United Nations Development Programme
Country: Jamaica

PROJECT DOCUMENT

Project Title:	Deployment of Renewable Energy and Improvement of Energy Efficiency in the Public Sector
UNDAF Outcome(s):	Outcome 1: National, local authorities and most vulnerable communities island-wide improve natural resource management and resilience to disasters

UNDP Strategic Plan Outcome: Outcome 1: Growth and development are inclusive and sustainable, incorporating productive capacities that create employment and livelihoods for the poor and excluded
Expected CP Outcome(s): Outcome 7 Energy conservation and efficiency increased and synergies between energy policies and human development considerations ensured
Expected CPAP Output(s): Output 5: Strengthening the Policy Framework and Institutional Arrangements for Climate Change Adaptation and Mitigation

Output 6: Capacity Development for Energy Efficiency and Security in Jamaica to reduce energy consumption
Executing Entity: United Nations Development Programme
Implementing Entity: United Nations Development Programme (UNDP) / Petroleum Corporation of Jamaica

Brief Description

This project seeks to advance a low carbon development path and reduce Jamaica's public sector energy bill through the introduction of renewable energy (RE) and improvement in energy efficiency (EE) in the health sector. The project will build relevant capacity in the public sector by increasing the knowledge base of its operatives on matters pertainent to RE and EE as well as developing the appropriate technical skills necessary to support investments in the sector. It will strengthen the regulatory framework that governs the development and deployment of RE and EE technologies. The project will support an investigate a potential mechanism involving public private partnership (PPP) that will engender a greater uptake of RE and EE. The hospital sector has a high-energy demand and high operational costs and would benefit significantly for RE and EE applications.

Programme Period:	2014 - 2017
Atlas Award ID:	00087974
Project ID:	00094832
PIMS #	4900
Start date:	1 March. 2016
End Date	28 Feb 2019
Management Arrangements	DIM
PAC Meeting Date	5 March 2015

Total resources required	**$** 10,748,754
Total allocated resources:	10,748,754
• Regular (UNDP TRAC)	30,000
• Other	
○ GEF	1, 254,987
○ PCJ (cash)	1,361,240
○ MoH (in kind)	65,000
○ DBJ (cash)	7,604,227
○ JPC (parallel inv.)	120,000
○ US Department of Energy	TBD
○ GEF SGP (assoc. fund.)	313,300

Agreed by (Government): _____

Date/Month/Year

Agreed by (Executing Entity/Implementing Partner): _____

Date/Month/Year

Agreed by (UNDP):

Date/Month/Year

Contents

Acronyms

Acronym	Meaning
AA	Administrative Assistant
APR	Annual Progress Report
BAU	Business-as-usual
BTOR	Back-to-office report
CARICOM	Caribbean Community Secretariat
CCCCC	CARICOM's Climate Change Center
CEIS	Caribbean Energy Information System
CPAP	Country Programme Action Plan
CRECS	Caribbean Renewable Energy Capacity Support
CREDP	Caribbean Renewable Energy Development Programme
CTA	Chief Technical Advisor
CWSA	Community Water and Sanitation Agency
DBJ	Development Bank of Jamaica
EC	Eastern Caribbean
ECCAA	East Caribbean Civil Aviation Authority
ECERA	Eastern Caribbean Energy Regulatory Authority
EDF	European Development Fund
EE	Energy Efficiency
EIAs	Environmental Impact Assessments
EOP	End of Project
EPSS	Electric power supply systems
ESA	Electricity Supply Act
ESIA	Environmental and social impact assessment
EU	European Union
EV	Electric vehicle
EWH	Electric water heaters
FIT	Feed-in tariff
FPS	Financial Procurement Specialist
FY	Fiscal year
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Greenhouse Gases
GHI	Global horizontal irradiance
GIZ	German Agency for International Cooperation
GoJ	Government of Jamaica
GJ	Gigajoules
GWh	Gigawatt-hour
HEV	Hybrid-electric vehicle
ICAO	International Civil Aviation Organization
IEA	International Energy Agency
INC	Initial National Communication
IPP	Independent power producers
IRENA	International Renewable Energy Agency
kWh	Kilowatt hours
LoI	Letter of intent
LPG	Liquid Propane Gas
MDG	Millennium Development Goals
M&E	Monitoring and Evaluation

Acronym	Meaning
MJ	Megajoules
MW	Megawatt
MWh	Megawatt – hour
NAMA	Nationally appropriate mitigation actions
NEP	National Energy Policy
NEAP	National Energy Action Plan
NGOs	Non-Government Organizations
NPD	National Project Director
NPM	National Project Manager
NREL	National Renewable Energy Laboratory
NWRMSP	National Water Resource Management Study Programme
OECS	Organization of Eastern Caribbean States
PCJ	Petroleum Corporation of Jamaica
PIR	Project Implementation Report
PMU	Project Management Unit
PPA	Power purchase agreement
PPP	Public private partnership
ProDoc	UNDP Project Document
PSC	Project Steering Committee
PV	Photovoltaic
RE	Renewable energy
RET	Renewable energy technology
RO	Reverse osmosis
RSC	Regional Service Centre
SIDS-DOCK	Small Island Developing States – Island Energy for Island Life
SNC	Second National Communication
SPACC	Special Project on Adaptation to Climate Change
SWH	Solar water heaters
TJ	Tera joules
TOE	Tons of oil equivalent
ToR	Terms of Reference
UNDP	United Nations Development Programme
UNDAF	United Nations Development Assistance Framework
UNFCCC	United Nations Framework Convention on Climate Change
VRE	Variable renewable energy
WTE	Waste-to-energy

1. Currency Equivalents[1]

Currency Unit = Jamaica Dollar (J$)

1 USD = J$ 112.00

1 http://www.un.org/depts/treasury/ (exchange rate effective August 2008)

I. SITUATION ANALYSIS

Context and Global Significance

1. Countries in the Caribbean region are heavily dependent on imported fossil fuels for their energy supplies with petroleum products accounting for an estimated 93% of commercial energy consumption including conventional methods of electricity production through fossil fuel plants. This serves as a primary source of greenhouse gas (GHG) emissions. Despite the Caribbean's substantial renewable energy (RE) resource, RE exploitation lags far below potential, due to policy, financing, capacity and awareness barriers. At the same time, the expansion of electricity generation is a key aspect to economic development in the Caribbean countries.

