with RRRA an alternative plan based on its current experience with the refrigerant element.

91. The following activities will be carried out to achieve Output 2.2.4:

i. Design of an innovative scheme, privately driven, for the recovery and recycling of waste metals and electronics of light units, including capacity building entrepreneurial capacities including business modelling and planning), co-financing recovery and recycling facilities, and outreach activities.

ii. Supporting commercially driven initiatives responsible for recovering and recycling of refrigerants, like building up entrepreneurial capacities (business modelling and planning), co-financing recovery and recycling facilities, and outreach activities.

iii. Developing a mechanism to collect and record data on the types and volumes of refrigerant recovered by recovery and recycling organisations.

iv. Establishing a RAC recycling hotline and drop-off points in both islands of Trinidad and Tobago with assistance from RRRA.

v. Design variants of RAC equipment replacement or early retirement fully documented and made publicly available.

Component III. Information outreach and Monitoring & Evaluation (M&E) implemented.

92. This component has been established for project monitoring and evaluation (M&E). It includes the design of an awareness raising campaign and information strategy and a programmatic monitoring of project global indicators (GEF Core Indicators 6.2, 6.2 and 11), together with a review of on-going, activities to ensure successful project implementation in accordance with UNDP and GEF procedures. The Project Management Unit will design the project´s M&E system and will be responsible for implementing the project´s M&E plan, including the project´s inception workshop and annual planning workshops.

93. Outcome 3.1: *"An information strategy to share knowledge gained, lessons-learned and best practices developed"*. The rationale for Outcome 3.1 responds to the need for designing and implementing a holistic strategy to increase public awareness towards the global environmental issues associated to the sustainable use of RAC technologies. Based on outputs of Components I and II, and under the operational leadership of the EPPD of the MPD, this strategy will highlight local benefits and global impacts to raise awareness in the national population, including gender and social related issues. Of greater importance will be given in this strategy to mainstream knowledge and stakeholder benefits of the District Cooling technology, given its great potential for climate change mitigation in T&T and the entire Caribbean region. This outcome is expected to be achieved through two outputs:

94. Output 3.1.1: *"An awareness raising campaign and information strategy implemented, including lessons learned and best practices dissemination at the national, regional and global levels"*. Information outreach for the citizens, as main beneficiaries of the project, is critical to sustain the project´s interventions over time. Cost-efficient innovations will be documented for the public as well as for specific audiences, as the project develops.

95. The following activities will be carried out to achieve Output 3.1.1:

i. Preparing an impact assessment study for RAC replacement nation-wide.

ii. Designing variants of RAC equipment replacement or early retirement fully documented and made publicly available.

iii. Carrying out technical workshops to socialize with policy makers, RAC traders and importers, large end-users and the academia, the main findings of this study.

96. Output 3.1.2: *"National capacities for the public and private sectors for calculations and monitoring of global impact indicators enhanced"*. This output seeks to build the capacity of the both the public and private sectors stakeholders on the collection, calculation and monitoring of global impact indicators and related information. The information collected and provided by these stakeholders would be added to the MRV and inform policymaking and decision making activities.

97. The following activity will be carried out to achieve Output 3.1.2:

i. Provide training to the public and private sectors in collaboration with the EPPD of the MPD, in support of data collection for the MRV. For DCS, national capacities would be enhanced considering the global benefit of using waste heat generated by thermal power plants, with key stakeholders in the RAC sector.

98. Outcome 3.2: *"A Monitoring and Evaluation plan and adaptive management applied in response to needs, as per the UNDP/GEF ProDoc procedures and of its environmental progress and impact indicators, has been designed and implemented"*. This outcome includes a programmatic monitoring of project indicators together with a review of on-going activities to ensure successful project implementation in accordance with UNDP and GEF procedures. M&E will also include the GEF Core Indicators of the Projects Results Framework (Section VI).

99. Output 3.2.1: *"Design and implementation of a module for data collection on GHG and HCFC/HFC emissions by residential and commercial buildings integrated with the national MRV system (including the consolidation of relevant indicators)"*. The project through the PMU in collaboration with the EPPD of the MPD will design a module for data collection that integrates into the MRV systems with a focus on collecting data related to GHG and HCFC/HFC emissions, which would be used for reporting to the respective conventions and inform policy development.

100. The following activity will be carried out to achieve Output 3.2.1:

i. Design of a module for data to be collected and recorded in the knowledge management system under the MRV system, adapted to the different cooling capacities of the most commonly used systems.

101. Output 3.2.2: *"Design and approval of a monitoring and evaluation plan, including gender and reporting indicators as well as UNDP Social and Environmental Screening Procedures (SESP)"*. This output includes close monitoring of the Project Risks matrix described in Table 8 and validating mitigation measures to reduce those unexpected risks. The project, through the PMU, will give special attention to the compliance of national legislation as per the EMA Act No 3 of 2000, Chapter 35:01 enforced by EMA during the implementation of the pilot investments, as per Annex G: Environmental and Social Management Plan (ESMP). For the DCS pipeline installation, Trinidad and Tobago has developed strong environmental measures due to the existing oil and gas industry that has well established environmental protocols.

102. The following activity will be carried out to achieve Output 3.2.2:

i. Implementing a program for monitoring and evaluation (M&E) of social and environmental risks in order to comply with the national environmental legislation.

103. Output 3.2.3: *"Monitoring of project progress in compliance with UNDP and GEF guidelines"*. This output includes monitoring of outcomes, outputs, activities, budget and monitoring in accordance with UNDP and GEF procedures and the guidance of this ProDoc and its annexes. The project –through the PMU- will deliver each year to UNDP the Program of Activities and the procurement plan in order to guarantee Annual Spending Limits (ASLs) assurance.

104. The following activities will be carried out to achieve Output 3.2.3:

i. Carrying out "at least one meeting of the National Steering Committee held every six months". The Project Management Unit (PMU), in coordination with the DGTPH, will organize these biannual meetings to guarantee successful project implementation in accordance with UNDP and GEF procedures.

ii. Implementing a program for monitoring and evaluation (M&E) of project results in order to inform adaptive management of the programme and improve the implementation of the project, in accordance with the UNDP management procedures.

105. Output 3.2.4: *"Carrying out of project progress report(s), including PIRs, Mid-term Review and a Terminal Evaluation"*. Progress reporting is an essential activity of project and would be the responsibility of the UNDP and the PMU. Annual reports on progress against budget, schedule and scope would be carried out.

106. The following activities will be carried out to achieve Output 3.2.4:

i. Carrying out "Annual progress reports in accordance with the established monitoring plan agreed in the ProDoc". The National Project Manager will prepare annual Project Progress Reports (PPR) and will provide inputs to the UNDP-CO for preparing the annual Project Implementation Report (PIR). These reports will include the Project Results Framework with outcome indicators, GEF Core Indicators, baseline and annual target indicators, monitoring of the Project Risks matrix, and identifying potential risks and mitigation measures (see Section VII for further details).

ii. Carrying out the "Mid-term review –MTR-". The MTR will be carried out two years after project start-up, at the latest, and will assess the progress of each project activity and attainment of the project's indicators presented in the Project Results Framework (Section V ProDoc) and Multi-annual Work Plan (Annex A ProDoc). This evaluation will also assess the disbursement of financial resources and co-financing provided by project partners, and it will monitor and assess administrative aspects for the execution of the project. The Mid-Term Review (MTR) will also inform the adaptive management of the project and improve its implementation for the remainder of the project's duration.

iii. Carrying out the Terminal Evaluation (TE). The TE aims to evaluate whether all planned project activities have been developed, resources granted by the GEF have been disbursed and spent in line with GEF and UNDP policies and rules, and in accordance with the activities as set out in this Project Document (ProDoc). The Terminal Evaluation will also extract and identify lessons-learned, how to disseminate them most efficiently and make recommendations to ensure that project results become sustainable.

4) Incremental/additional cost reasoning and expected contributions from the baseline, the GEFTF and co-financing;

107. The project design has included a strategy to deliver optimum results with the available resources to move towards a more sustainable path: the adoption of low-carbon technologies for Refrigeration and Air Conditioning (RAC) end-use; focused on low-cost/high-delivery innovative approaches already tested in other major energy-intensive environments worldwide. In addition, it will provide specific liaison assistance to improve the integration of the climate change mitigation with the allocation of complimentary resources to phase-out the consumption of Ozone-Depleting Substances, thus optimizing multiple benefits available at the national level. For each action, the use of resources is kept to the minimum needed to achieve the desired change. Therefore, the project is expected to prove the effectiveness of each action in an innovative way for much larger replication overtime.

108. In Component I, capacity-building activities, including training and better information management through the promotion of inter-institutional coordination, will allow for the incorporation of innovative approaches along the project continuum not only taking into account the decision making process of the high-level national authorities with the policy and regulatory instruments but also including specific actions for the proactive participation of the private sector through fiscal incentives and levelling off the ground for mainstreaming the public procurement of EE RAC/HFCF phase-out equipment and technologies. This approach increases the impacts of the project; for the public sector with the policy and regulatory instruments, a more efficient use of the resources of the institutions is expected, as well as an increase in long-term public financing that will serve to strengthen synergies, avoid duplication of efforts and reduce overall costs. In the collective context of Trinidad and Tobago, regular inter-institutional coordination meetings will serve to identify complementarity and joint planning together with the execution of activities in the field, and make this unique project in the Caribbean region very cost-effective.

109. The selected pathway should facilitate the removal of barriers to the deployment of low-carbon mobility options. A substantial part of the project resources is budgeted under Component II, accounting for 72% of the GEF funding (excluding project management) which is dedicated to this Component. This high share is justified by the lack of experience in District Cooling technologies in most of the Caribbean energy systems facing similar institutional and regulatory barriers: a wide array of regulations have to be modified, requiring the involvement of a variety of technical services within the national government and other public agencies.

110. On the other hand, actions in the field of the EE RAC technologies are profitable. Pilot demonstrations are the most convenient way to test the validity or viability of a process before it is applied on a large scale. For example, the pilot demonstrations under Outcome 2.2 are considered sufficient to represent the entire system and generate benefits, based on the consultations and raising awareness activities carried out with project stakeholders in Outcome 3.1. The proposed pilot investments (USD8.8M) are profitable since they will apply the practices and technologies that are being widely used in different parts of the world such as DCS, in addition to generating much greater benefits since they promote a citizen´s culture committed with their environment.

111. The participation of stakeholders at all levels will contribute to the cost/effectiveness of the project. Overall Governance (National Steering Committee, PMU, national and international consultants, UNDP), as well as the dialogue platforms will ensure adequate planning and execution of activities in line with the project's objectives, low-carbon sustainability priorities, as well as the complementarity with national policies.

112. Outcome 3.1 of Component III, a public awareness and communication strategy for low-carbon RAC technologies will contribute to a cost-effective expansion and reproduction of project results, as well as other large urban centres, for example, the Island of Tobago. This is complemented by a strategy to facilitate the access of women to the new jobs generated from the shift in the use of energy. Cultural change is foreseen to generate a more positive attitude towards urban citizens and more careful consideration of their

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

113. The considered project's actions have been structured in three avenues in order to estimate avoided *direct*, *direct post-project* and *indirect* avoided emissions, due to the adoption of more efficient cooling and refrigeration equipment and District Cooling systems, i. the PPG has estimated the global benefits of GEF energy efficiency tasks following the Standards and Labelling, ii. to avoided refrigerant emissions, in CO2eq basis, was developed considering the ODS phase-out commitments of the country under the Montreal Protocol, the HCFC phase-out management plan (HPMP). It was assumed that the phase out of HCFC-22 due to the HPMP implementation would avoid CO2e emissions, estimated using HCFC-22 GWP, and iii. estimations of global benefits in terms of mitigated CO2 emissions associated with the development of two pilot projects of District Cooling systems.

114. At the end of the project, the reduction of emissions linked to the implementation of standards and labelling activities would provide a *direct reduction* of 154,359 tCO2eq by the year 2023 and 202,930 by the year 2043; a *direct post-project* reduction of 334,851 tCO2eq by the year 2043 and *indirect* emissions avoided of 284,693 tCO2eq. In accordance with T&T commitments under the Montreal Protocol, HPMP, the 65% reduction in HCFC-22 consumption, potentially provides a *direct reduction* of 276,007 tCO2eq. In addition, at the end of the project, the reduction of energy consumption related to the implementation of District Cooling Systems would provide a *direct reduction* of 93,000 tCO2eq and *direct post-project* savings estimated at 430,500 tCO2eq.

115. The total accumulation of GHG emissions avoided by the project is approximately 1,500,333 tCO2eq; of which 450,289 are ***direct*** at the project end, 765,351 are ***direct post-project*** and 284,693 estimated as ***indirect.***

6) Innovativeness, sustainability and potential for scaling up.

Innovativeness

116. This project proposal aims to provide an innovative market change for the adoption of low-carbon technologies for Refrigeration and Air Conditioning (RAC) end-use in order to reduce GHG emissions in the commercial and residential sectors in Trinidad and Tobago. It will bring about integrated institutional planning and coordination of ground-breaking technology interventions aligned with, greater efficiency and increasingly equitable socioeconomic returns on low-emission of public and private investments in a very innovative way. Despite those programs and policy initiatives being undertaken in Trinidad and Tobago at the moment, their long-term successful continuance remains challenged due to the lack of coordinated implementation within the public sector responsible for the potentially synergic themes (ozone, climate, power sector, regulation, and ODS waste disposal). The project will look at treating the issue of energy efficiency for large-scale systems (District Cooling and CCHP) as well as smaller scale units (centralized, split and mini-split systems) to represent a holistic approach to encouraging a more sustainable energy consumption path, in a heavily-driven oil and gas producing country.

117. By project closure, it is expected that from an investment standpoint, innovation embrace a multilevel governance approach to scale up District Cooling, CCHP and more efficient de-centralized RAC investments in Trinidad and Tobago. It is also estimated that the project will enable the conditions to integrate national policies on climate change with energy efficient air conditioning technologies with low-GWP alternatives. The aggregation of these initiatives -endorsed politically at the highest level- will result in a set of actions that are likely to create positive local impacts and large environmental benefits over the long-run, and having a full transformative impact on the RAC privately driven markets of this country as well as for the overall Caribbean region.

118. This approach promotes a collaborative planning environment integrating climate change planners, RAC practitioners, investors and the beneficiaries. The originality of the project's approach lays in the attempt to provide an integrated, collaborative framework for the stakeholders to act together and move forward from innovative and revised regulations to pilots to general implementation (outcomes).

Sustainability

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119. For the global environment, the strategy of the project for greater results is intended to seize opportunities for higher impact through three manners:

1. a sharper focus on the drivers of market inefficiencies for energy efficient/low-carbon RAC technologies in order to bear on a sustainable basis a growing demand in all sectors of the economy;
2. Integration to harness synergies across the public sector and between a more sustainable policy environment in order to enhanced efforts to mobilize investments for highly efficient, very low-carbon cooling technologies, such as District Cooling.
3. this innovative cooling technology will also reflect the fact that many Caribbean countries face the same challenges. This project will generate significant lessons that can be amplified in the whole region increasing the potential to deliver significant global environmental benefits (GHG emission reductions).

