# PROJECT IDENTIFICATION FORM (PIF)

**PROJECT TYPE: Full-sized Project**
**TYPE OF TRUST FUND:GEF Trust Fund**

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## PART I: PROJECT INFORMATION

| | | | |
|---|---|---|---|
| Project Title: | Improving Energy Efficiency in the Social Housing Sector | | |
| Country(ies): | Trinidad & Tobago | GEF Project ID:[1] | 5733 |
| GEF Agency(ies): | IADB (select) (select) | GEF Agency Project ID: | TT-G1001 |
| Other Executing Partner(s): | Ministry of Energy and Energy Affairs (MEEA)<br>Ministry of Housing and Urban Development (MHUD)<br>Housing Development Corporation (HDC)<br>Trinidad and Tobago Bureau of Standards (TTBS)<br>T&T Green Building Council | Submission Date: | March 7, 2014. |
| GEF Focal Area (s): | Climate Change | Project Duration (Months) | 60 |
| Name of parent program (if applicable):<br>• For SFM/REDD+ ☐<br>• For SGP ☐<br>• For PPP ☐ | | Project Agency Fee ($): | 242,250 |

### A. INDICATIVE FOCAL AREA STRATEGY FRAMEWORK[2]:

| Focal Area Objectives | Trust Fund | Indicative Grant Amount ($) | Indicative Co-financing ($) |
|---|---|---|---|
| CCM-2 (select) | GEFTF | 2,550,000 | 11,700,000 |
| (select) (select) | (select) | | |
| (select) (select) | (select) | | |
| (select) (select) | (select) | | |
| (select) (select) | (select) | | |
| (select) (select) | (select) | | |
| (select) (select) | (select) | | |
| (select) (select) | (select) | | |
| (select) (select) | (select) | | |
| Total Project Cost | | 2,550,000 | 11,700,000 |

### B. INDICATIVE PROJECT DESCRIPTION SUMMARY

**Project Objective: Reducing energy consumption in the social housing sector by promotion of improved architectural designs, use of passive building elements and application of energy efficient equipment**

| Project Component | Grant Type[3] | Expected Outcomes | Expected Outputs | Trust Fund | Indicative Grant Amount ($) | Indicative Cofinancing ($) |
|---|---|---|---|---|---|---|
| 1. Residential sector analysis and savings potential identification. | TA | 1.1 Strengthen local institutions capacity regarding energy consumption performance, knowledge and information in the | 1.1.1. Established methodology for auditing and monitoring of existing buildings.<br><br>1.1.2. 100 energy | GEFTF | 100,000 | 100,000 |

[1] Project ID number will be assigned by GEFSEC.
[2] Refer to the reference attached on the Focal Area Results Framework and LDCF/SCCF Framework when completing Table A.
[3] TA includes capacity building, and research and development.

| | | | | | | |
|---|---|---|---|---|---|---|
| | | residential sector.<br><br>1.2 Establishment of the availability of energy efficient and renewable energy technologies and the capacity of the building industry. | audits conducted in the residential sector including the assessment of energy end-use patterns in households and the analysis of passive elements such as building envelope and solar shading.<br><br>1.2.1. Market analysis on the availability of EE technology along with a study of the capability of the building industry (local capacity, legislation and R+D, etc.) to implement EE measures. | | | |
| 2. Development of a regulatory framework as well as capacity building to support energy efficient housing. | TA | 2.1 Approval by TTBS of standards and norms for the design and construction of social housing with EE and RE.<br><br>2.2. Strengthening of industry capacity building for the implementation of EE and RE measures. | 2.1.1. Analysis of international regulations and capacity building benchmarks comparing with findings of component 1.<br><br>2.1.2. Cost-benefit analysis for a variety of passive and active EE measures identified in the baseline studies and energy simulations.<br><br>2.1.3. Design of the energy efficiency standards for social housing along with guidelines for passive design.<br><br>2.2.1. Development of courses content and guidelines for training sessions.<br><br>2.2.2. Training of at least 50 architects, contractors, municipal authorities, energy auditors, etc. | GEFTF | 160,000 | 760,000 |
| 3. Demonstration of energy-efficient housing constructions | Inv | 3.1 Demonstration of energy efficient design, standards, and | 3.1.1. 200 new housing units are built with EE standards along with | GEFTF | 2,040,000 | 10,020,000 |