2. Caribbean countries are also highly vulnerable to global oil price volatility; with a rise of oil prices, a commensurately larger allocation of national budgets needs to be diverted to pay for these fuel imports. This has a detrimental impact on foreign currency reserves, balance of payments and availability of budgetary resources for social sectors such as health, education and national security. Beyond the public sector, unpredictable energy costs puts pressures on households and business operations alike when increasingly larger proportions of disposable income needs to be allocated toward basic operations. *Energy security as related to affordability and reliability of supplies is therefore a real concern for most Caribbean countries. Energy security as related to affordability and reliability of supplies is therefore a real concern for most Caribbean countries.*

3. Moreover, owing to the geography, small market size, the absence of inter-state inter-connections, and the fact that electricity generation is largely characterised by inefficient diesel combustion, electricity tariffs in many Caribbean countries are among the highest in the world. With the importance of energy as a critical input into virtually all sectors of any economy, the current energy scenario of most Caribbean countries directly undermines efforts to improve their economic competitiveness and ability to fully integrate in the global economy. Moreover, their over-dependence on imported petroleum and petroleum products within Caribbean Community Secretariat (CARICOM) member states[2] is unsustainable, especially considering the forecasts of regional energy demand doubling over the next 20 years.

4. In response, several CARICOM member states have sought to catalyse and accelerate the development of indigenous energy resources, increased use of renewable energy as well as energy efficiency and conservation. Many Caribbean countries that are endowed with various indigenous sources of renewable energy, have embarked on the process of elaborating their national energy policies having approved national energy policies to exploit renewable energy resources and increase the contribution of energy efficiency as priorities. This has resulted in notable RE developments within CARICOM member states including solar thermal for water heating in Barbados and wind and hydropower development in Jamaica. While the efforts to increase RE development have intensified over recent years in CARICOM member states, the overall impact is marginal. The slow pace in the growth of RE development can be attributed to a number of factors including the lack of effective policy and local capacity,

2 http://www.caricom.org/

legislative and regulatory framework with a low level of RE awareness, and limited financing for project preparation and development.

Figure 1: The Caribbean Region

5. In 2004, the GEF supported the **Caribbean Renewable Energy Development Programme (CREDP) Project** that was aimed at dismantling identified barriers (in the areas of policy, capacity, information, awareness and finance) to the increased use of RE in the region. CREDP was implemented by UNDP, and executed by the Energy Programme within the CARICOM Secretariat with co-financing from GIZ. GEF support for CREDP was concluded in 2009 with only GIZ support continuing until 2012.

6. While CREDP did not achieve all of its objectives, it did strengthen capacity and raised awareness of RE issues, laying a useful foundation for further developments in RE and EE in CARICOM countries. In April 2008, the CARICOM Secretariat established an **Energy Programme** with the key objective of finalizing a CARICOM Energy Policy and facilitating its implementation. The Energy Programme provided greater focus on regional energy sectors issues and development by implementing a programmatic approach to regional energy sector developments. In March 2013, CARICOM completed the **Community Energy Policy,** the primary goals of which are to improve regional energy security through diversification of energy supplies and greater utilization of renewable energy and cleaner fossil fuel such as natural gas. The policy also seeks to encourage the establishment of more sustainable energy systems.

7. The enabling environment that facilitates the timely deployment of renewable energy technologies and the utilization of more energy efficient technologies in the public sector is created by milestone opportunities, a number of economic/financial incentives, legislative, political, and security drivers. This was demonstrated in a Caribbean Development Bank (CDB) contracted study undertaken by Caribbean Natural Resources Institute (CANARI)

entitled *"A New Paradigm for Caribbean Development: Transitioning to a Green Economy."* Whereas the study focused on the general context for renewable energy development in the Region demonstrated in three key sectors: utility scale grid-tied electricity generation (Wigton Wind Farm Ltd – Jamaica), tourism (Sandals La Toc - St. Lucia) and construction (Williams Industries – Barbados) the specific findings related to renewable energy deployment or hindrances in the public sector, was found to be applicable for a number of other Caribbean Small Island Developing States (SIDS).[3]

8. The lessons for the successful deployment of renewables in the Jamaican public sector are therefore:

    - Seeking and maximizing PPPs, special low interest loans or grants to produce project successes to further catalyze both private and public sector renewable and energy efficiency projects.
    - Prioritizing, by the State, more critical issues of energy security, sustainability and efficiency using clear and long-term policy instruments. However, the minority shares in the utility by the State could be a barrier for choosing renewables.
    - The current high cost of operation at all public facilities; fiscal constraints and demands under an IMF programme; existence of a Net Billing policy and programme and a National Energy Policy that favours clean energy and energy efficiency; availability of grant funding; willing and friendly states in other PPPs; and the existence of a mature energy industry are all enabling opportunities for implementing successful energy projects.

Energy Situation in Jamaica

9. Jamaica is a relatively small island developing state (SIDS) with a population of almost 2.7 million people. It is the largest island of the Commonwealth of the Caribbean and the third largest of the Greater Antilles, after Cuba and Hispaniola. Jamaica lies 140 km (90 mi) south of Cuba and 190 km (118 mi) west of Haiti and has an area of 10,911 km^2 or (4,213 sq mi).