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120. At the national level, Trinidad and Tobago, as a large gas-producing country, mainly uses Compressed Natural Gas (CNG) for power generation. Enhancing the use of energy efficient will support the growing for RAC equipment and will provide greater energy security for the future. This is in tune with its commitments under the UNFCCC: to formulate, implement and regularly update national programmes containing measures to mitigate climate change.

121. The strengthening of the public policy context proposed by this project is characterized as consistent with long-term strategies state on its National Climate Change Policy effective since 2011. Furthermore, the Nationally Determined Contributions (NDC) for the country, prepared in 2015, aims at reducing the intensity of CO2 emissions compared to GDP of 25% by 2030, based on 1990 levels. This commitment also includes the modernization and technological development of the country on a sustainable basis as well as a strengthening of the national capabilities, like the current high growth in CO2 emissions in the RAC sector.

122. Trinidad and Tobago has signed and ratified the Montreal Protocol and all the subsequent amendments. The country has been a vocal supporter of the Kigali Amendment on HFCs, and has played an important role in the Caribbean to move an HFC agreement forward in recent years. As an oil and gas producing country, most of the electricity production comes from fossil fuels and as a result, energy efficiency has previously not been a priority. The cost of fossil fuels has been subsidized in T&T, which has led to a situation with many energy intensive businesses with inefficient standards necessary to support alternative energy efficient technologies and to reduce the government´s fuel subsidy liability over time.

123. In the Caribbean context, Port of Spain offers fertile ground for integrating operations of interdependent systems of reliable provision of cooling services, reduced fossil fuel consumption and less polluted environments. Specifically, by introducing District Cooling in T&T´s large facilities, there is a direct impact on HFC phase out. Fringe benefits for the cooling system of the City are:

i. capacity reduction due to redundancy and simultaneous factor with respect to conventional cooling systems,
ii. financially optimized system by the use of large size chillers due to 24/7 operation control, and
iii. direct environmental benefits by production mix due to the use of alternative refrigerant without or low GWP (ammonia, HFO-1234ze).

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124. The project has been designed to create an enabling framework for a sustainable use of air conditioning systems through enhanced inter-institutional coordination, based on sectorial planning and defining short, medium and long-term goals, thus ensuring sustainability. In this sense, Outcome 1.1 of the project is specifically designed to promote project sustainability, since it is focused on the medium and long term. It will ensure –through the Ministry of Planning and Development- that the benefits derived from integrated public policy framework are mainstreamed into the project developer's and investor´s decision-making processes.

125. By strengthening and updating the existing policy and regulatory frameworks and building the capacities of the public institutions, mainly MPD and MEEI, the project will generate a much more cohesive and well-funded governance framework.

126. It will be better prepared to efficiently and effectively promote low-carbon RAC technologies. Capacity development activities in components I and II will enable project partners to improve their capacities for planning, implementation of the different development initiatives, and facilitation of information and knowledge sharing and MRV systems to

track progress; for instance, it will help to achieve the right balance between the interests and needs of urban developers and investors, policy makers, energy regulators, and equipment suppliers, thus ensuring sustainability of project results.

127. Outcome 2 will implement coordinated actions to demonstrate in the field the opportunities of integration and coordination, thus delivering solutions to global environment problems in a cost effective way. The proposed on the ground actions (e.g. reducing fossil fuel consumption, reducing ODS, increasing energy efficiency and facilitating access to information) will serve to demonstrate ways to mainstream those alternative practices into medium and long-term public policies. By demonstrating that these pilots offer practical solutions to environmental problems in the major city of the country (Port of Spain), it is expected that other countries´ policy-makers will incorporate similar strategies in their energy management behaviour, as is the case of most of the large cities in the Caribbean.

128. The project is also aiming at reducing the gap between men and women. Components I and II are gender sensitive, facilitating the access of women to leadership positions associated with decision-making on energy efficiency and focusing on those barriers women identify as jeopardizing their accessibility to low-carbon RAC technologies. This approach is expected to be sustained after project termination through the full inclusion of the project's gender Action Plan within the business-as-usual operations of the key stakeholders. The different gender mainstreaming strategies to be promoted are innovative (e.g. measures to encourage equal gauge of air conditioning temperatures and other indoor-climate parameters by men and women) and will generate a number of lessons that will be documented and shared with the beneficiaries and with the relevant national institutions and regional initiatives in the Caribbean basin.

129. In short, the sustainability after completion of this FSP depends on three main effects aligned with the development challenge:

i. Improve the institutional and regulatory frameworks in Trinidad and Tobago,

ii. increase the flow of investment capital to update and replace old-fashion RAC technologies for more energy efficient RAC technologies while eliminating ODS, and

iii. building up the national capacity to sustain an alternative, private sector-driven market for different capacities of RAC systems over the long-run.

Scaling Up

130. In terms of replication, the potential for scale-up is primarily linked to the direct benefits for: i. the RAC end-users in terms of reducing their electricity consumption and improving customer confidence, ii. for major AC customers and the manufacturing sector, cost-effective District Cooling solutions to replace over time the existing technology based on air-cooled chillers using HFC 134-a and increased demand for an energy efficient technology through research and development of such technology, respectively, and iii. for the country as a whole, increasing a low-carbon/environment awareness image by implementing energy efficiency standards necessary to support energy efficient and HFC phase-out technologies and to reduce the existing energy landscape with subsidized electricity.

131. The project will generate significant experiences and lessons to promote upscaling of results for the T&T RAC end-use. Under Outcome 1, the strengthening of the national planning and policy frameworks for market development for low-carbon RAC technologies will provide valuable feedback in terms of integrated planning covering multiple aspects and institutions. This will be useful to other sectors of the economy to help them mainstream energy efficiency, integrated energy cooling systems, gender mainstreaming and

climate change resilience. The policy and regulatory instruments to be developed will be applicable at different scales, for instance, guidelines and model documents for mainstreaming the public procurement of RAC EE equipment that may be used nation-wide.

132. Activities planned for Components I and II address a problem of an increasing dependency on inefficient AC units, which is not merely a problem of T&T but for all the Caribbean countries. These pilot interventions have been designed by a diverse group of stakeholders considering that they may be replicated within the country and in the Caribbean region. Of special attention is the innovative District Cooling alternative for large AC systems, as is a common practice in other large cooling systems around the world. The lessons provided by both pilot projects on District Cooling may be replicable at the national level in different locations where large conventional AC systems operate.

133. Triggering District Cooling systems in T&T is also associated to another technology that also brings up opportunities to scale-up energy efficiency in order to achieve high-energy savings, and therefore, more environmental global benefits, the Combined Cooling Heating and Power (CCHP) where waste heat (exhaust gas) from large thermal-powered plants can co-generate hot water to feed fuel absorption chillers which cool nearby premises. Additionally, hot water can also serve other purposes such as domestic and industrial end-uses nearby.

134. It is expected that collaboration with the Regional Building Energy Efficiency Project (BEEP) will ensure that the most up-to-date knowledge and international high-level expertise on District Cooling systems will be available to the other CARICOM members in building the new capacities. Information dissemination of this innovative technology will enable sharing the experiences and lessons with the different Caribbean cities involved in the implementation of the BEEP. This will be accomplished through knowledge transfer activities that support energy efficiency investments, peer-to-peer work on standards and labels, as well as participation in regional working groups on specific issues, documentation and outreach activities promoted by CARICOM.

A.2. Child Project?

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

No

A.3. Stakeholders

Please provide the Stakeholder Engagement Plan or equivalent assessment.

135. UNDP has formed mutually beneficial long-standing relationships with senior policy makers at the national level and has assisted the strengthening of the MPD during the formulation of the PIF and in the implementation of the PPG. It has also created a synergy with key stakeholders in the academic and CSO sectors during the formulation of the ProDoc and will continue in the upcoming execution phase.

136. A stakeholder engagement plan was undertaken in order to identify key stakeholder institutions and relevant beneficiaries to be involved in the project implementation process. Annex H of the ProDoc –*Stakeholders Engagement Plan*- describes the process of assessing the project's key stakeholder's interests and the ways in which these stakeholders may influence the project's outcomes. This Plan is important because it enhances local ownership, strengthens project integrity and design, and helps to create foundational relationships that may contribute to constructive problem solving if difficulties or challenging issues arise.

137. The *"Stakeholder Engagement Plan"* seeks to strengthen UNDP institutional partner capacities for managing social and environmental risks and ensuring full and effective stakeholder engagement, including appropriate mechanisms to respond to complaints from project-affected people. This Plan follows the Guidance Note UNDP Social and Environmental Standards (SES). For regulations and requirements in Trinidad and Tobago, public consultation and disclosure requirements related to the social and environmental assessment process is a key element of public policies overall, as a guiding process to execute the Environmental Impact Assessment (EIA) required by EMA. Thus, given the policy context and regulatory framework in which the project will be implemented, there is no risk that project interventions will exclude potentially affected stakeholders from fully participating in decisions that may affect them.

138. The EIA refers to the rationale to the Environmental Management Act, Chapter 35:05, as a process of identifying, predicting, evaluating and mitigating the biophysical and other relevant effects of development proposals. EMA considers an EIA crucial to its decision making when determining whether or not a project can operate without severe environmental consequences. The process provides an opportunity for all stakeholders, including the public, to participate in the identification of issues of concern, practical alternatives, and opportunities to avoid or mitigate adverse impacts. This process considers holding public consultation/public engagement strategies, which will depend on the application at hand and the circumstances surrounding the application, such as the case of the District Cooling pilot investments. The objective of the public engagement strategy is to ensure that meaningful consultation takes place in a transparent and effective manner.

139. A diverse group of stakeholders was engaged during the project preparation stage and their roles clearly stated during its execution, as described in Annex H (ProDoc). Stakeholders are beneficiaries and public institutions with an *interest* in the project or the ability to *influence* project outcomes, either positively or negatively and which are directly or indirectly affected by the project. This Annex also provides an overview of stakeholder interests, importance and influence on project outcomes. Transversally, from the gender perspective, the *Stakeholder Engagement Plan* provides an overview of stakeholder interests, importance and influence on project outcomes or operations that were validated at the PPG stage through a participatory exercise with stakeholders. Finally, this Annex includes a grievance mechanism, a process by which people concerned with or potentially affected by the project can express their grievances for consideration and redress will be geared directly to EMA, as stated in the Environmental Management Act, Chapter 35:05.

140. To achieve the planned outcomes, the project needs to get a variety of stakeholders involved: national policy makers (mainly MEEI in energy efficiency and MPD in HCFC phase-out), primarily interested in achieving the project's overarching objective of development by accomplishing the necessary implementation of national policies, in accordance with the mandates of the corresponding conventions signed by the country as well as reporting the environmental benefits to the GEF, regulators in charge of institutional and regulatory reforms (RIC and EMA, respectively), public utilities (like T&TEC) dedicated to become a greener public corporation, technological civil society organizations (CSOs) and academic stakeholders (TTBS, UTT, ARIA, and RRRA), private sector players (private chambers, local and regional investors and project developers), participating also with a gender equality approach and the cultural change needed to achieve the project´s objective.

141. Alliances will be established with the corresponding municipal authorities of the urban areas where the pilot projects will be implemented, based on workshops and awareness-raising meetings that will be held with local authorities and beneficiaries.

142. In short, the implementation of this project requires the active participation of several partners. Responsibilities of these partners in the project's implementation as well as initiatives supported by these partners in addressing the project's development challenge are presented in the Table below.

Table 6: Partnerships of the Full Size Project

Type	Stakeholder	Role
National Government	Ministry of Planning and Development (MPD)	The MPD, the project's Executing Entity, as the focal point of the UNFCCC and the Montreal Protocol, is the lead public partner responsible for development, detailed design and execution of the project, and as such, member of the Project Steering Committee. It is also responsible for liaison work with the other ministries and public agencies; the Project Management Unit (PMU) will be located in their premises.
	Ministry of Energy and Energy Industries (MEEI)	The MEEI is in charge of enforcing the country´s energy policy and planning. In this regard, its role in promoting fiscal instruments for triggering alternative RAC technologies is central to the main objective of the project through its Energy Research and Planning Division. The MEEI will be also an official member of the Project Steering Committee.
	Ministry of Trade and Industry (MTI)	The MTI is a key stakeholder in the implementation of the Montreal Protocol through the licensing system of refrigerants and refrigeration equipment. It grants import and export permits and as such closely regulates what can come in and out of the country. MTI will be also an official member of the Project Steering Committee.
	Ministry of Finance (MOF)	The MOF is in charge of fiscal appropriations of Government funds for various projects and programmes such as climate change, energy efficiency and any other related programmes inclusive of environment. The MOF currently in its legislation is responsible for any tax incentive to be identified and implemented for any initiative under the project, including tax exemptions and other fiscal measures.
	Trinidad and Tobago Bureau of Standards (TTBS)	The TTBs is a crucial partner to monitor the import of ODS-dependent equipment and national labelling standards for refrigerants. The primary role of TTBS is to develop, promote and enforce energy efficiency standards and labelling in order to improve the quality and performance of RAC technologies used in the country, based on minimum energy performance indicators and testing procedures.
Public agencies	Environmental Management Authority (EMA)	EMA is a statutory body established by the Government of the Republic of Trinidad and Tobago in June 1995 under the Environmental Management Act 1995, which was later repealed and re-enacted as the Environmental Management Act Chapter 35:05. The role of EMA in the project is to provide guidance and surveillance for compliance with national environmental regulation, in particular, issues and concerns related to the development of large RAC systems such as the District Cooling system as well as with the standards and guidelines on safety transportation, handling and use of natural refrigerants.