| | | | | | | |
|---|---|---|---|---|---|---|
| as well as energy-efficient refurbishment of existing dwellings | | technology and their successful implementation to increase market volumes and to pave the way for EE standards to be incorporated in future building codes.<br><br>3.2 Energy savings up to 30% respect to baseline conditions and reduction of 378 tons of $CO_2$ emissions per year.<br><br>3.3 Strengthened home owners awareness of energy savings and energy efficient appliances. | 100 existing housing units retrofitting, all equipped with EE and RE technologies.<br><br>3.1.3. Demonstration of LED street lighting in one housing complex.<br><br>3.2.1. Monitoring of energy performance of all intervened houses and comparative analysis with baseline information, demonstrating the reduction of operational costs, energy consumption and GHG emissions.<br><br>3.3.1. Development of demand-side management programme for lowering electricity consumption in the residential sector.<br><br>3.3.2. Information campaign for home owners on making existing buildings more energy efficient. | | | |
| 4. Financial and market-based mechanisms strategy for scaling up EE measures and RE. | TA | 4.1 Financial strategy to stimulate the implementation of EE and RE technologies in the housing sector is adopted by the Government. | 4.1.1. Analysis of international examples of financial benefits in relation to EE and RE measures in housing and possible implementation identifying suitable partners.<br><br>4.1.2. Development of a strategy that encourages financial institutions, banks, private developers, power utilities and retailers to include EE investments in their packages/products or services for low and medium income | GEFTF | 150,000 | 300,000 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | households. | | | |
| 5. Monitoring and Evaluation Plan | TA | Assesment of component progress. | Mid-term review and terminal evaluation completed. | GEFTF | 50,000 | |
| | (select) | | | (select) | | |
| | (select) | | | (select) | | |
| | (select) | | | (select) | | |
| | (select) | | | (select) | | |
| | (select) | | | (select) | | |
| Subtotal | | | | | 2,500,000 | 11,180,000 |
| Project Management Cost (PMC)[4] | | | | (select) | 50,000 | 520,000 |
| Total Project Cost | | | | | 2,550,000 | 11,700,000 |

## C. INDICATIVE CO-FINANCING FOR THE PROJECT BY SOURCE AND BY NAME IF AVAILABLE, ($)

| Sources of Cofinancing | Name of Cofinancier | Type of Cofinancing | Amount ($) |
|---|---|---|---|
| National Government | Ministry of Energy and Energy Affairs (MEEA) | In-kind | 500,000 |
| National Government | Ministry of Housing, Land and Marine Affairs | In-kind | 700,000 |
| National Government | Housing Development Corporation | Investment | 9,780,000 |
| GEF Agency | InterAmerican Development Bank | Cash | 720,000 |
| (select) | | (select) | |
| (select) | | (select) | |
| **Total Cofinancing** | | | 11,700,000 |

## D. INDICATIVE TRUST FUND RESOURCES ($) REQUESTED BY AGENCY, FOCAL AREA AND COUNTRY[1]

| GEF Agency | Type of Trust Fund | Focal Area | Country Name/Global | Grant Amount ($) (a) | Agency Fee ($) (b)[2] | Total ($) c=a+b |
|---|---|---|---|---|---|---|
| (select) | (select) | (select) | | | | 0 |
| (select) | (select) | (select) | | | | 0 |
| (select) | (select) | (select) | | | | 0 |
| (select) | (select) | (select) | | | | 0 |
| (select) | (select) | (select) | | | | 0 |
| **Total Grant Resources** | | | | 0 | 0 | 0 |

[1] In case of a single focal area, single country, single GEF Agency project, and single trust fund project, no need to provide information for this table. PMC amount from Table B should be included proportionately to the focal area amount in this table.

[2] Indicate fees related to this project.

## E. PROJECT PREPARATION GRANT (PPG)[5]

Please check on the appropriate box for PPG as needed for the project according to the GEF Project Grant:

| | Amount Requested ($) | Agency Fee for PPG ($)[6] |
|---|---|---|
| • No PPG required. | -- 0-- | --0-- |
| • (upto) $50k for projects up to & including $1 million | | |
| • (upto)$100k for projects up to & including $3 million | | |

[4] To be calculated as percent of subtotal.

[5] On an exceptional basis, PPG amount may differ upon detailed discussion and justification with the GEFSEC.

[6] PPG fee percentage follows the percentage of the GEF Project Grant amount requested.