10. According to the Vision 2030 National Development Plan, two of the main development challenges of Jamaica are high dependence on imported petroleum and inefficient use of energy. Jamaica is approximately ninety percent dependent on fossil fuels for its energy needs with the electricity sector accounting for over one-third of its oil consumption. Ninety five percent of Jamaica's installed electrical capacity is oil-based with electricity prices averaging around US$0.25/kWh in 2015[4]. Jamaica has the fourth highest electricity prices amongst CARICOM member states (excluding Belize, Dominican Republic and Montserrat) and spent US$2.0 billion on imported oil in 2014 (about 15% of GDP). The country's heavy reliance on imported fossil fuels and susceptibility to oil price fluctuations has greatly impacted the economy and overall competitiveness particularly in the manufacturing sector.

3 A New Paradigm for Caribbean Development: Transitioning to a Green Economy. Caribbean Development Bank May 2014

4 http://www.jamaicaobserver.com/business/Understanding-the-cost-of-energy-in-Jamaica---Part-1_18837470:

11. Jamaica is endowed with natural assets including arable lands, scenic beauty, high levels of biodiversity and modest mineral resources. Much of the country's early growth was generated from a vibrant tourism industry, sugar, bananas and significant bauxite mining. Sugar and bananas are in decline partly due to the removal of trade preferences on the European market[5]. The agriculture sector currently contributes approximately 5.6% to the Jamaican economy and employs about 18.9% of the labor force. For many years, Jamaica had one of the most diversified economies in the Caribbean. The manufacturing and services sectors are also key contributors to Jamaica's economy with the latter contributing approximately 69-70% to GDP (Economic and Social Survey 2014) and both sectors relying heavily on energy for production.

12. Most of the renewable sources currently come from wind, hydro, fuelwood, bagasse, solar and ethanol (used in the transportation sector). The electricity sector consumed the largest volume of petroleum amounting to 6,529,445 bbls (30.8%) for the generation of power mostly from old and inefficient generation plants. Approximately 5.6% of the electricity supply mix came from renewable sources for power generation namely hydro, wind and a smaller amount from biomass for both heat and power.[6]

Table 1: Jamaica's National Energy Mix (2011)

SOURCE	BOE	BOE	% MIX
Petroleum Imports		21,214,652	**95.3**
Coal Import		327,000	**1.5**
Renewables			
Hydro	*94,000*		
Wind	*57,000*		
Charcoal	*n/a*		
Bagasse	*570,000*		
Fuel wood	*n/a*		
		721,000	**3.2**
GRAND TOTAL		**22,262,652**	**100.0**

13. The renewable energy sources include 13% from hydropower, 7.9% wind and 79% from bagasse[7]. The GoJ plans to cut public sector energy consumption by 15% through significant improvement in energy efficiency (EE) and the deployment of RE technologies (RETs). The total public sector electricity bill for 2012 was J$15.4 billion (US$171.1 million) with energy

5 Vision 2030, National Development Plan.

6 Energy Economics and Planning Unit, Energy Division, Ministry of Science, Technology, Energy & Mining, 2012.

7 Source: Energy Economics and Planning Unit, Energy Division, Ministry of Science, Technology, Energy & Mining, 2012.

consumption approximately 477 GWh. Although the health sector accounted for 6% of total public sector electricity bill in 2012 at a cost of J$919.171 million (US$10.2 million), and 30 GWh/yr of energy consumption, few investments in sustainable energy measures have been conducted to date in this sector. In 2006, UNDP supported the audits of 22 hospitals, however they did not result in investments in RETs and EE improvements despite the possible near- and long-term savings benefits.

14. Although a comprehensive assessment of the socio-economic impact, in particular impact on human development of fossil fuel reliance would be useful, quite simply with fossil fuels representing 1/3 of the import bill (upwards of 15% of GDP), the impact on the ability to invest, produce and level of disposable income available at the household level will be negatively affected. In addition, the ability of the government to investment in key social sectors such as education, health, social safety nets would be severely hampered thereby affecting the quality of life and access the services in particular by vulnerable groups such as women, children, youth. In addition, on the demand side, the primary consumption groups of energy in Jamaica are: (i) Household; (ii) Commercial, which includes service providers such as the National Water Commission and the hotel industry; (iii) Industrial, which includes light manufacturing industries such as food processing and heavy industries such as Bauxite/Alumina; and (iv) Transport, which includes private and public vehicles as well as the maritime, aviation and limited rail services[8]. With reference to the household consumer and the commercial sector in particular small businesses, high cost of electricity would also affect the level of income available to access other services at the household level and contribute to increasing vulnerability.

15. As indicated in Jamaica's Sustainable Energy Road Map (2013), in most countries, energy-related issues are a male-dominated field because traditional gender roles tend to exclude women from technical training, investment decisions, and energy planning. Limited data are available on gender and energy concerns in Jamaica, but key barriers to gender equality are common globally and can be examined in the Jamaican context. Even in Jamaica, where most households have access to electricity and modern cooking fuels (the lack of which often exacerbates gender inequalities), women are still side-lined from energy-related decision making. The need to assess gender inequities with regard to access to sustainable energy wealth and job-creation opportunities in Jamaica was therefore highlighted as a key next step for Jamaica's sustainable energy transition.