	Trinidad and Tobago Airports Authority	This public agency manages the Piarco International Airport, which has become a major air transportation facility in the Caribbean region. It is made up by two terminals: the North Terminal inaugurated in 2011 is dedicated to the commercial passenger movements and the South Terminal, which is a 24-hour servicing cargo facility. Both demand a permanent cooling load based on a large chiller system with a cooling demand of 2000 tons, which makes this facility a top priority for developing a District Cooling system during the execution of the project.
	Trinidad and Tobago Electricity Commission (T&TEC)	The T&TEC is the single power utility servicing the whole country and the largest utility in the entire English speaking Caribbean. Its role is to participate in the project as a key leading actor for the sustainable management of the demand side, in particular, supporting the change in the existing paradigm for appropriate RAC technologies and business models for electricity end-users.
	Regulated Industries Commission (RIC)	RIC regulates public sector services (water, wastewater and electricity) and represents the interests of consumers. RIC will participate in the project in setting up appropriate tariffs for upcoming cutting-edge technologies, such as the District Cooling system.
	University of Trinidad and Tobago (UTT)	The UTT is a state-owned university established in 2004. There are several campuses located throughout the country with a diverse range of disciplines taught. The *Couva Point Lisas* Campus is known as the energy campus; as it looks at renewable energy and energy efficiency major initiatives. The UTT could also serve as an important pilot intervention for the District Cooling Development.
CSOs	Air Conditioning and Refrigeration Association (ARIA)	As a Civil Society Organization, ARIA will support in-country capacity building activities to enhance technical capacity for assembling and manufacturing of low-carbon, low-GWP RAC alternatives as well as on safety transportation, handling and use of low-GWP/HCFCs alternatives. ARIA plays a key role during the execution of the project and afterwards a long-established training centre to serve both, public and private interests.
	Refrigerant Recovery Recycle Association (RRRA)	RRRA is a non-profit organization formed to encourage and support all stakeholders involved in the protection of the Ozone Layer and reducing Global Warming. Its main role in the project will be to assist in the recovery, recycling and final disposal of refrigerants.
	T&T Chamber of Industry and Commerce	This CSO will bridge the interest of the private sector, mainly wholesale traders of RAC equipment and importers and retailers, with key public stakeholders, mainly MPD and MEEI, to foster a sustainable business strategy for low-carbon, HCFC phase-out alternatives. It participates in the execution the National Carbon Reduction Strategy initiative. This Chamber is an active player representing also the interests of investors, real estate developers, owners and operators when the investments have attractive returns and on top of provide good environmental benefits; improve corporate social responsibility and green profile.
Private sector	Edan K Properties Limited	This private property management and real estate firm is the owner of the Point Lisas Industrial Business Park. Their proximity to the UTT Point Lisas campus and the TPL Power Plant make it ideal for them to be considered as a potential off-taker of both District Cooling and heating to supply their tenants and customers.

	School of Refrigeration and Air-conditioning (SORAC)	The School of Refrigeration and Air-conditioning (SORAC) is a private institution formed in 1993 with its focus being the training Refrigeration & Air Conditioning (RAC) Technicians at the craft level. The institute provides theoretical & practical training, and has trained over one thousand craftsmen in this field. Since this institute has twenty-five years' experience in the educational field they would be a welcomed partner for the development of the capacity building activities of the project with respect to installation and maintenance of DCS technologies.
	Caribbean Airlines Limited (CAL)	Caribbean Airline Limited is an airline that operates on the compound of airports authority. They occupy bonded areas and offices on the compound, which are cooled with upwards of 120 mini-split units, as quoted by their operations manager. Their proximity to the Piarco Airport main terminal makes them a potential off taker of the DCS, which would improve their energy consumption, and thus reduce their operations cost.
	Caribbean Basin Sustainable Energy Fund (CABEF)	CABEF is a venture capital fund that invests in clean energy and energy efficiency projects and companies in the Caribbean Basin. Sustainable Energy Central America and Sustainable Energy Caribbean (SECA) act as Investment Advisors of CABEF. CABEF has indicated a strong interest in the project and is willing to play an important role in providing investment capital to assist pilots fund project related activities and fund scale-up actions.
	Trinity Power Limited (TPL)	This large private contractor supplies power to T&TEC the singe electric power utility on the Island of Trinidad. It plays a key role in providing relevant information to explore the potential to promote the use of District Cooling in the country.
	Energy Dynamics Ltd (EDL)	This is a local engineering firm with experience of District Cooling and absorption technology. EDL is a Trinidad based Energy Service Company (ESCo) with projects and operations undertaken throughout the English speaking Caribbean and the Dominican Republic. It will play a significant role in catalysing the required market change towards energy efficiency in the RAC sector focusing on the development of the District Cooling and Combined Cooling Heating and Power (CCHP) pilot investments.
UNDP	Implementing agency	UNDP T&T CO will be responsible for the overall implementation of the project under the National Implementation Modality (NIM), as well as for its overall management, under the leadership of a National Project Manager.
Beneficiaries	For the purposes of the project, the beneficiaries are the citizens of T&T; the end-users that enjoy an acclimatized environment for their comfort and demand a cooling load to cope with their daily business activities.	

[1] EMA: Environmental Impact Assessment, FAQ, "*A Guide to the Environmental Impact Assessment (EIA) Process*".

[2] See Figure 2 "Project Organization Structure", Section VIII below for further details.

Documents

Title	Submitted

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

See Annex H of the PRODOC - Stakeholder Action Plan

Select what role civil society will play in the project:

Consulted only; Yes

Member of Advisory Body; Contractor; Yes

Co-financier; Yes

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

Executor or co-executor; Yes

Other (Please explain)

A.4. Gender Equality and Women's Empowerment

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

143. From the gender perspective, Trinidad and Tobago's women and men need more information on environmental stresses and more data—disaggregated by sex, age and other factors—is urgently needed to build policies that are more comprehensive. The RAC markets, specifically in the context of this project, are usually male oriented, from the supplier and the maintenance perspectives, however from the demand point of view women play a very significant role in influencing indoor environments due to more sensitivity than men to temperature adjustments. Even though women are not strongly represented in the context of supplier and maintenance, they do have a leadership role in decision making at the corporate level for procurement and the design (engineering level) of RAC systems.

144. The project will promote equal benefits to women and men of increased low-carbon RAC technologies and energy efficiency as well as encouraging women to become energy entrepreneurs by building their capacity to be an integral part of sustainable energy solutions in their working environments. Annex I of the ProDoc describes the process of assessing the gender challenges for the project and how these may influence the project's outcomes.

145. The project has developed a strategy that links the most important gaps identified in relation to its components, the country's reality in terms of equality and the SDGs, particularly SDG 5. The gaps identified in the analysis and which are considered in the strategy include parity in decision-making spaces around energy efficiency, HFC phase-down and improvement of women's income and livelihoods. These gaps require the strengthening of institutional capacities to promote equality between women and men in a structural manner. The specific data of the Ministry of Gender and Youth Affairs were analysed, and several events were held with local stakeholders to develop the best strategy for the project, as described in Annex I.

146. For this purpose, and in accordance with the proposed gender strategy:

- Each activity was analysed to include the necessary elements to guarantee the reduction of identified gaps and establish more pro-active actions when appropriate.
- Specific activities that focus on the empowerment of women have been included (capacities, and access to planning and decision-making processes).
- Two indicators have been included to help measure progress in this field and will be monitored as part of the M & E process.
- A budget has been included to guarantee the measures and actions to be taken. The strengthening of the project team's capacities is planned to ensure the adequate mainstreaming of the gender perspective into all project activities.

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[1] *"Climate change connection: Common Ground In Bangladesh, Ghana, Nepal, Senegal and Trinidad and Tobago"*

[2] Please, refer to Section VI of the ProDoc: Indicators 3 and 4.

Documents

Title	Submitted

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

Yes

If yes, please upload document or equivalent here

The project will promote equal benefits to women and men of increased low-carbon RAC technologies and energy efficiency as well as encouraging women to become energy entrepreneurs by building their capacity to be an integral part of sustainable energy solutions in their working environments. The Gender Action Plan describes the process of assessing the gender challenges for the project and how these may influence the project's outcomes.

If possible, indicate in which results area(s) the project is expected to contribute to gender equality:

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

Improving women's participation and decision making Yes

Generating socio-economic benefits or services or women Yes

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

Yes

A.5. Risks

Elaborate on indicated risks, including climate change, potential social and environmental risks that might prevent the project objectives from being, achieved, and, if possible, the proposedmeasures that address these risks at the time of project implementation.

147. The key risks that could threaten the achievement of project results have been summarized in the following Table:

Table 7: Project Risks

Project risks					
Description	**Type**	**Impact & Probability**	**Mitigation Measures**	**Owner**	**Status**

Project risks					
Description	**Type**	**Impact & Probability**	**Mitigation Measures**	**Owner**	**Status**
1. The project's pilot actions with the implementation of the District Cooling technology using fresh water cooling (like sea water) to operate this sort of centralized system, may result in negative impacts on the flora and fauna near the exhaust of the cooling plant due to the excess of hot water, a context that poses additional challenges for maritime habitats or environmentally sensitive areas.	Environ-mental	The City of Port of Spain, particularly the coastal area where the large financial and commercial areas are located has a high demand of cooling systems but water-drainage issues, with a potential to mix the exhaust flows from the cooling plant with the sea water, threating the sea life in this surrounding area. This situation has worsened in recent years with the higher frequency of heavy rains due to storms and hurricanes. P = 2 I = 4	The PPG phase has acknowledged this environmental risk and search for a mitigation path following international best practices. The pilot site for the proposed cooling plant for the Piarco International Airport, first of all, will be located far away from the coastal area, as it is indicated in the preliminary layout developed by the international consulting firm DEVCCO (please, refer to Annex K of the ProDoc). In addition, the design has taken into consideration the impacts of extreme climate events following the ASHRAE international specifications for District Cooling in coastal areas. Besides the proposed pilot interventions, the project will ensure that over the long-run, compliance with the national environmental regulations (EMA Chapter 35:05) will be enforced considering that the District Cooling technology chosen for T&T is of least impact to the environment.	MPD	No change

Project risks					
Description	**Type**	**Impact & Probability**	**Mitigation Measures**	**Owner**	**Status**
2. Replacement of old RAC equipment and refrigerants can generate waste and ODS that must be discarded accordingly.	Environmental	The replacement of metallic and electronic elements of the inefficient RAC systems would generate both waste metals and refrigerants, which can have adverse effects on the environment. The refrigerants discarded from replacement activities can further threaten the global environment once not properly contained. P = 5 I = 3	The PPG phase has identified this risk and takes it on-board during the planning phase. The project has established an integral partnership with the RRRA in order to mitigate this risk, through their commitment to co-financing in kind all activities related to the recycling, and recovery of spent RAC equipment, which is in line with the association's mandate. This would be implemented by the establishment of a recycling hotline and drop-off points in both islands. With this specific risk in the national context, the project will ensure that the activities are in compliance with the national environmental regulations enforced by Environment Management Authority (EMA).	MPD RRRA	Reducing

Project risks					
Description	**Type**	**Impact & Probability**	**Mitigation Measures**	**Owner**	**Status**
3. During the formulation of the project, concerns have been raised in terms of gender, which should be taken into account in the implementation of the project, especially regarding participation in design and implementation or access to incremental benefits.	Social	National cooling policies and projects are very gender sensitive since women and seniors are more affected by sudden indoor changes in temperature. This project has stated the gender equality perspective in the outputs and activities, especially related to the need to enforce women role in the design and operation of RAC systems. P = 2 I = 2	As a GEF 6 project, the PPG phase carried out a gender analysis, which will be crucial to understand the current baseline and enhance the integration of women specific needs in the appropriation of alternative RAC technologies, as clearly presented in Annex I of the ProDoc: "Gender Analysis and Action Plan". The project also takes benefit of the alternative approach to accelerate the integration of women in what has thus far seen as a male-dominated working environment. By the implementation of this project, opportunities for increasing women participation in the training activities carried out by ARIA, leading to increased employment within the RAC market.	MPD	No change
4. Biological factors — notably size and physiological differences between women and men and between adults and children — influence susceptibility to health damage from exposure to chemicals and poor air quality, including those used as refrigerant fluids in RAC equipment.	Social	In daily life, men, women, and children are exposed to different kinds of chemicals, in varying concentrations that can cause adverse health issues and reduce performance in indoor environments. P = 3 I = 3	The project will enforce that the specifications for alternative RAC systems take into consideration the ASHRAE international standards for design as it relates to air quality of install RAC systems. ARIA would also include the best practices as it relates to maintenance of installed RAC systems, in their training programmes, to ensure optimum air quality, considering the needs of women, men and children.	MPD	No change

Project risks					
Description	**Type**	**Impact & Probability**	**Mitigation Measures**	**Owner**	**Status**
5. Incremental technical capacities among ozone depleting substance (ODS) and energy policy makers are not effectively neither timely implemented, limiting the synergies that would advance the country´s commitments with the Montreal Protocol and the Nationally Determined Contribution under the UNFCCC.	Organizational	Commercially driven alternative RAC technologies can be enhanced with an improved inter-governmental coordination amongst key policy makers (e.g. MPD, EMA, and MEEI) but in the absence of key synergies, the market change towards low-carbon alternatives will be delayed. P = 1 I = 3	Improvements in the current institutional framework have been identified during the PPG stage. These alternatives have been fully discussed and respond to the implementation of the *¨Climate Change Policy¨* and the *¨National Cooling Plan¨*. In addition, the selection of most promising pilot interventions has been a key input to this ProDoc during the PPG and validated with policy makers and private developers.	MPD	Improved
6. Market driven pilot investments are not effectively implemented, which limits the required take-off of low-carbon energy efficient technologies, which causes a limited access to senior financing to create sustained innovation within the RAC sector.	Financial	Target investors could see conventional RAC technologies and their current pricing structure as more attractive and low risk than the proposed low-carbon energy efficient technologies and based on market factors would choose not to fund projects that involve the new RAC technologies. P = 3 I = 3	The project during the PPG phase has approached and validated the pilot investments, especially for the district cooling as indicated in Annex K of the ProDoc, with committed developers, such as the Airports Authority´s senior management team and acquired their commitment to advance to the pre-investment and final design stage of the DCS pilot. At the PPG phase, the technical consultants (DEVCCO) assessed the feasibility of the DCS pilots and developed business cases to support successful implementation, reducing the perceived risks to investors. For decentralized / splits the project has considered an awareness raising campaign and information strategy following the *¨National Cooling Plan¨*.	MPD AATT	No change

Project risks					
Description	**Type**	**Impact & Probability**	**Mitigation Measures**	**Owner**	**Status**
7. Updating current standards for A/C systems and changes in regulations are not agreed or implemented in a timely manner.	Regulatory	There is strong political will favouring low-carbon energy efficient RAC alternatives based on existing commitments to the global environmental conventions. The consensus is weakened by the BAU RAC investors regarding the lack of market awareness to cost effective, environmentally friendly alternatives. P = 3 I = 3	The project has identified two mitigation measures: • The update of the standard the standard (TTS 76: Part 20, 2015 - *Requirements for labelling of refrigerant containers*) will use a collaborative approach including member of academia, public and private sectors under the leadership of the TTBS. • The data collected on GHG and HCFC/HFC emissions as part of the overall MRV plan will be used to inform the update and creation of new national standards to be developed and implemented by the TTBS.	TTBS	No change

148. Climate change risks are associated with the vulnerability of project outcomes to the potential impacts of climate change, mainly related to the occurrence of extreme weather events, most likely recurrent floods affecting urban infrastructure due to the path of tropical storms. The implementation of the pilot interventions will consider, since the planning stage and the design phase the climate prevention measures, in accordance with the enforced environmental regulation mainstreamed in the country. The PMU, with assistance from the Ministry of Planning and Development (MPD), will provide essential information that supports the design of major cooling facilities considering appropriate preventive and reactive measures for each extreme climate event. These reactive measures are already defined in the guidance documents for any Environmental Impact Assessment process in the country. In this regard, the increasing knowledge on these innovative cooling systems generated during the project execution will strengthen coherence and convergent management to reduce CO2 emissions, should extreme weather events occur.