- (upto)$150k for projects up to & including $6 million _____ _____
- (upto)$200k for projects up to & including $10 million _____ _____
- (upto)$300k for projects above $10 million _____ _____

**PPG AMOUNT REQUESTED BY AGENCY(IES), FOCAL AREA(S) AND COUNTRY(IES) FOR MFA AND/OR MTF ROJECT ONLY**

| Trust Fund | GEF Agency | Focal Area | Country Name/ Global | (in $) | | |
|---|---|---|---|---|---|---|
| | | | | **PPG** (a) | **Agency Fee** (b) | **Total** c = a + b |
| (select) | (select) | (select) | | | | 0 |
| (select) | (select) | (select) | | | | 0 |
| (select) | (select) | (select) | | | | 0 |
| **Total PPG Amount** | | | | **0** | **0** | **0** |

MFA: Multi-focal area projects; MTF: Multi-Trust Fund projects.

## PART II: PROJECT JUSTIFICATION[7]

### A. PROJECT OVERVIEW

A.1. Project Description. Briefly describe the project, including ; 1) the global environmental problems, root causes and barriers that need to be addressed; 2) the baseline scenario and any associated baseline projects, 3) the proposed alternative scenario, with a brief description of expected outcomes and components of the project, 4) incremental cost reasoning and expected contributions from the baseline , the GEFTF, LDCF/SCCF and co-financing; 5) global environmental benefits (GEFTF, NPIF) and adaptation benefits (LDCF/SCCF); 6) innovativeness, sustainability and potential for scaling up

**The global aspects**

Currently all buildings worldwide account for an estimated 30 to 40% of the world's energy consumption. Between 10-20% of the total energy consumed during the life-cycle of buildings is used for building material, construction, maintenance and demolition, while between 80-90% is used for operation of the building, such as for cooling, lighting, ventilation, domestic appliances etc. The sector's contribution to global $CO_2$ emissions just from operation is in the range of 25 to 30% including construction it makes up more than a third of all $CO_2$ emissions (UNEP SBCI; Buildings and Climate Change; 2009). For both, renovation and new construction, the level of energy efficiency (EE) built in will have an impact for at least 30 to 50 years or more. Globally, the fast growing building sector, especially in developing countries, offers the largest, most cost-effective opportunities for EE, with considerable co-benefits as outlined in the United Nations Development Programme (UNDP) report "Promoting EE in Buildings" (2010). However, to turn these opportunities into reality, multiple barriers must be removed. Improvements in energy efficient building and appliance designs have a good Greenhouse Gas (GHG) mitigation potential as clearly identified by the Intergovernmental Panel on Climate Change (IPCC) 4th Assessment Report, International Energy Agency (IEA).

**Baseline situation in Trinidad and Tobago (T&T)**

T&T enjoys a warm and tropical climate year-round (average temperature of between 25 and 27°C). The two main islands and some smaller islets are home for about 1.3 million inhabitants. The total number of households was 406,200 in 2011, while the number of dwellings is slightly higher with a total of 422,000 units. T&T is self-sufficient in terms of energy supply, with oil and gas mainly from offshore platforms covering most of the energy demand. However, T&T shows one of the highest in the world $CO_2$ emissions per capita with more than 20 tons/cap per year, mainly because all power plants run on natural gas and are extremely inefficient with only about 26% thermal efficiency on average. In addition, the low gas and electricity tariffs in combination with inefficient end-use technologies and relatively low public awareness for energy issues, have led to high specific energy consumption in all sectors, i.e. an energy intensive industry and the residential sector. The latter sector is fully electrified and consumes approximately 29% of total electricity used. Estimations have shown that the average domestic electricity demand in T&T (16.6 kWh per day) is about two times higher than in Barbados with a very similar living standard. Most social housing developments follow the principle of low-cost construction without considering operational life-cycle costs derived from daily energy consumption and climate adapted designs are only marginally introduced. Houses rely almost completely on electricity as the only energy source, with the exception of LPG that is quite common for cooking. Simulations in similar climate conditions in Mexico have demonstrated that with relatively low additional investments energy savings in social housing, of at least 30% could be achieved, using more natural ventilation, insulation of roofs and walls and with the application of shading devices. T&T has a strong demand for state-funded social housing for low-income families, the current unsatisfied demand exceeds 166,000, so the annual construction of more than 10,000 new homes annually plus an important stock of existing buildings constitutes a high potential for energy savings under EE measures implementation.

[7] Part II should not be longer than 5 pages.

**Barriers**

There are many barriers that have limited the implementation of EE and RE especially in building sector. Low awareness and interest about energy saving is a cultural and social barrier associated also with the low energy prices which make the implementation of EE measures not very financially attractive. In addition, there is lack of regulatory framework and strong institutional capacity that establish EE standards or facilitates the creation of the adequate financial mechanisms to encourage the implementation of EE measures in the building sector. Another barrier is the low knowledge about climate-adapted building designs due to the absence of adequate training at the university level and during professional life, as well as the lack of data regards energy consumption in housing sector.