Energy Policy, Legal and Regulatory Framework

16. The Jamaica's National Energy Policy (JNEP) 2009 - 2030 is built around a vision which states that Jamaica will have a "modern, efficient, diversified and environmentally sustainable energy sector providing affordable and accessible energy supplies with long-term energy security and supported by informed public behaviour on energy issues and an appropriate policy, regulatory and institutional framework". This strategic vision is supported by seven goals for the energy sector which incorporate energy conservation and efficiency; modern infrastructure; renewable energy sources; reduced greenhouse gas (GHG) emissions and environmental stewardship; enabling governance, institutional, legal and regulatory framework; and State leadership.

8 Energy Efficiency Potential in Jamaica: Challenges, Opportunities and Strategies for Implementation, Al Binger, April 2011, Caribbean Renewable Energy Project, GIZ

17. In addition, the policy framework for achieving these targets and developing an efficient and more environmentally benign sector is further strengthened by the development of five sub-policies, namely the National Renewable Energy Policy, National Energy from Waste Policy, Biofuels Policy, Energy Conservation and Efficiency Policy and Trading of Carbon Credits Policy.

18. The National Energy Policy has established targets for renewable energy; 11% by 2012, 12.5% by 2015 and 20% by 2030 (See Table 2 below).

Table 2: Renewable Energy Targets

INDICATOR	2009	2012	2015	2030
Percentage Renewables in Energy Mix.	8%	11%	12.5%	20%
Percentage Diversification of Energy Supply.	9%	11%	33%	70%

(Source: National Renewable Energy Policy 2010 – 2030).

19. Some of the proposed renewable projects and initiatives for the short to medium term – (2009 to 2016) include:

- Energy from Waste (landfill gas, agro-industry, municipal solid waste to energy).
- RFP for 115 MW base load and energy only commercial scale renewable energy supply (>15 kW to 115 MW). These are expected to include WTE, biomass cogeneration, solar, wind, and hydro plants.
- Net Billing – Phase II and accompanying Standard Offer Contract for energy only capacity of <100 kW (primarily solar and wind interests).
- Unsolicited bids for capacity of >100 kW but < 25 MW (all renewable).
- Power wheeling.

20. At this time, Net Billing under the Energy Ministry's policy mandate is the most feasible option for government facilities to generate their own power ($\leq$ 100 kW) without the need for a bidding process and may have the opportunity for an additional revenue stream. A capacity allocation of 2% of peak (around 12.8 MW) has been reserved for renewable sources in the category of 100 kW or less. The generator falls into two categories;

- Non-residential entity - refers to a Qualified Entity (QE) which is a company Or Other Business Entity whose Qualified Facility (QF) has a nameplate capacity of less than or equal to 100 kW.
- Residential entity - refers to a QE who is an individual whose QF has a nameplate capacity of less than or equal to 10 kW.

21. The contract terms and conditions with the Utility (Standard offer Contract – SOC) are for 5 years and may be reviewed every 5 years in keeping with the programme's experience and policy guidelines of the OUR. Therefore, under the Net Billing policy, small-scale generators have access to the grid where previously they faced a barrier to access by the utility which has a monopoly on the transmission and distribution grid and had a low appetite for small-

scale renewable generation. Net metering9 was not initially supported by the utility and Regulator which opined that net metering does not consider the capital or maintenance cost for maintaining transmission and distribution systems and multiple small generators would cause grid instability. The Net Billing policy restricted QFs to the prevailing short run avoided cost of generation (fuel costs not incurred/or avoided by the Utility), plus a premium of up to 15% at this time. This revenue is approximately 2/3 of the full electricity price to the consumer (approximately J$ 22/kWh). Before Net Billing, there was little interest for self-generation or distributed generation by entities as without Net Billing, the payback period and initial infrastructure costs were prohibitive for most commercial and residential entities. The added justification of revenues in the form of a tariff (based on short run avoided costs to the utility) facilitated the approvals of bank financing and budget allocations within firms and for residents.

22. Since the All Island Electricity License does not allow generators to sell excess generation to other parties it does not threaten competition with the utility in the generation market and retail aspects of the system.

23. The current pilot programme supports all renewable sources and technologies of an intermittent nature however to date most projects have proposed to generate electricity from solar photovoltaic (PV) though there is consideration for wind also. The programme will undergo an assessment in March 2015 which should lead to an improved Phase 2 of the programmes. As at November 2014 there were 265 applications out of which 224 had licenses issued. One hundred (100) of the applicants have received SOCs and 68 of which were connected to the grid.

24. The Net Billing Standard Offer Contract Program has therefore encouraged the expansion of small additional renewable generation in Jamaica however the impact on the national grid is not significant as the programme allocation amounts to less than 1.5% of total generation capacity. The utility has indicated its willingness to tolerate 5% of the peak demand from intermittent/not-guaranteed power on the grid (solar and wind) to avoid additional expenditure on standby base load capacity for conditions of low or no generation. Nevertheless small initiatives such as Net Billing can improve energy security, reduce foreign exchange flight, diversify the energy base and when distributed at nodes across the grid can improve grid quality/reliability by matching the daytime peaks loads between 11:00 am and 5:00 pm with less energy loss on the grid lines than with other alternatives.

25. Jamaica's national developmental plan to 2030 "Vision 2030" supports the objectives of the JNEP and states that "*Jamaica will create a modern, efficient, diversified and environmentally sustainable energy sector providing affordable and accessible energy supplies with long-term energy security that contributes to international competitiveness throughout all the productive sectors of the Jamaican economy. By 2030, no less than 20 per cent of our energy supply will come from renewable sources*"[10].

9 Net metering involving one electrical meter, provides the small generator with tariffs equal to the retail price of electricity where the full price of electricity sold is also the purchase price to the generator; whereas Net Billing requiring 2 electrical meters only provides for the avoided cost of fuel plus a renewable energy premium paid to the generator.