149. Environmental and social risks mentioned above have been discussed with the executing partners and with a variety of stakeholders through the workshops held during the PPG. These risks were discussed and were analysed in the *"Social and Environmental Screening Procedure"* (SESP, Annex F of the ProDoc) and the ones rated as MODERATE have been reviewed in more detail within the *"Environmental and Social Management Plan"* (ESMP, Annex G of the ProDoc).

150. Reduced resilience of the potential outcomes of the Project due to potential impacts of extreme climate change-related risk events as a SIDS country, like thunderstorms and heavy rain. The project design has addressed this challenge with two main avoidance actions: the first one refers to project Outcome 2.2 on selecting the sites for the innovative District Cooling pilot interventions in order to avoid the negative impacts on the flora and fauna near the exhaust of the cooling plant due to the excess of hot water. National institutional capacity, through the project, will be enhanced to identify cost-efficient pilot measures to gain robustness. The second one refers to the close project collaboration with EPPD of MPD to strengthen national capacities with the methodologies developed by T&T in facing extreme climate-change related events, in particular floods due to storms and hurricanes. This risk has been assessed as MODERATE, given the high probability of occurrence of these types of events on this Caribbean Island.

151. Another environmental risk is associated with the replacement of the old and inefficient RAC equipment, which can generate solid waste and ODS. In fact, mitigation options within the project will include recycling, which is a key element in the waste management directives of T&T. The actions for implementing this policy are described in Annex G "Environmental and Social Management Plan (ESMP of the ProDoc)". Although the expected number of RAC waste involved in the pilots is relatively low enough to pose no environmental hazard during the lifetime of the project, an adequate regulatory and management solution has to be envisaged for the future. Accordingly, this risk is therefore assessed as MODERATE.

152. On the other hand, the waste of HCFC refrigerants has been fully considered in the design of this project. T&T has developed a learning curve in this aspect with heavy involvement of the Refrigerant Recover and Recycling Association (RRRA). Under the leadership of the MP and technical participation of the RRRA, HCFC refrigerants would be recovered and stored until they can be disposed of, ensure secure containment and reducing the risk of release into the atmosphere.

153. It cannot be fully discounted that social and environmental grievances will not arise during project implementation. The following channels will be used by the project:

i. Public Consultations in accordance with the Environmental Management Act, Chapter 35:05 and the Certificate of Environmental Clearance Rules that are the guidance documents for any EIA process in the country.

ii. Consultations with the relevant stakeholders to gather information/feedback/input to inform the preparation of a revised national planning and policy framework for market development of EE gains for RAC end-uses.

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[1] Please, refer to Section 3 of the "*Stakeholder Engagement Plan*", in Annex H of the ProDoc.

A.6. Institutional Arrangement and Coordination

Describe the Institutional arrangementfor project implementation. Elaborate on the planned coordination with other relevant GEF-financed projects and other initiatives.

154. The project will be implemented following UNDP's national implementation modality (NIM), according to the Standard Basic Assistance Agreement between UNDP and the Government of Trinidad and Tobago, and the Country Programme. The Ministry of Planning and Development (MPD), Executing Entity (EA) of the Project,

will be the Implementing Partner in this project, which is in charge of addressing political guidance to the country´s commitments, as a signatory to the UNFCCC and the Montreal Protocol.

155. The Implementing Partner is responsible for:

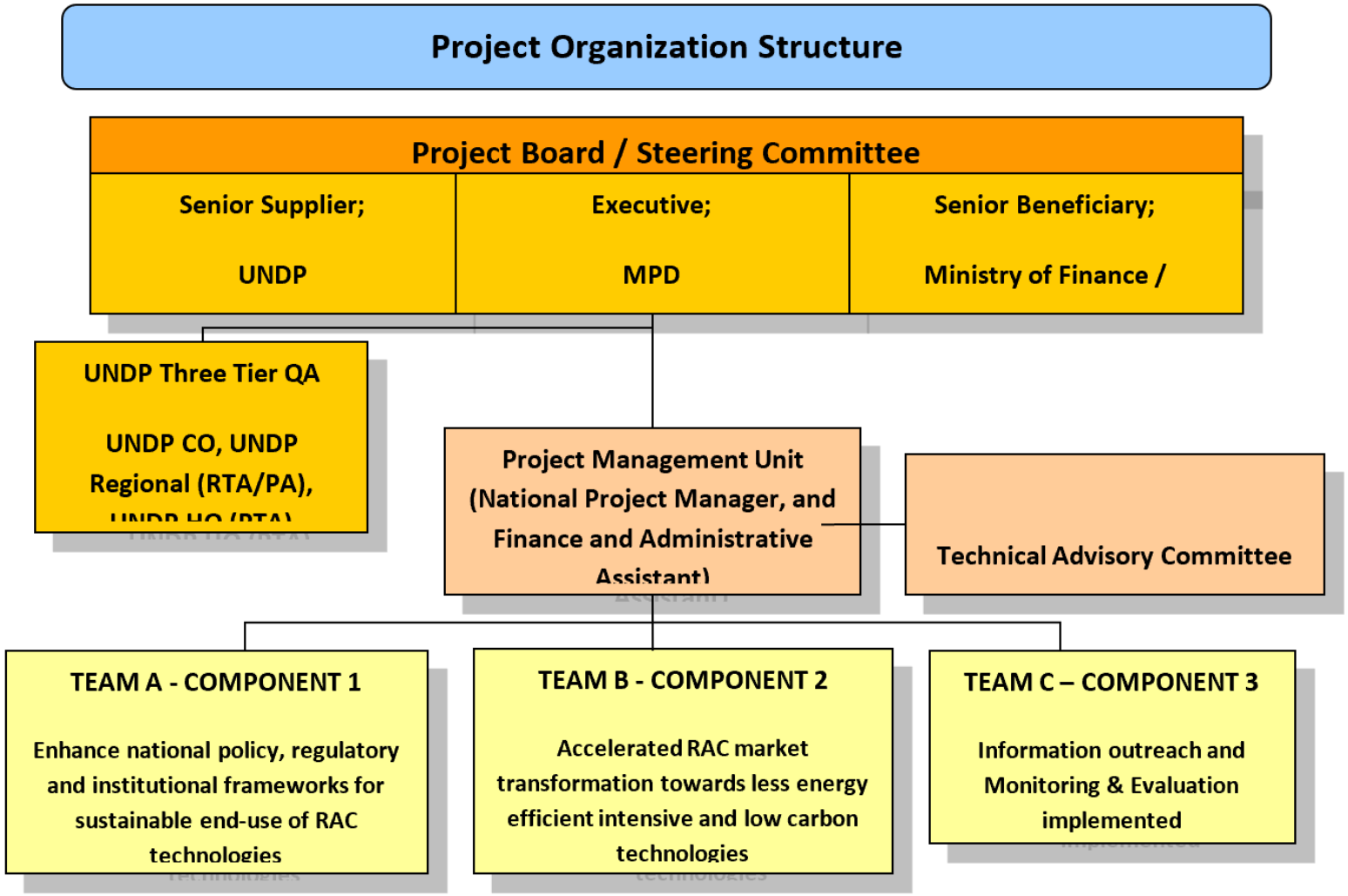
- Approving and signing the multiyear workplan;
- Approving and signing the combined delivery report at the end of the year; and,
- Signing the financial report or the funding authorization and certificate of expenditures.

156. The United Nations Development Programme (UNDP), as GEF Implementing Agency, will support the implementation of the project by providing the necessary technical and operational assistance. Likewise, it will be responsible for high-level monitoring of the project and all necessary reporting to GEF. All actions will be planned and conducted in close collaboration between MPD, UNDP, and the other members of the Project Board.

157. UNDP will function as Responsible Party for Monitoring and Evaluation and for Project Management, and as such will be responsible for the selection, appointment and oversight of consultants and contractors, and for the procurement of other goods and services necessary under these components.

158. The project organization structure is shown in Figure 3 as follows:

FIGURE 3: PROJECT ORGANIZATION STRUCTURE



159. **Project Board:** The Project Board (also called Project Steering Committee) is responsible for making by consensus, management decisions when guidance is required by the Project Manager, including recommendations for UNDP/Implementing Partner approval of project plans and revisions, and addressing any project level grievances. In order to ensure UNDP's ultimate accountability, Project Board decisions should be made in accordance with standards that shall ensure management for development results, best value money, fairness, integrity, transparency and effective international competition. In case a consensus cannot be reached within the Board, final decision shall rest with the UNDP Programme Manager in Collaboration with the NOU of the MPD.

160. The Project Board will be integrated by the Ministry of Planning and Development, the Ministry of Energy, the Ministry of Trade and Industry and the UNDP. This Committee will meet at least twice per year. As part of its role, it will approve the Annual Operating Plans and will carry out periodic monitoring of the project to evaluate its performance. It will also ensure the implementation of corrective actions that are necessary to ensure that the desired outcomes are achieved. The responsibilities of the National Steering Committee are described in Annex E.

161. The composition of the Project Board must include the following roles:

162. **Executive**: Is an individual who represents ownership of the project and chairs the Project Board. The Executive is normally the national counterpart for nationally implemented projects. The Project Executive is: The Ministry of Planning and Development.

163. Specific Responsibilities (as part of the responsibilities for the Project Board) include:

- Ensure that there is a coherent project organization structure and logical set of plans;
- Set tolerances in the AWP and other plans as required for the Project Manager;
- Monitor and control the progress of the project at a strategic level;
- Ensure that risks are being tracked and mitigated as effectively as possible;

- Brief relevant stakeholders about project progress;
- Organize and chair Project Board meetings.

164. **Senior Supplier:** The Senior Supplier is an individual or group representing the interests of the parties concerned, supporting the implementation of the project and oversight of its execution. The Senior Supplier's primary function within the Board is to provide guidance to ensure that the project is being carried out in accordance with agreed standards and requirements. The Senior Suppler is the UNDP.

165. Specific Responsibilities (as part of the above responsibilities for the Project Board)

- Make sure that progress towards the outputs remains consistent from the supplier perspective;
- Promote and maintain focus on the expected project output(s) from the point of view of supplier management;
- Ensure that the supplier resources required for the project are made available;
- Contribute supplier opinions on Project Board decisions on whether to implement recommendations on proposed changes;
- Arbitrate on, and ensure resolution of, any supplier priority or resource conflicts.

166. **Senior Beneficiary**: The Senior Beneficiary is a group of individuals representing the interests of those who will ultimately benefit from the project and will guarantee the outcomes of the project from the perspective of the beneficiaries of the project. The Senior Beneficiary's primary function within the Board is to ensure the realization of project results from the perspective of project beneficiaries. A representative of the government or civil society holds the Senior Beneficiary role. The Senior Beneficiaries are: The Ministry of Energy and Energy industries, Ministry of Finance, and the Air-conditioning and Refrigeration Association (ARIA).

167. The Senior Beneficiary is responsible for validating the needs and for monitoring that, the solution will meet those needs within the constraints of the project. The Senior Beneficiary role monitors progress against targets and quality criteria. This role may require more than one person to cover all the beneficiary interests. For the sake of effectiveness, the role should not be split between too many people.

168. Specific Responsibilities (as part of the above responsibilities for the Project Board)

- Prioritize and contribute beneficiaries' opinions on Project Board decisions on whether to implement recommendations on proposed changes;
- Specification of the Beneficiary's needs is accurate, complete and unambiguous;
- Implementation of activities at all stages is monitored to ensure that they will meet the beneficiary's needs and are progressing towards that target;
- Impact of potential changes is evaluated from the beneficiary point of view;
- Risks to the beneficiaries are frequently monitored.

169. **Project Management Unit (PMU):** The PMU shall have two members of staff, the National Project Manager, and a Finance and Administrative Assistant. This operational unit will be housed at the Ministry of Planning and Development and supported by technical teams indicated in the Figure 3. Members of the groups can be invited to the National Steering Committee sessions, with specific roles described in Annex E. The following stakeholders support the Technical Teams:

170.

- Trinidad and Tobago Bureau of Standards - TTBS
- Refrigerant Recovery Recycle Association - RRRA
- Air Conditioning and Refrigeration Industry Association - ARIA
- The University of Trinidad and Tobago - UTT
- Ministry of Public Utilities - MPU
- Ministry of Energy and Energy Industries - MEEI

171. **National Project Manager**: The National Project Manager (NPM) has the authority to run the project on a day-to-day basis on behalf of the Project Board within the constraints laid down by the Board. The NPM is responsible for day-to-day management and decision-making for the project. The NPM's prime responsibility is to ensure that the project produces the results specified in the project document, to the required standard of quality and within the specified constraints of time and cost. The Implementing Partner appoints the NPM, who should be different from the Implementing Partner's representative in the National Steering Committee. The Project Manager function will end when the final project Terminal Evaluation report and corresponding management response, and other documentation required by the GEF and UNDP, has been completed and submitted to UNDP (including operational closure of the project).

172. The National Project Manager will be supported by one full-time person providing administrative, financial and technical support.

173. Specific responsibilities of the National Project Manager, administrative position and consultants are presented in Annex E "*Terms of Reference for Key Project Stakeholders*".

Other strategic partners

174. Local stakeholders will be formally represented in the planning and decision-making structures of the project through a series of organizations. These public organizations will be engaged at different stages of the project execution in order to share specific experiences and to participate in the project's activities:

- Customs and Excise – C&E
- Ministry of Trade and Industry - MTI
- Environmental Management Authority - EMA

175. **Project Assurance**: UNDP provides a three – tier supervision, oversight and quality assurance role – funded by the GEF agency fee – involving UNDP staff in Trinidad and Tobago and at regional and headquarters levels. Project Assurance must be very independent of the Project Management function. The UNDP Country Office specifically by the Environmental Programme Associate will provide the project assurance role. The UNDP Regional Technical Advisor as needed will provide additional quality assurance. The quality assurance role supports the Project Board and Project Management Unit by carrying out objective and independent project oversight and monitoring functions. This role ensures appropriate project management milestones are managed and completed. The Project Board cannot delegate any of its quality assurance responsibilities to the Project Manager. This project oversight and quality assurance role is covered by the GEF Agency.

Governance role for project target groups:

176. The project is targeting a variety of groups, with different levels of engagement in decision-making, as presented in Section 4.1 of the Stakeholder Engagement Plan (Annex H). Stakeholders are beneficiaries and public institutions with an interest in the project or the ability to influence project outcomes, either positively or negatively and which are directly or indirectly affected by the project. Of special attention are the end-users of the District cooling pilots. This group is critical for a sound approach to quality improvement and will be fully engaged through the established stakeholder linkages developed during the PPG phase. It is expected that the PMU will set up appropriate collaboration mechanisms during implementation of project components.

Elaborate on the planned coordination with other relevant GEF-financed projects and other initiatives.

177. The project is expected to liaise with UNDP/GEF project BUR (T&T's Second Biennial Update Report). The main area of collaboration regards the estimate, monitoring and reporting of GHG emissions from the residential and commercial sectors. UNDP will support the PMU so that the project coordinates with the International Projects Roundtable, which is one of the mechanisms established for this purpose by the 3CN- -1BUR Project.