**Baseline Projects**

The Housing Development Corporation (HDC) as part of the Ministry of Housing and Urban Development (MHUD) is mandated to provide 6,500 housing units per year for sale to eligible, low-income citizens. In 2012, only 3,500 units could be delivered due to shortages in the construction industry. Average costs per housing units were about US$48,000. Those homes are both constructed as individual single-family houses or as multi-family apartment buildings and supplied to the users without appliances or light bulbs. The plan of HDC for the period 2013-2015 foresees the construction of 9,850 units in total, among those the rehabilitation of 164 units that have been rented out. It is intended by HDC that solar street lighting, solar water heaters, efficient lighting fixtures and – if possible - solar PV panels should be part of future projects. In order to increase the efficiency and productivity of its programme, HDC seeks to include training, workshops and symposiums for contractors, suppliers and employees. The Trinidad and Tobago Bureau of Standards (TTBS) is already engaged with determining the appropriate EE standards for lighting and appliances and some activities related to EE labelling of appliances are taking place in T&T. However, there is no specific programme aimed at encouraging purchases of energy-efficient appliances, specifically in the lighting sector, where the use of incandescent light bulbs is still very common.

**Expected Outcomes and components**

This project will allow T&T to integrate EE to the housing development plans, promoting the transformation of building sector with a strong focus on social housing. The contribution will be done through the assessment of the baseline conditions of energy performance in social housing, the development of the relevant regulatory framework and standards, the demonstration of EE technologies and measures in a pilot and also the identification of financial mechanisms. The project will be executed by the Ministry of Energy and Energy Affairs (MEEA) in coordination with the HDC. The project will tackle the entire spectrum of energy consumption within the housing sector based mainly on reducing demand (passive design) and final use consumption (efficient active systems and appliances) and also compensating consumption (on site renewable energy (RE) generation), these actions will be tied together with the promotion of greater awareness of energy saving. The pilot project is expected to avoid the emission of 3,780 tons of $CO_2$ over the next ten years plus and indirect reduction, due to the implementation of EE standards in oncoming housing projects, of 450,450 of tons of $CO_2$ (See Annex 1)

**Component 1. Residential Sector Analysis and saving potentials identification (GEF US$100,000, co-finance US$ 100,000)**

At present, the information on the level and proportion of energy consumption in the social housing sector and the residential sector in general is very limited and mainly based on estimations. Neither T&TEC nor the statistical office or the MEEA have sound and reliable data on how much energy is used for which purpose in the domestic area. There are also no data available on the energy performance (cooling demand) of new or existing housing constructions. This is necessary to have an understanding of the current conditions of the housing sector and to be able to carry out the appropriate actions to encourage EE. It will therefore be necessary to perform energy audits in a defined number of existing dwellings and run monitoring programmes that provide information on the EE of existing building designs with the previously mentioned concepts in mind. Emphasis will be placed on studying the buildings envelope and other passive elements alongside the active systems efficiency. Based on these results, saving potentials for energy consumption will be identified.In parallel it is important to establish the existing capacity of the building industry to provide energy efficient housing. On one hand the EE knowledge of the professionals

concerned: architects, technicians, housing developers, contractors, municipal authorities, and energy auditors etc. and on the other hand the availability of energy-efficiency products on the market to implement low energy design (insulation, RE technologies etc.)

**Component 2. Development of a regulatory framework as well as capacity building to support energy efficient housing. (GEF US$ 160,000, co-finance US$ 760,000)**

In this component appropriate standards for energy efficient housing design and construction will be defined and approved by the TTBS. Initial analysis of international regulatory examples will set the benchmark. This will be accompanied by a cost-benefit analysis and simulation models that show how residential buildings can be optimized in terms of energy consumption for cooling and lighting by using different envelope shapes, orientations, insulation materials, windows, natural ventilation etc. and the related reduction in functioning costs. The component will also include capacity building and training for the development of qualified construction companies, electricians and other stakeholders. Due to the reduced existing knowledge and skills available with regards to energy efficient buildings, training and capacity building will include topics such as using insulation material, installation of solar water heaters, selection of water saving devices, use and performance of shading devices, selection of building material with a low carbon footprint, etc. Apart from the trainings, guidelines for architects, technicians and other main stakeholders will be developed, before entering into the realization of concrete model housing projects. This has to be matched with a training programme for service providers and technicians on specification and application of energy-efficiency material and equipment to allow for a high standard in implementing the improvement measures.