10 Vision 2030 Jamaica, National Development Plan. Planning Institute of Jamaica 2009.

26. With these two central expressions of the national policy on energy, Jamaica's electricity sector is being transformed through three main areas of focus: fuel diversification for a transition from oil to natural gas; generation plant modernization and efficiency; and the accelerated addition of indigenous commercial scale renewable energy resources for power.

27. The deployment of renewable and energy efficient technologies under the Carbon Trading (Sub) Policy Goal #4 and which may have access to green funding opportunities include:

    - Energy efficiency.
    - Renewable energy (wind, solar, bagasse co-generation, landfill gas recovery, biofuels).
    - Use of alternative fuels (e.g. LNG, LPG, CNG).
    - Waste-to-energy (biogas, methane etc.).

28. The benefits of incorporating carbon trading into future generation projects include:

    - Transitioning towards a less carbon intensive economy (shift to a gas generation with smaller organic molecules) which uses more renewable sources of energy.
    - Facilitating the renewal and operational improvements of important infrastructure such as power stations.

29. Power wheeling may be a future opportunity for public sector to utilize renewable energy distributed generation (DG) from the national energy mix as has been considered by NWC e.g. to access power from Wigton Wind Farm Ltd at its various pumping stations. The benefits of wheeling could not be exercised in Jamaica before 2013 as the governing legislation (Condition 2(4) of the *"Jamaica Public Service Company Ltd Amended and Restated All-Island Electric License 2011"),* did not provide a mechanism for access and use of the grid except by the owner of the assets and rights – the utility. Notwithstanding Condition 2(4) which also allows an entity to provide service for its own use and notwithstanding Condition 12 of the License which mandates JPS to provide open access to self-generators to the island-wide grid on such terms and conditions as are approved by the OUR, actual wheeling terms and conditions were not ready for action prior to 2011.

30. In 2011, Jamaica had one of the highest energy intensity rates in Latin America and the Caribbean and ranks 92nd in the world with a ratio of energy consumption to national gross domestic product of 5,691 Btu per Year measured in 2005 U.S. Dollars (based on Purchasing Power Parity)[11] compared to 5,950 for South and Central America and 7,413 for the world[12]. Based on market value, the Total Primary Energy Consumption per US$ of GDP = 17,671.835 in 2007. Jamaica has been inconsistent in achieving significant energy efficiency improvements which has impacted its ability to develop economically. It is therefore necessary to exploit energy efficiency and conservation opportunities in the residential, commercial, and industrial and public sectors of the economy.

Root Causes and Threats

31. One of the overriding factor for the slow development of RE in Jamaica and as well as many other CARICOM countries is that they are small islands with small energy markets, where electricity generation was originally developed through the use of diesel fuels. Many of these systems have not been changed over the years and have evolved into archaic and inefficient

11 5,691 British thermal units (BTU) are required to produce US$1.00 of output.

12 US Energy Information Administration 2015.

diesel generation systems. The spikes in global oil prices hitherto recent fall in prices have accentuated the volatility and vulnerability of the Jamaican economy and those of other CARICOM member states, where higher oil price increases have been paid for through diversion of national budgets. This has adversely impacted the country's foreign currency reserves, balance of payments and availability of budgetary resources for the social sectors such as health, education, education and national security. Until the fossil fuel price spikes of 2008 and 2009, the GoJ had little incentive to improve the status quo.

32. Notwithstanding its size compared to several of its CARICOM member states, Jamaica's electricity grid is still relatively small and there is no interconnection arrangement with neighbouring islands for cheaper energy. As a result, Jamaica as well as other CARICOM states have some of the highest electricity tariffs in the world. The opportunities for developing renewable energy in Jamaica as a means of mitigating these prices are attracting increasing interest from several donor agencies, as well as government and the private sector of Jamaica. Jamaica has enjoyed some level of economic prosperity in the past. However, in recent years, it has experienced some economic challenges. The rising energy costs not only diverts national budgets away from social programmes and maintenance of state institutions such as hospitals and schools but has also limited the Government's ability to promote and diversify the energy mix of Jamaica with a higher proportion of renewable energy.

33. Current budgetary constraints are also making it increasingly difficult for the government to invest in decentralised solar-PV installations and other technologies for state institutions. It is therefore imperative that solutions to lower electricity cost for public institutions be contingent on renewable energy interventions such as solar PV and solar water heating complemented by appropriate energy efficiency programmes.

Barrier Analysis

34. There are a number of challenges that are hindering the scale up of RE and EE in Jamaica in general and particularly so solar PV. These can be summarised as regulatory, policy and legal barriers, technical barrier, capacity and knowledge barrier and financial barrier. The project will seek to contribute to addressing these barriers and establish the framework for a viable PV sector complemented by an energy efficiency programme in selected public buildings.

Capacity and Knowledge Barrier

35. Jamaica currently has very limited installed solar energy capacity. Currently there is 16 MW of installed solar PV capacity in Jamaica. To date, solar PV has been used only for a few specific applications in the country, including rural electrification, street lighting, and some stand-alone generation. Jamaica Broilers, the largest poultry producer in the Caribbean, completed installation of 600 kW of solar PV panels across 40 of its chicken houses in 2013, one of the country's largest solar projects to date.

36. Jamaica shows tremendous solar potential. The global horizontal irradiance, or GHI (see Sidebar 1), ranges from 5 to 7 kWh per square meter per day (kWh/m² /day) throughout most of the country. (See Figure 2.) Some parts of the country have an even higher GHI, reaching

up to 8 kWh/m2/day. To put things in perspective, Germany, which has nearly half of the world's installed solar PV capacity, has very few locations with a GHI above 3.5 kWh/m2/day[13].