178. The UNDP/GEF project will coordinate, at the national level, with the *"Capacity Development for improved management of Multilateral Environmental Agreements for Global Environmental Benefits",* an initiative to be implemented in T&T from 2017 up to 2020 and aligned with the GEF-6 Cross Cutting Capacity Development (CCCD) strategy. Through a learning-by-doing process, this project will implement capacity development activities in Trinidad and Tobago to improve the synergistic implementation of the Multilateral Environmental Agreement (MEA). Outcome 1.1 of this UNDP/GEF project will focus on improving the national policy and regulatory frameworks for energy efficiency gains for RAC equipment while the second outcome of the MEA initiative will support activities to strengthen the existing Green Fund, enhancing national awareness of financing environmental activities. Under the leadership of the Environmental Policy and Planning Division of the MPD, both projects will be aligned; hence contributing to national environmental benefits and by extension to global environmental benefits, specifically to shared obligations under the UNFCCC.

179. This project will also coordinate activities with the upcoming project *"Capacity Building for CO2 Mitigation"*, a joint initiative of the European Union (EU) and the International Civil Aviation Organization (ICAO) on the use of renewable energy at the Piarco International Airport. ICAO seeks to assess and demonstrate the feasibility of replacing carbon-intensive gate equipment with electric types powered by solar energy consistent with the UN's Clean Development Mechanism Small-scale Methodology "Solar Power for Domestic Aircraft At-Gate Operations". The ICAO-EU initiative is complimentary to the UNDP/GEF project because once the large the use of solar photovoltaic systems is fully operational, it will help to cope with the Airport´s power generation, specifically the chiller power demand and the amount of power used by the gate electrification equipment; in about half of the total required supply of the Piarco International Airport.

180. At the regional level, Trinidad and Tobago Bureau of Standards is actively involved in the development of a series of regional standards for energy efficiency including the labelling of energy efficient RAC technologies. The Caribbean Regional Organisation for Standards and Quality (CROSQ) is facilitating this activity for Standards development.

181. Also, at the regional level -through the coordination of the RTA for LAC- the project is also expected to cooperate with other energy efficiency-related UNDP/GEF projects in LAC, and has assigned some resources under knowledge management for this purpose, such as the El Salvador UNDP/GEF FSP #5462 *"San Salvador Low-emission Urban Development Path"*; specifically with procurement of public goods (air conditioning units) in the municipal sector and the design of mandatory standards and labels for air conditioning units. Once both projects are under implementation, areas of common interest are basically related to triggering actions for an integrated strategy for low-emissions urban development involving the public and private sectors, including policy, planning, and implementation, as well as capacity building for the establishment of long-term RAC market transformation.

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[1] Trinidad and Tobago. "Feasibility Study on the use of SOLAR energy at Piarco International Airport". ICAO-EUROPEAN UNION Assistance Project: Capacity Building for CO2 Mitigation from International Aviation, 2018.

Additional Information not well elaborated at PIF Stage:

A.7. Benefits

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

Describe the socioeconomic benefits to be delivered by the project at the national and local levels.

167. The project's vision is to set up an effective transition towards the implementation of a market for the adoption of low-carbon technologies for Refrigeration and Air Conditioning (RAC) end-use in Trinidad and Tobago and deliver multiple benefits -at national and global levels-.

Socio-economic benefits at national and local levels

168. At the national and local levels, the implementation of coordinated pilot actions to demonstrate in the field the opportunities of institutional integration and coordination, private-driven investments, will demonstrate that the positive results of the pilots would serve to improve and enforce current regulation for more efficient, low-carbon RAC technologies. Innovative market interventions offer alternative solutions to the growing need for cooling and refrigeration in the country, but it is also expected that other Caribbean islands will follow and integrate these strategies in their climate change policy agenda. For this, a public awareness and communication strategy for low-carbon/more energy-efficient RAC systems should result in direct gains for the beneficiaries.

169. The project will also enhance quality improvements in the cooling and refrigeration technologies imported and installed in the country. Agreed targets amongst public, CSO and private stakeholders such as the development and enforcement of Minimum Energy Performance Standards (MEPS) for RAC equipment, should result in the increase of a more conscious citizen towards the efficient use of energy and contribute to the change of mind setting in a country with highly subsidised electricity pricing. The implementation of pilot programs as an effective way to remove barriers to change, to learn from experience, and to change the historical paradigm of cheap electricity, to accelerate the adoption of alternative technologies at all levels, from regulators to operators to beneficiaries over the long-run, is one of the three principles of the project's strategy.

How do these benefits translate in supporting the achievement of global environment benefits (GEF Trust Fund) or adaptation benefits (LDCF/SCCF)?

170. In the BAU national context, warmer global climate will put a heavy burden on the demand for new RAC equipment with a trend to use High-Global Warming Potential (GWP)/Hydrofluorocarbons (HFC) refrigerants used in air-conditioning units and cooling systems, which are likely to generate more CO_2 emissions when compared to existing commercial, low-GWP alternatives at the global level. Trinidad and Tobago´s climate change policy aims at mitigating the adverse impacts of climate change such as those related to global temperature increases, in addition to changes in precipitation and sea level rise. With a relatively high per-capita emission, approximately 23.87 t/CO2, national and local benefits will translate in supporting a less-dependent economy on oil and gas and will make direct contributions to global warming, ozone layer and air quality in the order of 650,000 tCO2eq of GHG emissions avoided by project-end.

A.8. Knowledge Management

Elaborate on the Knowledge management approach for the project, including, if any, plans for the project to learn from other relevant projects and initiatives (e.g. participate in trainings. conferences, stakeholder exchanges, virtual networks, project twinning) and plans for the project to assess and document ina user- friendly form (e.g. lessons learned briefs, engaging websites, guidebooks based on experience) and share these experiences and expertise (e.g. participate in community of practices, organize seminars, trainings and conferences) with relevant stakeholders.

171. Fostering an Energy Efficiency culture in an oil and gas leading producing country by building the capacity of the human capital in the RAC sector on matters of design, installation and maintenance of low-carbon technologies and increasing the awareness of the benefits of using low-carbon technologies at the corporate and consumer levels, is one the alternative paths proposed by the project as a result of the Theory of Change analysis carried out during the PPG.

172. The boost on national capacities (Component I), will be collected and validated with relevant information so that the project will disseminate project-results related to RAC equipment replacement (Output 3.1.1), in line with the "Stakeholder Engagement Plan" (Annex H of the ProDoc). Outcomes under this Component will foster an integrated and participatory approach and accelerate the implementation of more collaborative practices; the sharing of knowledge and promotion will involve policy makers, CSOs, and private stakeholders. The consolidation of gathered knowledge and experiences within the three teams (Figure 3: Project Organization Structure), is also a key element of the Project's exit strategy.

173. The communication strategy should serve as a platform for dissemination, providing lessons learned and technical information material for other countries to implement large-scale, alternative RAC systems, such as the District Cooling technology. All knowledge management activities will be gender mainstreamed; this includes integration of gender dimensions into RAC training activities, for instance, through the presentation of sex-disaggregated data, activities related to reducing gender, and gender mainstreaming in training programs in line with the Gender Action Plan.

174. Finally, UNDP will ensure that relevant information and lessons learned will be collected as input for the Mid-term Review and Terminal Evaluation.

B. Description of the consistency of the project with:

B.1. Consistency with National Priorities

Describe the consistency of the project with nation strategies and plans or reports and assessements under relevant conventions such as NAPAs, NAPs, ASGM NAPs, MIAs, NBSAPs, NCs, TNAs, NCSAs, NIPs, PRSPs, NPFE, BURs, INDCs, etc.

175. This FSP will build upon ongoing efforts of the Government of the Republic of Trinidad and Tobago to fulfil its global environmental commitments through the implementation of two legal instruments. One is the UNFCCC, which aims at reducing GHG emissions to contribute to voluntary climate change mitigation, as well as strengthening collateral socioeconomic and environmental sustainability reforms at the national level, through engagement with key ministries and other public and private stakeholders. In this regard, this project will also build on significant baseline national policies as well as on enacted programs that are in the planning stage for implementation in the coming years to

address a change in the current paradigm for the use of RAC technologies with a long-term strategic vision, in accordance with its National Plan for Climate Change. The other legal instrument is to strengthen compliance with ongoing actions to reduce the consumption of HCFCs that affect the ozone layer as a signatory of the Montreal Protocol and the recent approval of the Kigali amendment on HFCs, and funded by the MLF. However, the baseline actions on these two fronts have significant limitations; one of these is the need to ensure –jointly- the maximum delivery of global environmental benefits and boost climate change resilience.

176 The project will look for synergies between the implementation of the UNFCCC and the Montreal Protocol. Apart from their depletion effects to the ozone layer, HCFCs are also potent greenhouse gases (GHG). The most common HCFCs used in RAC applications can cause severe side effects to the global climate. Although low-GWP technological solutions exist at commercial levels, they are mostly applied in developed countries, where the enabling policy and regulatory environments are better suited to support this transition. In this case, it is being noticed that developing countries, due to many political, technical and economic barriers, are widely adopting high-GWP Hydrofluorocarbons (HFCs) substances as an interim leading solution in this HCFCs phase-out process. All activities related to phase-out of Hydrochlorofluorocarbons (HCFCCs) and high GWP/HFC phase down in the future will be fully funded and implemented via projects supported by the Multilateral Fund (MLF) for the implementation of the Montreal Protocol (MP).

177. In the energy policy arena, the leading entity is the Ministry of Energy and Energy Industries (MEEI), with a focus on creating partnerships and innovations that foster self-reliance and a resilient energy sector, and a very strong emphasis on extractive energy sources, mostly in the oil and gas industries. Nevertheless, through its Energy Research and Planning Division, there is a mandate to provide guidance on drafting local legislation on renewable energy and energy efficiency policies. Along this path, this project proposal will strengthen and facilitate current efforts in T&T to curb the growth of CO2 emissions in the energy sector. In fact, T&T, as a signatory to the UNFCCC, has stated in its National Climate Change Policy (July 2011). This public policy will provide policy guidance for the development of an appropriate administrative and legislative framework, in harmony with other sectoral policies, for the pursuance of a low-carbon development path through suitable and relevant strategies and actions to address climate change, such as increasing energy efficiency measures in the commercial and residential sectors, in an effort to reduce the carbon footprint of the country.

178. The National Climate Change Policy and the Multilateral Environmental Agreement under the Montreal Protocol aim to provide policy guidance for the development of an appropriate administrative and legislative framework, in harmony with other sectoral policies, for the pursuance of a low-carbon development path for Trinidad and Tobago through suitable and relevant strategies and actions to address climate change, including sectoral and cross-sectoral mitigation and ozone depleting measures such as capacity building and market development of cleaner and energy efficient ground-breaking technologies and best practices.

179. There are a few GEF- financed projects in T&T currently under implementation, which could provide some additional support to strengthening this institutional partnership approach: the UNDP has already started the UNDP/GEF project *"Third National Communication and the First Biennial Update Report (BUR) of Trinidad and Tobago to UNFCCC (3CN-1BUR)"*. Considering the relevance of energy efficiency to the whole country for T&T´s GHG emissions, and the involvement of some of the institutional partners in all of them (MPD, MEEI, EMA), it seems likely that mutual benefit would be achieved by their interaction.

180 For the global development agenda, this project is aligned with Sustainable Development Goal (SDG) 11 (Sustainable Cities and Communities), while innovative interventions will also help achieve Goal 5 (Gender Equality), Goal 7 (Affordable and Clean Energy), Goal 9 (Industry, Innovation and Infrastructure), and Goal 13 (Climate Action).

C. Describe The Budgeted M & E Plan:

1. The project results as outlined in the project results framework will be monitored annually and evaluated periodically during project implementation to ensure the project effectively achieves these results.

2. Project-level monitoring and evaluation will be undertaken in compliance with UNDP requirements as outlined in the UNDP POPP and UNDP Evaluation Policy. The UNDP Country Office will work with the relevant project stakeholders to ensure UNDP M&E requirements are met in a timely fashion and to high quality standards. Additional mandatory GEF-specific M&E requirements (as outlined below) will be undertaken in accordance with the GEF M&E policy and other relevant GEF policies[1].

3. In addition to these mandatory UNDP and GEF M&E requirements, other M&E activities deemed necessary to support project-level adaptive management will be agreed during the Project Inception Workshop and will be detailed in the Inception Report. This will include the exact role of project target groups and other stakeholders in project M&E activities including the GEF Operational Focal Point and national institutes assigned to undertake project monitoring. The GEF Operational Focal Point will strive to ensure consistency in the approach taken to the GEF-specific M&E requirements (notably the GEF Tracking Tools) across all GEF-financed projects in the country. This could be achieved for example by using one national institute to complete the GEF Tracking Tools for all GEF-financed projects in the country, including projects supported by other GEF Agencies.[2]

M&E Oversight and monitoring responsibilities:

4. Project Manager: The Project Manager is responsible for day-to-day project management and regular monitoring of project results and risks, including social and environmental risks. The Project Manager will ensure that all project staff maintain a high level of transparency, responsibility and accountability in M&E and reporting of project results. The Project Manager will inform the Project Board, the UNDP Country Office and the UNDP-GEF RTA of any delays or difficulties as they arise during implementation so that appropriate support and corrective measures can be adopted.

5. The Project Manager will develop annual work plans based on the multi-year work plan included in Annex A, including annual output targets to support the efficient implementation of the project. The Project Manager will ensure that the standard UNDP and GEF M&E requirements are fulfilled to the highest quality. This includes, but is not limited to, ensuring the results framework indicators are monitored annually in time for evidence-based reporting in the GEF PIR, and that the monitoring of risks and the various plans/strategies developed to support project implementation (e.g. ESMP, gender action plan, stakeholder engagement plan etc..) occur on a regular basis.

6. Project Board: The Project Board will take corrective actions as needed to ensure the project achieves the desired results. The Project Board will hold project reviews to assess the performance of the project and appraise the Annual Work Plan for the following year. In the project's final year, the Project Board will hold an end-of-project review to capture lessons learned and discuss opportunities for scaling up and to highlight project results and lessons learned with relevant audiences. This final review meeting will also discuss the findings outlined in the project Terminal Evaluation report and the management response.

7. Project Implementing Partner: The Implementing Partner is responsible for providing all required information and data necessary for timely, comprehensive and evidence-based project reporting, including results and financial data, as necessary. The Implementing Partner will strive to ensure project-level M&E is undertaken by national institutes, and is aligned with national systems so that the data used and generated by the project supports national systems.

8. UNDP Country Office: The UNDP Country Office will support the National Project Manager as needed, including through annual supervision missions. The annual supervision missions will take place according to the schedule outlined in the Annual Work Plan (AWP). Supervision mission reports will be circulated to the project team and Project Board within one month of the mission. The UNDP Country Office will initiate and organize key GEF M&E activities including the annual GEF PIR, the *independent Mid-term Review* and the independent Terminal Evaluation. The UNDP Country Office will also ensure that the standard UNDP and GEF M&E requirements are fulfilled to the highest quality.