**Component 3. Demonstration of energy-efficient housing constructions as well as energy-efficient refurbishment of existing dwellings (GEF US$ 2,040,000, co-finance US$ 10,020,000)**

The objective of this component is to allow the MEEA to implement, test and demonstrate the EE standards, measures and technologies through a pilot project supported by the HDC with the incorporation of EE in some units of its housing development plan. First, 200 houses will be constructed taking into account the EE standards, these houses will be also a demonstration project that supports the development of new similar projects in the future. Some of the EE features of the houses will be: passive measures for curbing energy demand for cooling, solar collectors for water heating, and energy efficient lighting, ventilation, air-conditioning and refrigeration. Second, at the same time existing buildings offer huge opportunities for improvements with regard to energy use for air-conditioning, lighting and water heating, so this component also includes the retrofitting of 150 houses. Third, construction and retrofitting will be accompanied by demand side management, awareness raising, capacity building and training, as defined in Component 2. Fourth, LED street lighting technology will be installed in the same residential complex where the housing units will be built in order to test and demonstrate this technology. Trinidad and Tobago presents the unique case in the Caribbean where energy consumption is high across the board but, because of energy price subsidies and low retail energy prices, the business case for energy efficiency investments is low. There are several established energy efficiency technologies that are relevant to the provision of the energy services lighting, cooling, ventilation and mechanical work to end users, as it is shown in Annex II. In the Trinidad & Tobago market some are financially and economically viable, others are not. Finally, awareness campaigns will also be fundamental in this phase for the final home owners. The project will conduct training workshops for the families and end users on the operation and maintenance of the technologies and equipment that will be installed in their houses. Special focus will be given to women, afro-descendants, and children on how to use their homes and appliances efficiently and be aware of the consequences of wasting energy. Information campaigns, workshops and visits to the newly built houses will pave the way for greater savings when the owners enter their houses.

**Component 4. . Financial and market-based mechanisms strategy for scaling up EE measures and RE (GEF US$150,000, co-finance US$ 300,000)**

The higher up-front costs of some EE measures and the limited finance capacity of low-income households make it necessary that special financing mechanisms are put in place for future implementation of EE and RE technologies in both new buildings and retrofits. These may include soft loans, grants, fiscal incentives, funded by the Government or other entities for benefits at national scale for lowering energy consumption

and saving resources. For such purpose, banks, credit unions, utility and other stakeholders will be advised how financing programmes for EE measures and purchases could be established within their portfolio of services for low and medium-income families. Analysis will be made of international schemes that are currently operational to design a strategy for the needs of T&T.

**Innovativeness, sustainability and potential for scaling up**

The project will be the first of its kind in the country, introducing new practices in design and construction in the building industry, with the implementation of new and innovative technologies and development of large scale EE measures that could be replicated in other sectors.

The sustainability of the project is backed up by several actions. The involved institutions will be engaged with the beneficiaries and will provide continued support during the project implementation. Furthermore, this project includes in Component 3 training for technicians and other industry professionals, in order to provide future maintenance services, and also for end-users, on the appropriate responsible operation of the equipment and appliances that will be installed. Subsequent to the implementation of the GEF project, it is expected that any further costs will be directly absorbed by the homeowners as would be the case for any other household maintenance items..

In addition, the creation of a regulatory framework combined with capacity building activities are expected to provide the necessary structure to promote market transformation in the building sector and scale up the construction of energy efficient housing in the country. Furthermore, this project will support the HDC in its commitment to introduce EE measures in all future housing projects.

A.2. Stakeholders. Identify key stakeholders (including civil society organizations, indigenous people, gender groups, and others as relevant) and describe how they will be engaged in project preparation:

- Ministry of Energy and Energy Affairs (MEEA): As the authority in charge of the policies and planning of the Energy Sector the MEEA will be the main executor of the project, specifically through the Energy Research and Planning Division.
- Ministry of Housing and Urban Development (MHUD): The MHUD is responsible for the development and implementation of the national housing policy and the building stock. It will play a crucial role when it comes to identifying the new and existing housing projects.
- Housing Development Corporation (HDC): The HDC is in charge of providing affordable shelter for low and middle income persons and carrying out the broad policy of the Government in relation to housing. As a key stakeholder the HDC is going to be responsible of providing the housing units to be intervened.
- Trinidad and Tobago Bureau of Standards (TTBS) and T&T Green Building Council: These two institutions will play an important role in the development of national building code that includes the EE standards, as well as other relevant aspects with regards to appliances.