Fig. 2: Average Global Horizontal Irradiance (GHI) in Jamaica

37. Accelerated growth in the RE market and more so for solar PV, will require an increase in the skill sets for various components of the sector. As the RE market and that of solar PV develops, more investments will be necessary to develop the technical capacity to support the market in the areas of design and assembly, installation and maintenance. There is a small segment of the market with these skills but training is required to have more people available to support market growth and to ensure quality delivery of services.

38. The expansion of the market must give consideration to foreign direct investment. It is important that a cadre of locally trained and certified technicians in solar PV technology are available from which foreign investors can choose to develop competitive solar PV businesses. Failure to develop the technical capacity of Jamaicans to support a growing PV market, will result in the loss of job opportunities and slow growth in the PV market. It is recognised that energy is typically a male-dominated sector and that market expansion should support greater access to opportunities in the RE/EE industry.

Legal and Regulatory Barriers

39. The key legal and regulatory framework governing various aspects of the Jamaican power market are contained in and regulated by the following:

- The OUR Act 1995 (as amended).
- The Electric Lighting Act.
- JPS's Amended and Restated All-Island Electric License, 2011.

13 Jamaica Sustainable Energy Roadmap Pathways to an Affordable, Reliable, Low-Emission Electricity System

- OUR's Regulatory Policy on Guidelines for the addition of Generating Capacity to the Public Electricity Supply System: June 2006 (Document # Ele 2005/08.1).
- Generation Expansion Plan 2010.

40. The Electricity Lighting Act of 1958 and the Building Regulations includes provisions for renewable energy development in Jamaica and the former is being revised. However, secondary legislation needs to be drafted to facilitate the implementation of the proposed measures. The absence of a modern Building Code places no obligation on the public sector (or other sectors) to achieve higher energy performance standards. The Electricity Lighting Act and the Building Regulation are to be repealed to incorporate new standards in building designs that will promote energy efficiency. In the meantime, the public and private sectors are being mandated to accommodate energy efficacy and clean energy in building designs.

41. The existence of ineffective legislation and delayed repeal of older and less effective legislation is therefore a barrier which must be urgently removed. Legislation should specify guaranteed quality standards for solar hot water systems and provision for Net Billing, interconnection standards and equipment performance standards for small-scale power generation.

42. Net Billing is a mechanism which will enable the public sector to reduce expenditure on electivity bills; match high daytime electrical cooling demands; and reduce recurrent maintenance cost for supplying hot water for sterilization by using onsite-distributed generation. Although standards exist internationally for small RE installations (0-100kW which are easily found online) they have not been part of the standards requirements for small RE installations (0-100kW) in Jamaica.

43. There are no guaranteed quality standards for solar hot water systems and the Net Billing application process, interconnection standards and equipment performance standards for small-scale power generation and other pieces of electricity legislation. The Government electrical Inspectorate has stated that Net Billing system installers have inadequate competence to deliver a consistent quality service in the sector which could jeopardize a Public Sector project. This view is supported by the EU-ESCO project assessment. The issue is that interconnection procedures are applied inconsistently and differently across generation seeking to interconnect. The absence of quality standards, unpredictable grid connection process, and inadequately trained installers are barriers for grid connection in the Public Sector. As such, the UNDP-GEF project has an opportunity to address these barriers.

44. The Bureau of Standard of Jamaica is the only entity testing and certifying PV power inverters. None of the other grid connected equipment components is being tested. The Bureau has a defunct laboratory for testing solar water heaters and an inadequately equipped laboratory for testing miscellaneous energy efficient standards. A World Bank Energy Sector Energy Efficiency Programme (ESEEP) is currently attempting to build the relevant capacity to enable the BSJ to develop an equipment-testing laboratory for energy efficient devices (there is no testing of light emitting diodes a critical energy efficacy equipment, as LEDs are the prevue of the Ministry of Health).

45. BSJ is also mandated with establishing energy management standard (ISO 50001), energy efficiency and conservation standards, and codes (JS 178, JS 330; JS 309-2009; JS 179; ISO

13153). Without these quality standards the public sector at the procurement level, may reject expending resources for the proposed installations, as there are no guarantees.

Financial Barriers

46. The upfront investment cost of purchasing RE and making EE building retrofits is either prohibitive for many potential customers or requires them to secure debt financing. Since the lending market for RE and EE is relatively young in Jamaica, many financial institutions lack a full understanding of the risks, opportunities, and paybacks of investments. This leads to the structuring of lending terms that are not optimally structured for RE and EE investments. This can lead to high interest rates, collateral requirements or short tenors which lead many consumers to decide that a loan is not worthwhile. This situation proves especially challenging for the lowest income groups who lack access to finance and where savings in electricity costs could be especially beneficial.

47. Jamaica has a well-established financial sector that includes national/indigenous banks, credit unions and international banks which provide debt financing to the residential, commercial and industrial sectors. To date, however, lending for RE/EE investments have been limited. During a meeting with the PPG Team the Bankers Association of Jamaica explained that the lending market for RE/EE investments has been slowly growing and is hindered by the perception that rapid changes in technology will render current technologies obsolete. Additionally, the Association indicated that the majority of Jamaicans and lending managers are not aware of the short-term benefits and paybacks of such investments.

48. In Jamaica, there are commercial loans and low interest Development Bank of Jamaica (DBJ) loan for energy audits, installation of energy efficiency retrofits and renewable energy systems uptake. There is still a lack of fiscal incentives for investment in clean energy and efficiency products. The upfront investment cost of these technologies remains a deterrent for the public sector especially in a fiscally tight space exacerbated by the IMF restriction on capital investment and essentially a prohibition on new debts which is not pre-approved by the Bank.