9. The UNDP Country Office is responsible for complying with all UNDP project-level M&E requirements as outlined in the UNDP POPP. This includes ensuring the UNDP Quality Assurance Assessment during implementation is undertaken annually; that annual targets at the output level are developed, and monitored and reported using UNDP corporate systems; the regular updating of the ATLAS risk log; and, the updating of the UNDP gender marker on an annual basis based on gender mainstreaming progress reported in the GEF PIR and the UNDP ROAR. Any quality concerns flagged during these M&E activities (e.g. annual GEF PIR quality assessment ratings) must be addressed by the UNDP Country Office and the Project Manager.

10. The UNDP Country Office will retain all M&E records for this project for up to seven years after project financial closure to support ex-post evaluations undertaken by the UNDP Independent Evaluation Office (IEO) and/or the GEF Independent Evaluation Office (IEO).

11. UNDP-GEF Unit: Additional M&E and implementation quality assurance and troubleshooting support will be provided by the UNDP-GEF Regional Technical Advisor and the UNDP-GEF Directorate as needed.

12. Audit: The project will be audited as per UNDP Financial Regulations and Rules and applicable audit policies on NIM implemented projects.[3]

Additional GEF monitoring and reporting requirements:

13. Inception Workshop and Report: A project inception workshop will be held within 60 days of project CEO endorsement, with the aim to:

a. Familiarize key stakeholders with the detailed project strategy and discuss any changes that may have taken place in the overall context since the project idea was initially conceptualized that may influence its strategy and implementation.
b. Discuss the roles and responsibilities of the project team, including reporting lines, stakeholder engagement strategies and conflict resolution mechanisms.
c. Review the results framework and monitoring plan.
d. Discuss reporting, monitoring and evaluation roles and responsibilities and finalize the M&E budget; identify national/regional institutes to be involved in project-level M&E; discuss the role of the GEF OFP and other stakeholders in project-level M&E.
e. Update and review responsibilities for monitoring project strategies, including the risk log; SESP report, Social and Environmental Management Framework and other safeguard requirements; project grievance mechanisms; gender strategy; knowledge management strategy, and other relevant management strategies.
f. Review financial reporting procedures and budget monitoring and other mandatory requirements and agree on the arrangements for the annual audit.
g. Plan and schedule Project Board meetings and finalize the first-year annual work plan.
h. Formally launch the Project.

14. GEF Project Implementation Report (PIR): The annual GEF PIR covering the reporting period July (previous year) to June (current year) will be completed for each year of project implementation. Any environmental and social risks and related management plans will be monitored regularly, and progress will be reported in the PIR. The PIR submitted to the GEF will be shared with the Project Board. The quality rating of the previous year's PIR will be used to inform the preparation of the subsequent PIR.

15. Knowledge management: The project team will ensure extraction and dissemination of lessons learned and good practices to enable adaptive management and upscaling or replication at local and global scales. Results will be disseminated to targeted audiences through relevant information sharing fora and networks. The project will contribute to scientific, policy-based and/or any other networks as appropriate (e.g. by providing content, and/or enabling participation of stakeholders/beneficiaries)

16. GEF and/or LDCF Core Indicators: The GEF and/or LDCF/SCCF Core indicators included as Annex will be used to monitor global environmental benefits and will be updated for reporting to the GEF prior to MTR and TE. Note that the project team is responsible for updating the indicator status. The updated monitoring data should be shared with MTR/TE consultants prior to required evaluation missions, so these can be used for subsequent groundtruthing. The methodologies to be used in data collection have been defined by the GEF and are available on the GEF website. The required Protected Area Management Effectiveness Tracking Tool (METTs) have been prepared and the scores include in the GEF Core Indicators.

17. Independent Mid-term Review (MTR):The terms of reference, the review process and the final MTR report will follow the standard templates and guidance prepared by the UNDP IEO for GEF-financed projects available on the UNDP Evaluation Resource Center (ERC).

18. The evaluation will be 'independent, impartial and rigorous'. The consultants that will be hired by UNDP evaluation specialists to undertake the assignment will be independent from organizations that were involved in designing, executing or advising on the project to be evaluated. Equally, the consultants should not be in a position where there may be the possibility of future contracts regarding the project under review.

19. The GEF Operational Focal Point and other stakeholders will be actively involved and consulted during the evaluation process. Additional quality assurance support is available from the UNDP-GEF Directorate.

20. The final MTR report and MTR TOR will be publicly available in English and will be posted on the UNDP ERC at the same year as the 3rd PIR.. A management response to MTR recommendations will be posted in the ERC within six weeks of the MTR report's completion.

21. Terminal Evaluation (TE): An independent terminal evaluation (TE) will take place upon completion of all major project outputs and activities. The terms of reference, the evaluation process and the final TE report will follow the standard templates and guidance prepared by the UNDP IEO for GEF-financed projects available on the UNDP Evaluation Resource Center.

22. The evaluation will be 'independent, impartial and rigorous'. The consultants that will be hired by UNDP evaluation specialists to undertake the assignment will be independent from organizations that were involved in designing, executing or advising on the project to be evaluated. Equally, the consultants should not be in a position where there may be the possibility of future contracts regarding the project being evaluated.

23. The GEF Operational Focal Point and other stakeholders will be actively involved and consulted during the terminal evaluation process. Additional quality assurance support is available from the UNDP-GEF Directorate.

24. The final TE report and TE TOR will be publicly available in English and posted on the UNDP ERC by (add date). A management response to the TE recommendations will be posted to the ERC within six weeks of the TE report's completion.

25. Final Report: The project's terminal GEF PIR along with the terminal evaluation (TE) report and corresponding management response will serve as the final project report package. The final project report package shall be discussed with the Project Board during an end-of-project review meeting to discuss lesson learned and opportunities for scaling up.

26. Agreement on intellectual property rights and use of logo on the project's deliverables and disclosure of information: To accord proper acknowledgement to the GEF for providing grant funding, the GEF logo will appear together with the UNDP logo on all promotional materials, other written materials like publications developed by the project, and project hardware. Any citation on publications regarding projects funded by the GEF will also accord proper acknowledgement to the GEF. Information will be disclosed in accordance with relevant policies notably the UNDP Disclosure Policy and the GEF policy on public involvement.

Table 10: Mandatory GEF M&E Requirements and M&E Budget:

GEF M&E requirements	**Primary responsibility**	**Indicative costs to be charged to the Project Budget[4] (US$)**		**Time frame**
		GEF grant	**Co-financing**	
Inception Workshop	UNDP Country Office	USD 12,000	*10,000*	Within two months of project document signature
Inception Report	Project Manager	None	None	Within two weeks of inception workshop
Standard UNDP monitoring and reporting requirements as outlined in the UNDP POPP	UNDP Country Office	None	None	Quarterly, annually
Risk management	Project Manager Country Office	5,000 (1,000 per year)	None	Quarterly, annually
Monitoring of indicators in project results framework	Project Manager	20,000 (4,000 per year)		Annually before PIR
GEF Project Implementation Report (PIR)	Project Manager and UNDP Country Office and UNDP-GEF team	None	None	Annually
Lessons learned and knowledge generation	Project Manager	None	*None*	Annually
Monitoring of environmental and social risks, and corresponding management plans as relevant	Project Manager UNDP Country Office	*None*	*None*	On-going

GEF M&E requirements	Primary responsibility	Indicative costs to be charged to the Project Budget[4] (US$)		Time frame
		GEF grant	Co-financing	
Monitoring of stakeholder engagement plan	Project Manager UNDP Country Office	10,000 (2,000 per year)	*None*	On-going
Monitoring of gender action plan	Project Manager UNDP Country Office UNDP GEF team	10,000 (2,000 per year)	*None*	On-going
Addressing environmental and social grievances	Project Manager UNDP Country Office	*2,000 (200 per meeting, two meetings per year)*	*None*	On-going
Project Board meetings	Project Board UNDP Country Office Project Manager	*None*	*None*	At minimum annually
Supervision missions	UNDP Country Office	None[5]		Annually
Oversight missions	UNDP-GEF team	None32		Troubleshooting as needed
GEF Secretariat learning missions/site visits	UNDP Country Office and Project Manager and UNDP-GEF team	None		To be determined.
Mid-term GEF Tracking Tool to be updated by *(add name of national/regional institute if relevant)*	Project Manager	USD 15,000		Before mid-term review mission takes place.
Independent Mid-term Review (MTR) and management response *(add name of national/regional institute if relevant)*	UNDP Country Office and Project team and UNDP-GEF team	USD 20,000		Between 2nd and 3rd PIR.
Terminal GEF Tracking Tool to be updated by Project Manager	Project Manager	USD 12,000		Before terminal evaluation mission takes place
Independent Terminal Evaluation (TE) included in UNDP evaluation plan, and management response	UNDP Country Office and Project team and UNDP-GEF team	USD 20,000		At least three months before operational closure
TOTAL indicative COST Excluding project team staff time, and UNDP staff and travel expenses		**USD 126,000**		

[1] See https://www.thegef.org/gef/policies_guidelines

[2] See https://www.thegef.org/gef/gef_agencies

[3] No audit costs will be charged to the M&E Budget. For additional information on UNDP audits see: https://popp.undp.org/UNDP_POPP_DOCUMENT_LIBRARY/Public/NIM_for_Government_english.pdf

[4] Excluding project team staff time and UNDP staff time and travel expenses.

[5] The costs of UNDP Country Office and UNDP-GEF Unit's participation and time are charged to the GEF Agency Fee.

PART III: Certification by GEF partner agency(ies)

A. GEF Agency(ies) certification

GEF Agency Coordinator	Date	Project Contact Person	Telephone	Email
Pradeep Kurukulasuriya	5/17/2019	Kasper Koefoed-Hansen	5073024573	Kasper.koefoed@undp.org

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

This project will contribute to the following Sustainable Development Goal (s): 5 (Gender Equality), 7 (Affordable and Clean Energy), 9 (Industry, Innovation and Infrastructure), 11 (Sustainable Cities and Communities), and 13 (Climate Action).					
This project will contribute to the following country outcome included in the UNDAF/Country Programme Document: Outcome #3: Increased environmental sustainability to achieve sustainable development through environmental management, compliance with international treaties, adaptation to climate change, and improvement in capacity for policy and strategy development.					
This project will be linked to the following output of the UNDP Strategic Plan: *Output 1.5: Inclusive and sustainable solutions adopted to achieve increased energy efficiency and universal modern energy access (especially off-grid sources of renewable energy).*					
-	**Objective and Outcome Indicators**	**Baseline**	**Mid-term Target**	**End of Project Target**	**Data Collection Methods and Risks/Assumptions**
Project Objective: To promote the adoption of low-carbon technologies for Refrigeration and Air Conditioning (RAC) end-use.	Project Indicator 1 (GEF Core Indicator 6.2): Number of GHG emissions avoided over the investment period of the project (direct).	*0*	*200,000 CO_{2eq}*	*450,289 CO_{2eq} (direct)*	Data Collection Method: CO_2 emissions model implemented by the Environmental Policy and Planning Division of the MPD, based on monitoring of project outcomes and outputs.

					Risk: Incremental national capacities among policy makers and project developers for alternative RAC technologies are not effectively implemented, reducing priority for sustainable low-carbon options. Assumption: Regular (annual) checking of baseline assumptions carried out by the PMU and validated by the MTR and TE with the support of the UNDP CO and RTA for LAC.
	Project Indicator 2 (GEF Core Indicator 6.3): Energy saved GWh (equivalent to 3.6 million mega joules).	*0*	*8*	*22*	Data Collection Method: Annual update of national import for energy efficient, alternative low-carbon systems, as reported by TTBS, gathered and analysed by the PMU.

					Risks: 1. Failure to harmonize policy making of environmentally-friendly approaches among national public institutions (ministries of the Central Government and power and environmental regulators). 2. Poor coordination between government agencies and private sector stakeholders to implement the required pilot investments. Assumptions: 1. Low-carbon and ODS-phase out policies have been developed under the guidance of a National Steering Committee and during the project execution will be implemented under a similar arrangement for ensuring coordination. 2. All alternative proposed activities executed by the project will be followed-up by training and awareness-raising. 3. Legal agreements and Memorandum of Understanding will be prepared to ensure the delivery of implementation arrangements.

	Project Indicator 3 (GEF Core indicator 11): Number of direct project beneficiaries disaggregated by gender as co-benefit of GEF investment during the project implementation period.	*Total: 145 (100%)* *Men: 100 (69%)* *Women: 45 (31%)*	*Total: 160 (100%)* *Men: 104 (65%)* *Women: 56 (35%)*	*Total: 250 (100%)* *Men: 150 (60%)* *Women: 100 (40%)*	Data Collection Method: Annual report on the number of persons trained and in attendance at awareness sessions collected by and reported on by the PMU. This information would be de-aggregated by gender and recorded in a project beneficiaries database.
					Risk: Incremental national capacities among project stakeholders integrating the gender approach are not effectively or timely implemented. Assumption: Enhanced capacity building activities implemented by the project and related to the execution of the RAC pilot investments are able to create an enabling commercial environment for low carbon RAC technologies.
	Indicator 4: Number of women participating in leadership positions for the execution of the pilot projects.	*0*	*2*	*5*	Data Collection Method: Annual surveys conducted by Ministry of Gender and Youth Affairs and adjusted by the PMU in accordance with project outcomes, outputs and activities.

					Risk: Project stakeholders would potentially reproduce discriminations against women based on gender, especially regarding participation in design, implementation and access to incremental benefits of this FSP. Assumption: Implementation of the Gender Action Plan (Annex I) will help strengthen gender equality and empower women by improving their working conditions when directly employed in those activities related to low-carbon RAC implementations.
Component I /Outcome 1.1 The national policy, regulatory and institutional frameworks for Energy Efficiency (EE) gains for RAC technologies have been strengthened.	Indicator 5: Regulations and code of practice for DCS and CCHP published by the T&T Government.	*0*	*1*	*1*	Data Collection Method: Methodology for monitoring imports of EE equipment carried out by TTBS and in compliance with EMA regulations during the implementation of the project. Risk: Limited capacity in government due to insufficient trained staff on the implementation of low-carbon RAC alternatives. Assumption: High effectiveness of the national policy makers (MPD, MEEI, TTBS and EMA) engaged in carrying out different collaborative activities to address the identified barriers.