Special attention will be given to women's perspectives for the design of the project and in particular focusing on the families' needs and consumption habits.

A.3 Risk. Indicate risks, including climate change, potential social and environmental risks that might prevent the project objectives from being achieved, and, if possible, propose measures that address these risks to be further developed during the project design (table format acceptable):

| Risks | Level | Mitigation Measures |
|---|---|---|
| Lack of human and institutional capacity for designing and building energy-efficient homes. | Medium | The project will dedicate part of its efforts towards improving the know-how base on the level of engineers and technicians in the field of building design and construction, and support the strengthening of relevant institutions. |
| Lack of awareness of consumers on the benefits of EE appliances | Medium | The project will carry out awareness campaigns for the final home owners, that is expected to improve awareness on EE and its benefits. |
| Delay in the housing units delivery and procurement process. | Medium | The building process could be delayed due to the contractors, material purchasing process among others. The MEEA and the MHUD will control and follow up carefully the procurement processes through and appropriate management and monitoring team. |

A.4. Coordination. Outline the coordination with other relevant GEF financed and other initiatives:

The project will closely coordinate with the regional UNEP-GEF project "Energy for Sustainable Development in Caribbean Buildings" (GEF ID: 4171), with emphasis on practical demonstration and providing the right framework conditions to make EE an essential part of all housing projects. Information exchange will take place with the UNEP-GEF project "Promoting Energy Efficiency and Renewable Energy in Buildings in Jamaica" (GEF ID: 4167). It will further make reference to results from the United Nations Human Settlements Programme (UN-Habitat) within its project on Sustainable Housing and benefit from experiences made within the UNEP Sustainable Buildings and Climate Initiative (SBCI), the UNEP-SBCI Task Force on Greening the Building Sector Supply Chain, the UNEP Sustainable Social Housing Initiative in Bangladesh and India, the International Council for Research and Innovation in Building and Construction and the International Initiative for a Sustainable Built Environment. The project will also take advantage of the Knowledge Centre on Cities and Climate Change, an online platform launched by UNEP, UN-Habitat, World Bank and the Cities Alliance. It will also refer experiences from the Collaborative Labeling and Standards Appliance Programme (CLASP). The project will further exchange know-how and experiences with other similar GEF projects currently taking place in closely related subjects, e.g. “Market Transformation through Energy Efficiency Standards and Labeling of Appliances in South Africa” (GEF ID: 2692), “Energy Efficiency and Labelling in Colombia” (GEF ID: 3087), “Improving Energy Efficiency in Buildings in Colombia” (GEF ID: 3829) and “Development and Implementation of a Standards and Labeling Programme” in Kenya (GEF ID: 2775). It will also take note of the results from the EU-supported project “Eastern Caribbean Energy Efficiency Project” (ECELP) on standards and labeling of electric appliances and it will align with the Caribbean Regional Organization for Standards and Quality (CROSQ) in Barbados as representation of the Bureaus of Standards in the region, in order to harmonize with other approaches on EE standards and labeling in the Caribbean.

B. **DESCRIPTION OF THE CONSISTENCY OF THE PROJECT WITH**:

B.1 National strategies and plans or reports and assessments under relevant conventions, if applicable, i.e. NAPAS, NAPs, NBSAPs, national communications, TNAs, NCSAs, NIPs, PRSPs, NPFE, Biennial Update Reports, etc.:

The project is fully in line with relevant national strategies and plans. In the Second National Communication to the UNFCCC, the Government of Trinidad and Tobago recognizes that energy security, efficiency and conservation and a sustainable environment are crucial to the country’s economic sustainability[8] ; and in this communication was presented how the government agencies are implementing

[8] Ministry of the Environment and Water Resources. Second National Communication of the Republic of Trinidad and Tobago under the United Nations Framework Convention on Climate Change, April 2013, pg. 22. http://unfccc.int/resource/docs/natc/ttonc2.pdf

EE and RE, such as the Trinidad and Tobago Electricity Commission (T&TEC) which included energy efficient measures among its objectives.

T&T is currently developing a national energy policy Green Paper that foresees EE and RE, as an important pillar of the future of T&T. The project is also in line with the objectives of regional energy policy of CARICOM, regarding the promotion of EE in building sector. The project intents to pave the way of the Cabinet Appointed National Building Code Committee (CANBCC) for its plans to develop a Green Building Code incorporating energy aspects, as part of the wider National Building Code. The project with its combination of social housing and EE is integrated into country priorities, sector strategies and policies from both, the MHUD and the MEEA.