49. A series of financial barriers have restricted the public sector from making investments in RE and EE. These include:
    a. Investments in RE or EE are not factored into public sector capital expenditure or operating budgets.
    b. Due to IMF expenditure limitations the public sector needs to reduce its investment by 10%, and therefore cannot add investments into the public sector budget.
    c. Investments in RE/EE would reduce public sector electricity consumption and foreseeably reduce electricity bills, however, the effects of such investments are not felt immediately due to the upfront cost of RE/EE investments.
    d. Renewable energy and energy efficiency are outside of the core expertise area for most public sector entities. Investments in energy efficiency and renewable energy have long-term impacts and require thoughtful evaluation of the financial trade-offs, risks, and opportunities. The time investment to make such decision further deters budget- and time-strapped public servants from considering investments.
    e. Alternate public sector EE/RE financing vehicles, such as Energy Performance Contracting and Third Party Ownership models exist but have been largely untested in Jamaica.

50. Globally, public sector institutions face similar challenges when it comes to investments in RE/EE. Typically it is not included in the budgeting process and governments are unable to access the capital to make upfront investments in energy savings. This has led to the development of the Energy Performance Contracting (EPC) market, which has become the largest provider of EE upgrades in the United States public sector and one of the most common approaches to public sector financing worldwide. Energy Performance Contracting (EPC) is a turnkey service that provides customers with either a selection or a comprehensive suite of energy efficiency and renewable energy measures. At the core of the EPC market are Energy Service Companies (ESCOs) which typically deliver an EPC project, providing services to the public sector including: conducting in-depth energy audits, designing and planning the upgrades, financing, construction and installation, as well as the evaluation and monitoring of energy use over time.

51. As such, ESCOs can help public entities overcome the lack of time and expertise that local governments may face in identifying the right building upgrades, and implementing them. While several service providers in Jamaica call themselves ESCOs, a "true" ESCO which relies on EPC as a way of providing turnkey RE and EE services has not been identified. Consultations with a series of service providers and key stakeholders such as the Jamaica Productive Centre (JPC) and the Jamaican Solar Association has confirmed that many service providers could be classified as "almost ESCOs"—many companies provide some but not all of the types of services offered through a typical ESCO. This is fairly consistent across the Caribbean region.[14]

Information/Awareness and Perception Barriers

52. Over the last couple of decades, tremendous progress have been made in renewable energy development in the Caribbean and there is widespread evidence of the application of renewable energy in every country. For example the Caribbean Energy Information System (CEIS) websites provides a range of free energy information and has been building awareness in energy since 1987. However in general, there is insufficient awareness and sustained communication on the benefits of RE and EE among the general public and the private sector 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 renewable energy and the choices that will bring optimum benefits. In many cases information about renewable energy technology is not readily available and such matters are not often discussed in the media aimed at promoting public education.

53. For many years, there has been significant room for improvement in investments (by financial institutions) in RE technologies, their transaction costs, risk management etc. partly because of lack of knowledge and experience with specific technologies. The lack of information in addition to legislative barriers inhibits financial institutions from participating in the renewable energy market and provide the opportunity for growth. In recent years, the Development Bank of Jamaica has provide leadership in providing loans for the uptake of renewable energy. People continue to make choices on cost rather than on benefits to be gained over the long term. The issue of purchasing an electric water heater which has a high energy consumption rate as compared to a solar water heater with a high upfront cost, reasonable payback period

14 A company most closely identified in the Caribbean as an ESCO is EMS, LTD of Dominica.

and an average guarantee of twenty years including several environmental benefits is a case in point.

Stakeholder Analysis

54. The governing institutional framework for the energy sector is composed of the energy Ministry, a utility regulator, the electricity utility, various government agencies, a national advisory council and a special energy sector team.

55. **Ministry of Science, Technology, Energy and Mining (MSTEM)** was established with a mission to "*create an enabling environment for Jamaicans to capitalize on sustainable and secure energy, responsible minerals investments, and a vibrant science, technology, and innovation sector",* has the overall portfolio responsibility for the energy sector and as such has the role of formulating and promulgating the implementation of Jamaica's Energy Policy and sub-policies. MSTEM's specific mandates with regards to energy are;

    - Encourage private sector innovation in the science, technology, energy and mining sectors;
    - Lead legal and regulatory reform of the electricity and gas sectors;
    - Improve national energy efficiency and conservation; and
    - Increase the percentage of electricity generation from renewable sources, thereby reducing dependence on imported fuels and increasing Jamaica's energy security.

56. **Petroleum Corporation of Jamaica (PCJ)** was conceived as the state energy corporation established in 1979 under the Petroleum Act of 1979 as a response to the 1973 oil crisis. PCJ became a Statutory Corporation, under the Ministry of Energy and Mining with the exclusive right to explore for oil, to develop Jamaica's petroleum resources and to enter all stages of the petroleum industry including the right to negotiate import contracts, operate a refinery, transportation and sale of petroleum and petroleum products and the acceleration of the renewable energy agenda. In 1995, the Corporation was mandated to develop indigenous renewable energy resources to facilitate the goals of the Jamaica Energy Sector Policy and in 2006 the Petroleum Corporation of Jamaica (Extension of Function) Order 2005 extended PCJ's mandate to include the *"exclusive right to explore and develop in addition to petroleum, all renewable and other energy resources existing in Jamaica".*

57. In 2011 an act of Parliament removed the exclusive right of PCJ to exploit and develop renewable energy resources to allow full liberalization of the energy market and open it to competition thus creating a legal and regulatory environment for the diversification of energy solutions. This would empower the Office of Utilities Regulation to seek competitive bids for the addition of commercial scale renewable energy capacity to the local grid at a time when oil prices passed the US$100/bbls threshold. The change would also resolve an inconsistency between the exclusivity of the order and other regulatory and legislative provisions under the OUR Act to encourage open competition in the provision of prescribed utility services.