	Indicator 6: Standards & Labelling (S&L) regulations for RAC technologies developed, approved and ready for enforcement by the T&T Bureau of Standards (TTBS).	*3*	*4*	*5*	Data Collection Method: Official records of TTBS based on S&L procedures carried out in the technical committees. Risks: 1. Poor coordination between government agencies and private sector stakeholders. 2. Limited capacity of stakeholders to conceptualize S&L for innovative RAC technologies. Assumption: High level of local participation and synergy from both, public and private sectors, to adopt and mobilize up-to-date knowledge of low-carbon RAC technologies.
Component II / Outcome 2.1 Accelerate RAC market transformation towards less energy intensive and low-GWP technologies.	Indicator 7: Number of trained professionals and technicians directly linked to the project execution to sustainable RAC technologies and the reduction of GHG emissions.	*0*	*50*	*150*	Data Collection Method: Annual update -of the number of trained personnel- carried out by the PMU and the EPPD of the MPD, with technical support from UNDP, as an activity associated to the implementation and monitoring of the Carbon Reduction Strategy (CRS). The data captured would be stored in the Knowledge Management system currently developed through the MRV

					Risks: 1. Project progress delayed. 2. Changes in government management systems and priorities due to change in the national political status. Assumptions: 1. The project design has considered multiple stakeholders from the public, private and CSO sectors. 2. Government commitment to align policies and institutions to fully comply with national obligations under the UNFCCC and the Montreal Protocol.
	Indicator 8: Number of financial and market mechanisms for the development of low-carbon RAC technologies.	*0*	*1*	*2*	Data Collection Method: Methodology for monitoring imports of EE equipment carried out by TTBS and in compliance with EMA regulations during the implementation of the project.

					Risks: 1. Project implementation delayed due to the limited capacity of stakeholders to develop innovative financial mechanisms. 2. Staff turnover and limited resources to commit to training in a timely manner. Assumption: Project activities are implemented by stakeholders under respective annual corporate plans.
Component II / Outcome 2.2 Investment portfolio on replacement of energy intensive technologies implemented.	Indicator 9: Amount of private sector capital investment mobilized by the project.	*0*	*250,000*	*750,000.00*	Data Collection Method: Methodology for monitoring imports of EE equipment carried out by TTBS and in compliance with EMA regulations during the implementation of the project. Information is then analysed to extrapolate capital investment figures.

					Risks: 1. Project implementation delayed due to the limited capacity of stakeholders to assist in the deployment of the new technologies. 2. Unwillingness to invest in cooling system upgrades due to energy prices low and high fuel subsidies. Assumptions: 1. The PPG stage has already advanced with the definition of a private sector-driven investment pipeline and interested investors (please, refer to Annex K (DEVCCO Reports). 2. Decision / policy makers have been engaged throughout the PIF and the PPG and are ready to bring the institutional changes and approve financial commitments. 3. Awareness will be raised among stakeholders about the economic and global benefits of the alternative low-carbon technologies.
Component III / Outcome 3.1 Knowledge Management and M&E	Indicator 10: Number of relevant EE and HCFCC/HFC emission indicators integrated into the national MRV system implemented by the MPD and reported to the UNFCCC and the Montreal Protocol.	*0*	*1*	*2*	Data Collection Method: CO_2 emissions model implemented by the Environmental Policy and Planning Division of the MPD, based on monitoring of project outcomes and outputs.

					Risk: Lack of national capacity to support the process in a timely manner. Assumption: Project progress will be regularly monitored especially the GEF Core Indicators.
	Indicator 11: Percentage of project expenditure spent on the MSP planned activities.	0	50%	100%	Data Collection Method: UNDP Expenditures as reported in Atlas.
					Risk: Lack of adequate public financial allocations for the procurement of the proposed low-carbon measures. Assumption: Success in the implementation of the co-financed investment activities, as 72% of the GEF contribution is committed to Component 2 of the project.
This project will contribute to the following Sustainable Development Goal (s): 5 (Gender Equality), 7 (Affordable and Clean Energy), 9 (Industry, Innovation and Infrastructure), 11 (Sustainable Cities and Communities), and 13 (Climate Action).					

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

Comments	Response	Reference in documents
Comments from from Council at Work Program (Germany)		

The PIF in paragraph 30 states "there is no manufactures or assembly facilities for RAC equipment" in the country. However, paragraph 19 describes the market conditions and supply chain. The final project proposal should clarify on this.	Indeed, in Trinidad and Tobago, there is no manufacture or assembly facilities for RAC equipment, as stated in para. 30 of the PIF. Para. 19 describes the current situation of a RAC market w7here the supply chain is made up by a wide diversity of players. The project´s strategy, as clearly stated in para. 20 of the ProDoc, includes the principle of an integrated approach, incorporating actions at the operational level (project developers, investors and consumers).	Output 2.1.2 has been proposed to mainstream innovative knowledge for low-carbon RAC systems in order to improve in-country technical capacity and backstopping for assembling energy efficient RAC systems. (Please, refer to para. 76-77)
The project will make a significant change in the existing consumption of inefficient technologies for refrigeration and air conditioning, mostly in the commercial and residential sectors. As one of the main barrier identified are heavily subsidised energy prices (e.g. low electricity tariffs for industrial, residential and commercial customer). Average prices are much lower than in other Small Island Developing States (SIDS) and a major challenge to the promotion and implementation of energy efficiency programs. However, the project component does not address this essential barrier. Germany would like to encourage the project to consider energy price reform in the proposal or analyse ongoing activities in this regard in the final proposal.	Indeed, as an oil and gas-producing country, energy efficiency development in Trinidad and Tobago is currently at a rudimentary stage, due to the high level of subsidies to the price of electricity for all customers, a fact which is a major barrier to the desired transformation. In this regard, the project will strongly support the implementation of the National Climate Change Policy, which provides policy guidance for the development of an appropriate administrative and legislative framework. The project´s strategy, as clearly stated in para. 49 of the ProDoc, includes the principle of accompanying decision makers to foster the necessary structural changes in public policies.	Under Output 1.1.1, a key activity is the development of a national policy that synergizes the Montreal Protocol, its National Determined Contribution and the Carbon Reduction Strategy, including an analysis of the legal setting for energy pricing. Moreover, a study on the outlook for power market subsidies in T&T on electricity tariffs (commercial, residential), their impact on investment and financial returns for energy efficient RAC applications, and recommendations to improve market development and financial sustainability will be performed to strengthen the applicable National Policies. (Please, refer to para. 61-62)

Electricity consumption for air conditioning and refrigeration equipment by sector is not officially available (paragraph 13) at the moment for Trinidad and Tobago. The final proposal should in detail describe how the expected emission reduction potential is derived by elaborating on current baseline and penetration data. *The project will promote a series of pilot activities by scaling up baseline interventions co-funded by the Montreal Protocol mainly by the private sector, e.g. district cooling projects. For these activities feasibility studies will be completed. Germany would like to ask to also consider renewable energy technologies in these studies, such as solar cooling system driving adsorption or absorption chillers.*	Indeed, during the PPG phase a detailed calculation for GHG benefits of this project was structured in three avenues: i. global benefits of GEF energy efficiency interventions of the project, ii. avoided emissions due to the ODS phase-out commitments of the country under the HCFC phase-out management plan of the Montreal Protocol, and iii. estimations of global benefits in terms of mitigated CO2 emissions associated with the development of two pilot projects of District Cooling systems.	Please, refer to Annex B: GHG Emissions Calculations for the first part of the comment. On the other hand, in order to consider renewable energy technologies, such as solar cooling system driving adsorption or absorption chillers, the pre-feasibility studies have shown the viability of using new absorption chiller technique using waste heat from existing sources at the Trinity Power Plant. (Please, refer to para. 86)
Comments from from Council at Work Program (US)		
We strongly recommend that the project design include development of national minimum energy performance standards for the various categories of equipment in the RAC sector, including a clear plan for how to achieve adopting and implementation of the standards.	This recommendation is of great significance for the success of this project. Outputs in the policy arena (Component I) and in market transformation (Component II) already consider it, for both low-carbon/low-GWP RAC technologies and the innovative District Cooling system. In this regard, the T&T Bureau of Standards (TTBS) has been fully engaged during the execution of the PPG phase.	Component I: Output 1.1.3 (Please, refer to para. 65-66) Component II: Output 2.1.3 (Please, refer to para. 78-79)

The project proposal seems to predetermine the best low-GWP technology prematurely at this stage of project development. Technology neutrality is essential to an effective consideration of the best technology choice available at the time for a specific location. Absent neutrality, technology selection is biased, inhibiting innovation and potentially the sustainability of the project. The full project proposal should demonstrate full consideration of all available technologies that will produce and environmental benefit while maximizing the effectiveness and sustainability of the project. This consideration cannot be limited to only CO2 and hydrocarbons, but must give equal consideration to all potential low-GWP alternatives to HCFCs and HFCs.	Recommendation is fully accounted in the ProDoc.	Please, refer to para. 45 under Component II to note the following paragraph: *"In order to guarantee technology neutrality, the project will consider the best low-GWP technology in order to support innovation and sustainability of the project. This consideration cannot be limited to only CO2 and hydrocarbons, but must give equal consideration to all potential low-GWP alternatives to HCFCs and HFCs".*
In light of the high level of funding envisaged for the technology interventions planned under Component II of the project, it will be important for the project proposal to be specific about the types of technology interventions planned (sectors, applications, costs of individual conversions, alternatives selected etc.) as well as their replicability and potential to lead to a market change towards enhancement of energy efficiency across the RAC sector.	For conventional RAC equipment, the project will focus on light and centralized RAC systems in the commercial sector, mostly running on HCFC-22 refrigerant. In the residential sector, it will focus on air conditioning light units also using mostly HCFC-22 of the conventional split-type. For District Cooling systems, it is expected that a market transformation will be triggered, as a result of the project, based on the financial opportunities identified during the execution of the PPG, as shown in Table 2. The ProDoc has planned to carry out a detailed market analysis during year 1 of project implementation (Annex 01: Multi-year Work Plan).	Please, refer to para. 74-75 (Component I: Output 2.1.1) and its timeline in Annex 01: Multi-year Work Plan.

There are some discrepancies in the levels of funding indicated for Components I and II between Section B of the PIF and the table on pages 19-20.	Budget calculations have been adjusted accordingly to the ProDoc template.	Please, refer to Section X of the ProDoc.
Comments from the GEF Sec		
(no remaining comments)		
Comments from STAP		
1. The project aims to promote the adoption of low-carbon technologies for refrigeration and air conditioning end-use in Trinidad and Tobago.		**UNDP Response:** Noted
2. Given the rapid growth of refrigerators and air conditioners in T&T, the project will make low-C refrigeration and air-conditioning technologies more efficient. This includes, through the use of standards and labeling, as well as fiscal incentives for imports. Market transformation is also planned to replace high energy technologies, including for district cooling as part of the USD 8.5M investment portfolio from cofinancing. The project also includes awareness raising and capacity building efforts, along with data collection on F-gas emissions.		**UNDP Response:** Noted

3. High per capita emissions are evident in T&T, although the 2005 and 2006 data quoted is out of date and should be updated in the proposal.	**UNDP Response:** Noted. The Project establishes emissions trends and uses the latest available Official data sources such as: · Energy Dossier: Trinidad and Tobago, Interamerican Development Bank, Technical Note No. IDB-TN-938, February 2016. · Energy Sales and Peak Demand Forecast,, October 1st, 2015. · Framework for Development of a Renewable Energy Policy for Trinidad and Tobago, Ministry of Energy and Energy Affairs, January 2011. · National Climate Change Policy, Government of the Republic of Trinidad and Tobago, July 2011. · State of the Environment Report 2010, Environmental Management Authority (EMA). · MPD, LECB, UNDP: NDC Policy Brief Series: Policy Brief No.2, October 2016 · Government of the Republic of Trinidad and Tobago. Strategy for Reduction of Carbon Emissions in Trinidad and Tobago", Page 49, August 2015 · Climate change connection: Common Ground In Bangladesh, Ghana, Nepal, Senegal and Trinidad and Tobago

4. The current baseline scenario of use of high GWP refrigerants and low-efficiency equipment can be improved by various practical means such as ensuring imported technology meets stringent guidelines. Disposal of spent refrigerant can also be improved but not totally avoided. The project, through the outline activities, seeks to achieve this.	**UNDP Response:** Noted.
5. A 1.5 Mt CO2-eq emission avoidance is projected over 20 years in line with the country's NDC. Replication from other projects is also possible and can provide further climate benefits. A further 62.5t of emissions can be avoided indirectly by using natural refrigerants to replace ODS.	**UNDP Response:** Noted. Annex B – includes the emissions Reductions Calculations where more details can be found.
6. The introduction of energy efficient equipment/technologies through the GEF funding will also allow for the introduction of low-GWP refrigerants which will be implemented through funds from the Montreal Protocol. Hence, GEF funding would indirectly help the phase-out of ozone-depleting substances – (such as HCFCs). This should have been recognized in the project document, but was not.	**UNDP Response:** Trinidad and Tobago is currently implementing its HCFC Phase-out Management Plan to phase-out Ozone-depleting substances with support from the MLF. The HPMP includes bans on ODP-containing equipment and imports of HCFCs.
7. Furthermore, since 100% of T&T's electricity comes from natural gas and diesel oil units (see Paragraph 53 in the project document), improving energy efficiency in the refrigeration and air conditioning sectors will not only provide CO2 emission reduction benefits, but will also help avoid black carbon emissions reduction for which diesel power generators are an important source (see for example, Evans et al, 2015: https://www.atmos-chem-phys.net/15/8349/2015/acp-15-8349-2015.pdf; WHO: http://www.who.int/sustainable-development/cities/health-risks/climate-risks/en/; and Chow et al., 2006: https://www.arb.ca.gov/research/apr/past/04-307_v1.pdf). This should be recognized as part of the possible climate benefits from this project.	**UNDP Response:** Noted
8. A wide range of project stakeholders exists with several ministries involved in the project. Close cooperation and communication across ministries will be essential. Lessons learned, such as from the district cooling scheme, will be shared with the private sector.	**UNDP Response:** Noted. A stakeholder engagement plan was developed during the PPG Phase. In addition, M&E considerations have been incorporated into the project and Workplans.

ANNEX C: STATUS OF IMPLEMENTATION OF PROJECT PREPARATION ACTIVITIES AND THE USE OF FUNDS.

A. Provide detailed funding amount of the PPG activities financing status in the table below:

PPG Grant Approved at PIF: 150,000			
Project Preparation Activities Implemented	*GETF/LDCF/SCCF/CBIT Amount ($)*		
	Budgeted Amount	*Amount Spent to Date*	*Amount Committed*
Project preparation grant to finalize the project: Energy Efficiency through the Development of Low-carbon RAC Technologies in Trinidad and Tobago	150,000.00	122,823.13	27,176.87
Total	150,000.00	122,823.13	27,176.87

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

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

ANNEX E: GEF 7 Core Indicator Worksheet

Use this Worksheet to compute those indicator values as required in Part I, Table G to the extent applicable to your proposed project. Progress in programming against these targets for the program will be aggregated and reported at any time during the replenishment period. There is no need to complete this table for climate adaptation projects financed solely through LDCF and SCCF.