B.2. GEF focal area and/or fund(s) strategies, eligibility criteria and priorities:

The project is fully in line with the objectives as laid down in the Climate Change Strategies for GEF-5, in particular with the GEF focal area on Climate Change Mitigation- Objective 2: PROMOTE MARKET TRANSFORMATION FOR ENERGY EFFICIENCY IN INDUSTRY AND THE BUILDING SECTOR. The project will follow an integrated approach, supporting the GoRTT, and especially the MEEA and the MHUD in the development of a more energy efficient building sector, with a strong focus on social housing, as well as the development of the relevant regulatory frameworks and standards. The project will contribute significantly to climate change mitigation as the housing sector in T&T is mainly using electricity from power plants with low thermal and a high level of CO2 emissions, around 700 g/kWh. Although the project will focus on the state-funded social housing sector, it will also reach out to the whole residential sector with the introduction of new regulations and standards and by developing capacity and markets for energy-efficient construction and equipment. therefore it is expected that results from the project will be replicated with effects reaching far beyond the immediate target of the planned activities. The project will support all three intended outcomes: (i) appropriate policy, legal and regulatory frameworks adopted and enforced; (ii) sustainable financing and delivery mechanisms established and operational and (iii) GHG emissions avoided,. As a result of the activities and through the long term and systematic integration of EE into buildings in T&T, the project will positively contribute to climate change mitigation, as one of the major global environmental benefits, avoiding around 378 and 8,190 tons of CO2 emissions directly and indirectly respectively per year. The project is innovative for T&T, as energy efficient buildings and operations virtually do not exist in the country. It will specifically mitigate, improve EE and final energy consumption at end-use and lead to an increased adoption of a low-carbon development path through technology transfer, market transformation and enabling activities.

B.3 The GEF Agency's comparative advantage for implementing this project:

In the framework of upgrading low-income housing the IADB is currently supporting the Government of T&T (GOTT) in promoting more productive and affordable forms of housing with its proven social and economic multiplier effects through the "Neighborhood Upgrading Program (TT-L1016)", which is currently being implemented. At the same time it is supporting the MEEA through the Policy Based Loan Sustainable Energy Framework (TT L 1023), that aims the development of a more sustainable energy policy and the implementation of EE and RE energy in the country. One aspect is the support of EE by providing advice to the ESCO committee and the execution of energy audits that are directly related to EE in the building sector. Based on the ongoing dialogue with the GORTT authorities, specifically with the Planning Department of the MEEA, the IADB Energy Division has identified an opportunity to complement this program by the application of EE measures in social housing. With this approach, the IADB, as the GEF implementing agency can built upon its ongoing work in two different areas- Sustainable Energy and the Neighborhood Upgrading Program and thus create synergies between the two programs that will lead to further sustainability of the already undertaken activities. The project will seek to support the local government in the planning and implementation of programs to reduce the energy-cost burden on low-income households while also generating other energy, environmental, and economic benefits for the local community.

## PART III: APPROVAL/ENDORSEMENT BY GEF OPERATIONAL FOCAL POINT(S) AND GEF AGENCY(IES)

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

| NAME | POSITION | MINISTRY | DATE *(MM/dd/yyyy)* |
|---|---|---|---|
| Dr. Joth Singh | GEF Operational Focal Point / Managing Director/CEO | ENVIRONMENTAL MANAGEMENT AUTHORITY, TRINIDAD AND TOBAGO | **08/02/2013** |
| | | | |
| | | | |

**B. GEF AGENCY(IES) CERTIFICATION**

**This request has been prepared in accordance with GEF/LDCF/SCCF/NPIF policies and procedures and meets the GEF/LDCF/SCCF/NPIF criteria for project identification and preparation.**

| Agency Coordinator, Agency name | Signature | DATE *(MM/dd/yyyy)* | Project Contact Person | Telephone | Email Address |
|---|---|---|---|---|---|
| Michael Collins GEF Coordinator IDB |  | 03/21/2014 | Natacha Marzolf | 2026232436 | natacham@iadb.org |
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## Annex I: $CO_2$ Emissions Estimation

This annex describes how the $CO_2$ emissions were estimated based on the available information about the emissions from power generation, the average electricity consumption per home and the expected new social housing units to be built in the next ten years by the HDC.