Annex C: GEF Core Indicators

Core Indicator 1	**Terrestrial protected areas created or under improved management for conservation and sustainable use**		***(Hectares)***
		Hectares (1.1+1.2)	
		Expected	Achieved

		PIF stage	Endorsement	MTR	TE	
			n/a			
Indicator 1.1	Terrestrial protected areas newly created					
Name of Protected Area	WDPA ID	IUCN category	Hectares			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
				n/a		
		Sum				
Indicator 1.2	Terrestrial protected areas under improved management effectiveness					
Name of Protected Area	WDPA ID	IUCN category	Hectares	METT Score		
				Baseline	Achieved	
				Endorsement	MTR	TE
		Sum				
Core Indicator 2	**Marine protected areas created or under improved management for conservation and sustainable use**					***(Hectares)***
		Hectares (2.1+2.2)				
		Expected		Achieved		
		PIF stage	Endorsement	MTR	*TE*	
			n/a			
Indicator 2.1	Marine protected areas newly created					

Name of Protected Area	WDPA ID	IUCN category	Hectares			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
		Sum				

Indicator 2.2	Marine protected areas under improved management effectiveness	

Name of Protected Area	WDPA ID	IUCN category	Hectares	METT Score (Scale 1-3)			
				Baseline		Achieved	
				PIF stage	Endorsement	MTR	TE
		Sum					

Core Indicator 3	**Area of land restored**	***(Hectares)***

		Hectares (3.1+3.2+3.3+3.4)			
		Expected		Achieved	
		PIF stage	Endorsement	MTR	TE
			n/a		

Indicator 3.1	Area of degraded agricultural land restored	

			Hectares			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE

Indicator 3.2	Area of forest and forest land restored					
			Hectares			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
Indicator 3.3	Area of natural grass and shrublands restored					
			Hectares			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
Indicator 3.4	Area of wetlands (including estuaries, mangroves) restored					
			Hectares			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
Core Indicator 4	**Area of landscapes under improved practices (hectares; excluding protected areas)**					***(Hectares)***
		Hectares (4.1+4.2+4.3+4.4)				

		Expected		Expected	
		PIF stage	Endorsement	MTR	TE
			n/a		
Indicator 4.1	Area of landscapes under improved management to benefit biodiversity				
			Hectares		
			Expected	Achieved	
			PIF stage	Endorsement	MTR	TE
Indicator 4.2	Area of landscapes that meet national or international third-party certification that incorporates biodiversity considerations				
Third party certification(s):			Hectares		
			Expected	Achieved	
			PIF stage	Endorsement	MTR	TE
Indicator 4.3	Area of landscapes under sustainable land management in production systems				
			Hectares		
			Expected	Achieved	
			PIF stage	Endorsement	MTR	TE

Indicator 4.4	Area of High Conservation Value Forest (HCVF) loss avoided					
			Hectares			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
Core Indicator 5	**Area of marine habitat under improved practices to benefit biodiversity**					***(Hectares)***
Indicator 5.1	Number of fisheries that meet national or international third-party certification that incorporates biodiversity considerations					*n/a*
Third party certification(s):			Number			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
Indicator 5.2	Number of large marine ecosystems (LMEs) with reduced pollution and hypoxial					
			Number			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
Core Indicator 6	**Greenhouse gas emission mitigated**					***(Tons)***
			Tons (6.1+6.2)			
			Entered		Entered	

		PIF stage	Endorsement	MTR	TE
	Expected CO2e (direct)	*357500*	*450289*		
	Expected CO2e (indirect)	*335000*	*1048244*		
Indicator 6.1	Carbon sequestered or emissions avoided in the AFOLU sector				

			Tons			
			Entered		Entered	
			PIF stage	Endorsement	MTR	TE
	Expected CO2e (direct)					
	Expected CO2e (indirect)					
	Anticipated Year					

Indicator 6.2	Emissions avoided					

			Tons CO2eq			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
	Expected CO2e (direct)		*357500*	*450289*		
	Expected CO2e (indirect)		*335000*	*1048244*		
	Anticipated Year		*2035*	*2038*		

Indicator 6.3	Energy saved					

			GWH / MJ			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE

		Expected energy savings (GWh)	*n.a.*	*22GWH or 79,200,000 MJ*		
Indicator 6.4	Increase in installed renewable energy capacity per technology					
		Technology	Capacity (MW)			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
Core Indicator 7	**Number of shared water ecosystems (fresh or marine) under new or improved cooperative management**					***(Number)***
Indicator 7.1	Level of Transboundary Diagnostic Analysis and Strategic Action Program (TDA/SAP) formulation and implementation					*n/a*
		Shared water ecosystem	Rating (scale 1-4)			
			PIF stage	Endorsement	MTR	TE
Indicator 7.2	Level of Regional Legal Agreements and Regional Management Institutions to support its implementation					
		Shared water ecosystem	Rating (scale 1-4)			
			PIF stage	Endorsement	MTR	TE
Indicator 7.3	Level of National/Local reforms and active participation of Inter-Ministerial Committees					
		Shared water ecosystem	Rating (scale 1-4)			

			PIF stage	Endorsement	MTR	TE
Indicator 7.4	Level of engagement in IWLEARN through participation and delivery of key products					
		Shared water ecosystem	Rating (scale 1-4)			
			Rating		Rating	
			PIF stage	Endorsement	MTR	TE
Core Indicator 8	**Globally over-exploited fisheries Moved to more sustainable levels**					***(Tons)***
			Metric Tons			
			PIF stage	Endorsement	MTR	TE
Core Indicator 9	**Reduction, disposal/destruction, phase out, elimination and avoidance of chemicals of global concern and their waste in the environment and in processes, materials and products**					***(Tons)***
		Metric Tons (9.1+9.2+9.3)				
		Expected		Achieved		
		PIF stage	PIF stage	MTR	TE	
Indicator 9.1	Solid and liquid Persistent Organic Pollutants (POPs) and POPs containing materials and products removed or disposed					
POPs type		Metric Tons				
		Expected		Achieved		

			PIF stage	Endorsement	MTR	TE
Indicator 9.2	Quantity of mercury reduced					
			Metric Tons			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
Indicator 9.3	Number of countries with legislation and policy implemented to control chemicals and waste					
			Number of Countries			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
Indicator 9.4	Number of low-chemical/non-chemical systems implemented particularly in food production, manufacturing and cities					
		Technology	Number			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
Core Indicator 10	**Reduction, avoidance of emissions of POPs to air from point and non-point sources**					***(Grams)***
Indicator 10.1	Number of countries with legislation and policy implemented to control emissions of POPs to air					

			Number of Countries			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
Indicator 10.2	Number of emission control technologies/practices implemented					
			Number			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
Indicator 10.3	Number of countries with legislation and policy implemented to control chemicals and waste					
			Number of Countries			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
Core Indicator 11	**Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment**					***(Number)***
					Number Achieved	
					MTR	TE
				Female	*45*	
				Male	*100*	
				Total		

ANNEX: Project Taxonomy Worksheet

Use this Worksheet to list down the taxonomic information required under Part1 by ticking the most relevant keywords/topics//themes that best describes the project

Level 1	Level 2	Level 3	Level 4
☒ **Influencing models**			
	☒ **Transform policy and regulatory environments**		
	☒ **Strengthen institutional capacity and decision-making**		
	☒ **Convene multi-stakeholder alliances**		
	☒ **Demonstrate innovative approaches**		
	☒ **Deploy innovative financial instruments**		
☐ **Stakeholders**			
	☐ **Indigenous Peoples**		
	☐ **Private Sector**		
		☐ Capital providers	
		☐ Financial intermediaries and market facilitators	
		☐ Large corporations	
		☐ SMEs	
		☐ Individuals/Entrepreneurs	
		☐ Non-Grant Pilot	
		☐ Project Reflow	
	☐ **Beneficiaries**		
	☐ **Local Communities**		
	☐ **Civil Society**		
		☐ Community Based Organization	
		☐ Non-Governmental Organization	
		☐ Academia	
		☐ Trade Unions and Workers Unions	
	☐ **Type of Engagement**		
		☐ Information Dissemination	
		☐ Partnership	
		☐ Consultation	
		☐ Participation	
	☐ **Communications**		
		☐ Awareness Raising	
		☐ Education	
		☐ Public Campaigns	
		☐ Behavior Change	
☐ **Capacity, Knowledge and Research**			
	☐ **Enabling Activities**		
	☐ **Capacity Development**		
	☐ **Knowledge Generation and Exchange**		
	☐ **Targeted Research**		
	☐ **Learning**		

		☒ Knowledge Management	
		☒ Innovation	
		☒ Capacity Development	
		☒ Learning	
	☐ **Stakeholder Engagement Plan**		
☐ **Gender Equality**			
	☐ **Gender Mainstreaming**		
		☐ Beneficiaries	
		☐ Women groups	
		☐ Sex-disaggregated indicators	
		☐ Gender-sensitive indicators	
	☐ **Gender results areas**		
		☐ Access and control over natural resources	
		☐ Participation and leadership	
		☐ Access to benefits and services	
		☐ Capacity development	
		☐ Awareness raising	
		☐ Knowledge generation	
☐ **Focal Areas/Theme**			
	☐ **Integrated Programs**		
		☐ Commodity Supply Chains ([1]Good Growth Partnership)	
			☐ Sustainable Commodities Production
			☐ Deforestation-free Sourcing
			☐ Financial Screening Tools
			☐ High Conservation Value Forests
			☐ High Carbon Stocks Forests
			☐ Soybean Supply Chain
			☐ Oil Palm Supply Chain
			☐ Beef Supply Chain
			☐ Smallholder Farmers
			☐ Adaptive Management
		☐ Food Security in Sub-Sahara Africa	
			☐ Resilience (climate and shocks)
			☐ Sustainable Production Systems
			☐ Agroecosystems
			☐ Land and Soil Health
			☐ Diversified Farming
			☐ Integrated Land and Water Management
			☐ Smallholder Farming
			☐ Small and Medium Enterprises
			☐ Crop Genetic Diversity
			☐ Food Value Chains
			☐ Gender Dimensions
			☐ Multi-stakeholder Platforms
		☐ Food Systems, Land Use and Restoration	

			☐ Smallholder Farmers
		☐ Sustainable Cities	
			☐ Integrated urban planning
			☐ Urban sustainability framework
			☐ Transport and Mobility
			☐ Buildings
			☐ Municipal waste management
			☐ Green space
			☐ Urban Biodiversity
			☐ Urban Food Systems
			☐ Energy efficiency
			☐ Municipal Financing
			☐ Global Platform for Sustainable Cities
			☐ Urban Resilience
	☐ **Biodiversity**		
		☐ Protected Areas and Landscapes	
			☐ Terrestrial Protected Areas
			☐ Coastal and Marine Protected Areas
			☐ Productive Landscapes
			☐ Productive Seascapes
			☐ Community Based Natural Resource Management
		☐ Mainstreaming	
			☐ Extractive Industries (oil, gas, mining)
			☐ Forestry (Including HCVF and REDD+)
			☐ Tourism
			☐ Agriculture & agrobiodiversity
			☐ Fisheries
			☐ Infrastructure
			☐ Certification (National Standards)
			☐ Certification (International Standards)
		☐ Species	
			☐ Illegal Wildlife Trade
			☐ Threatened Species
			☐ Wildlife for Sustainable Development
			☐ Crop Wild Relatives
			☐ Plant Genetic Resources
			☐ Animal Genetic Resources
			☐ Livestock Wild Relatives
			☐ Invasive Alien Species (IAS)
		☐ Biomes	
			☐ Mangroves
			☐ Coral Reefs
			☐ Sea Grasses
			☐ Wetlands
			☐ Rivers

			Accounting
			☐ Conservation Trust Funds
			☐ Conservation Finance
		☐ Supplementary Protocol to the CBD	
			☐ Biosafety
			☐ Access to Genetic Resources Benefit Sharing
	☐ **Forests**		
		☐ Forest and Landscape Restoration	
			☐ REDD/REDD+
		☐ Forest	
			☐ Amazon
			☐ Congo
			☐ Drylands
	☐ **Land Degradation**		
		☐ Sustainable Land Management	
			☐ Restoration and Rehabilitation of Degraded Lands
			☐ Ecosystem Approach
			☐ Integrated and Cross-sectoral approach
			☐ Community-Based NRM
			☐ Sustainable Livelihoods
			☐ Income Generating Activities
			☐ Sustainable Agriculture
			☐ Sustainable Pasture Management
			☐ Sustainable Forest/Woodland Management
			☐ Improved Soil and Water Management Techniques
			☐ Sustainable Fire Management
			☐ Drought Mitigation/Early Warning
		☐ Land Degradation Neutrality	
			☐ Land Productivity
			☐ Land Cover and Land cover change
			☐ Carbon stocks above or below ground
		☐ Food Security	
	☐ **International Waters**		
		☐ Ship	
		☐ Coastal	
		☐ Freshwater	
			☐ Aquifer
			☐ River Basin
			☐ Lake Basin
		☐ Learning	
		☐ Fisheries	
		☐ Persistent toxic substances	

Font		Paragraph	
		☐ Transboundary Diagnostic Analysis and Strategic Action Plan preparation	
		☐ Strategic Action Plan Implementation	
		☐ Areas Beyond National Jurisdiction	
		☐ Large Marine Ecosystems	
		☐ Private Sector	
		☐ Aquaculture	
		☐ Marine Protected Area	
		☐ Biomes	
			☐ Mangrove
			☐ Coral Reefs
			☐ Seagrasses
			☐ Polar Ecosystems
			☐ Constructed Wetlands
	☐ **Chemicals and Waste**		
		☐ Mercury	
		☐ Artisanal and Scale Gold Mining	
		☐ Coal Fired Power Plants	
		☐ Coal Fired Industrial Boilers	
		☐ Cement	
		☐ Non-Ferrous Metals Production	
		☐ Ozone	
		☐ Persistent Organic Pollutants	
		☐ Unintentional Persistent Organic Pollutants	
		☐ Sound Management of chemicals and Waste	
		☐ Waste Management	
			☐ Hazardous Waste Management
			☐ Industrial Waste
			☐ e-Waste
		☐ Emissions	
		☐ Disposal	
		☐ New Persistent Organic Pollutants	
		☐ Polychlorinated Biphenyls	
		☐ Plastics	
		☐ Eco-Efficiency	
		☐ Pesticides	
		☐ DDT - Vector Management	
		☐ DDT - Other	
		☐ Industrial Emissions	
		☐ Open Burning	
		☐ Best Available Technology / Best Environmental Practices	
		☐ Green Chemistry	
	☐ **Climate Change**		
		☐ **Climate Change Adaptation**	
			☐ Climate Finance
			☐ Least Developed Countries

			☐ Mainstreaming Adaptation
			☐ Private Sector
			☐ Innovation
			☐ Complementarity
			☐ Community-based Adaptation
			☐ Livelihoods
		☒ **Climate Change Mitigation**	
			☐ Agriculture, Forestry, and other Land Use
			☒ Energy Efficiency
			☐ Sustainable Urban Systems and Transport
			☒ Technology Transfer
			☐ Renewable Energy
			☐ Financing
			☐ Enabling Activities
		☐ **Technology Transfer**	
			☐ Poznan Strategic Programme on Technology Transfer
			☐ Climate Technology Centre & Network (CTCN)
			☐ Endogenous technology
			☐ Technology Needs Assessment
			☐ Adaptation Tech Transfer
		☐ **United Nations Framework on Climate Change**	
			☐ Nationally Determined Contribution

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