According to the $CO_2$ emissions from fuel combustion report of the IEA in 2007, power generation in T&T emits 700 g/kWh. With potential savings of EE around 30%, this project is going to avoid 378 tons of $CO_2$ per year directly from the pilot construction. On the other hand, the indirect savings come from the future housing plan that will introduce the standards and measures established in this project. According to its estimations, HDC aims to provide 6,500 social housing units per year over the period 2012-2022. The implementation of the EE measure in those units will avoid 8,190 tons per year, in means a total of 450,450 tons accumulated in a period of ten years, as it is presented in table A2.

**Table A1. $CO_2$ emissions estimation per year. Pilot project and new social housing projects**

| | Baseline Scenario | GEF Project | Difference |
|---|---|---|---|
| Average Electricity Consumption per home per year kWh/y | 6,000 | 4,200 | |
| Emissions kg/kWh | 0,70 | 0,70 | |
| Expected reduction due to EE measures | 0 | 0,30 | |
| Number of units pilot project | 300 | 300 | |
| Energy Comsumption kWh | 1,800,000 | 1,260,000 | 540,000 |
| $CO_2$ Emissions (kg) | 1,260,000 | 882,000 | 378,000 |
| New housing units per year | 6,500 | 6,500 | |
| Indirect $CO_2$ Emissions per year (kg) | 14,700,000 | 10,290,000 | 8,190,000 |

**Table A2, Total $CO_2$ emissions avoided per year, new social housing projects.**

| Año | New Housing Units per year | $CO_2$ Avoided Emissions (Tons) |
|---|---|---|
| 1 | 6,500 | 8,190 |
| 2 | 6,500 | 16,380 |
| 3 | 6,500 | 24,570 |
| 4 | 6,500 | 32,760 |
| 5 | 6,500 | 40,950 |
| 6 | 6,500 | 49,140 |
| 7 | 6,500 | 57,330 |
| 8 | 6,500 | 65,520 |
| 9 | 6,500 | 73,710 |
| 10 | 6,500 | 81,900 |
| **Total** | **65,000** | **450,450** |

## Annex II: Technology Availability

This annex describes which technologies have potential by sector and its viability. As shown in table A3.

**Table A3. Available technologies**

| EE Type | Description | Potential sector of application | Technical EE Potential | Estimated uptake |
|---|---|---|---|---|
| CFL lamps | Small fluorescent lamps with electronic ballast in base, designed to replace regular incandescent lamps and provide the same light output for one-fifth to one-third the electricity consumption, with an average lifetime 8 times longer. | Residential<br>Commercial | High<br>High | Low<br>Low |
| T8 fluorescent lamps w electronic ballast | Slim, 1" dia. efficient fluorescent tube that operates using electronic ballasts as well as the traditional magnetic ballast. | Residential<br>Commercial<br>Small Industrial<br>Public Sector | Med-High<br>Med-High<br>Med-High<br>Med-High | Low<br>Low-Medium<br>Low-Medium<br>Low |
| T5 fluorescent lamps (electronic ballast) | Slim, 5/8" dia. efficient fluorescent tube that operates with electronic ballast. More efficient but significantly higher investment cost than T8 tube. | Commercial<br>Small Industrial<br>Public Sector | High<br>High<br>High | Low<br>Low<br>Low |
| LED lamps | Highly efficient lighting based on light-emitting diode (LED) technology. Very high investment cost. | Residential<br>Commercial<br>Small Industrial<br>Public Sector | High<br>High<br>High<br>High | None<br>None<br>None<br>None |
| LED street lamps | Street lighting that utilizes highly-efficient LED lamps for illumination. Very low energy usage, but very high cost of installation. | Public sector | High | None |
| Variable-frequency drives | Electronic controller for AC motors that allow the speed and power (and hence the energy consumption) of the motor to be varied to suit the motor's load. | Commercial<br>Small Industrial<br>Industrial | Med-High<br>Med-High<br>High | Low<br>Low<br>Low-Medium |
| High-efficiency air-conditioning units | Room air-conditioning units with an energy efficiency ratio (EER) of 10 or more. The EER is the ratio of the cooling capacity (in Btu per hour) to the power input (in watts) | Residential<br>Commercial | High<br>High | Low<br>Low |
| High-efficiency commercial and industrial scale chiller units | High-capacity cooling units with efficient compressors employing variable-frequency drives, or absorption chillers utilizing waste heat. | Commercial<br>Industrial<br>Public Sector | High<br>High<br>High | Low<br>Low<br>Low |
| High-efficiency, domestic appliances and consumer electronics devices | Appliances and consumer electronics devices achieving Energy Star or similar rating for energy efficiency. | Residential<br>Commercial | Med | Low |

Source: Centre of Partnerships for Development (CAD). Sustainable Energy Program Final Report.