58. In addition, the exclusivity afforded to PCJ also meant that a condition of the All-Island Electric Licence, issued to the Jamaica Public Service Company would not permit JPS to contract for new wind and hydropower resources under a competitive tender since "*save to the extent that the Office [OUR] agrees, or as provided in this licence, the licensee shall not contract for new capacity other than pursuant to a competitive tending procedure".*

59. The PCJ Group subsidiaries include Wigton Windfarm Limited, Petrojam Limited (oil refinery), Petrojam Ethanol Limited, Petcom Limited (marketing and retailing company) and Jamaica Aircraft Refuelling Services. The PCJ is committed to the diversification of the nation's energy sources away from the heavy dependence on imported petroleum to and more towards indigenous resources.

60. **Office of Utilities Regulation (OUR)** is a multi-sector regulatory agency which was established in 1995 by the Office of Utilities Regulation Act (the OUR Act) from which it derives its mandate to regulate the provision of certain utility services in Jamaica. Section 4 (1) of the OUR Act sets out the functions of the Office. Section 4(3) provides for the Office, in the performance of its functions under the OUR Act to "undertake such measures as it considers necessary or desirable to –

    I. Encourage competition in the provision of prescribed utility services;
    II. Protect the interests of consumers in relation to the supply of a prescribed utility service;
    III. Encourage the development and use of indigenous resources
    IV. Promote and encourage the development of modern and efficient utility services;
    V. Enquire into the nature and extent of the prescribed utility services provided by a licensee or specified organization.

61. With respect to the electricity sector, the OUR has responsibility for, *inter alia*:

    i. Direct regulation of the electricity sector including the establishment of tariffs and service standards;
    ii. Oversee the preparation of generation expansion plans;
    iii. Oversee the procurement of additional generating capacity.

62. **Electricity Division (Government's Electrical Inspectorate - GEI)** was established in 1956 as an external Division of the MSTEM, and is responsible for the inspection and certification of all electrical installations throughout the island in accordance with the Electric Lighting Law to ensure that they meet the required standards of safe electrical installations. The mission of the Electricity Division is;

    a) To ensure that electrical installations island-wide are carried out in a manner consistent with the Jamaica Standards Regulations.
    b) To educate the society on the importance of having electrical installations inspected and certified.
    c) To monitor electrical installation practices with the aim of preventing loss of life and property as a result of electrical accidents.

63. The **Bureau of Standards Jamaica (BSJ)** as an agency under the Ministry of Industry, Investment and Commerce (MIIC), is a statutory body established by The Standards Act of 1969 to promote and encourage standardization in relation to commodities, processes and practices. BSJ also provides certification, inspection, testing and calibration as related to the energy sector and for appliances. Its main activities include:

    a) facilitating the timely development, promulgation, promotion and implementation of national and regional standards (and technical regulations) to which particular commodities, services, practices and processes must comply;
    b) monitoring for compliance;

c) conducting inspections and tests and calibrating instruments;
d) management systems certification; and certifying products, product performance and quality, and conformity to requirements stipulated in the relevant standards;
e) Providing industrial training and promoting research and education in standardization.

64. BSJ is the certifying body for renewable energy under the Net Billing Programme and generally responsible for certification of standards and performance of energy efficient equipment. It is currently establishing various codes and standards such as the Energy Conservation Code (JS 309-2009) under the National Building Code; standard of testing energy efficient refrigerators (JS178); testing energy efficient air conditioning (JS 179); and training for certification in ISO 50001 – Energy management System.

65. The **Scientific Research Council (SRC)** established as a statutory body in May 1960, is an agency of MSTEM and is responsible for fostering, coordinating and promoting scientific research and its application. Some of its work to date has been in renewable energy primarily solar thermal in agriculture, biogas/anaerobic technology and biomass. The SRC is also the Regional Focal Point for the Caribbean Energy Information System (CEIS) Network which spans eighteen Caribbean Countries including Jamaica. The CEIS was established through a mandate from CARICOM Heads which arose out of the Regional Energy Action Plan in the 1980s. The CEIS provides energy information for policy decision making, awareness and sharing of best practices. The CEIS in 2009 developed and launched the Caribbean Information Platform on Renewable Energy to build greater awareness and use of renewable energy information.

66. The **Rural Electrification Programme (REP)** was incorporated in 1975 with the specific mandate to expand the reach of electricity supply to rural areas. That mandate was expanded in 2003 to include the Urban Electrification Regularization Programme, aimed at minimizing unauthorized connection in urban communities. Under the REP over 7,000 km of low voltage distribution lines were constructed and approximately 80,000 rural homes electrified. In excess of 98% of households island-wide now have access to electricity. The REP is nearing completion of its mandate and the remaining 2% of homes in remote areas more than three kilometres from the grid will be wired by a succeeding new entity to REP titled **National Energy Solutions Company Limited (NESCL**). The new entity to be created will be charged with developing renewable energy solutions for those households further than three kilometres from the grid, to bring electrification to 100 per cent.

67. NESCL will also promote energy efficiency and conservation, and provide project management services for the design and implementation of energy solutions for major housing initiatives by agencies of the state, especially where low-income earners are the targeted population for those housing solutions. 68. NESCL will partner with the Social Development Commission (SDC), Planning Institute of Jamaica (PIOJ), and the Jamaica Public Service Company (JPS), to arrive at a multi-faceted set of interventions aimed at combating electricity theft.

68. On March 12, 2012, the Cabinet gave approval for the establishment of an overarching National Energy Council (the **Jamaica Energy Council - JEC)** to support the objectives of the Energy Policy through inter-agency and institutional coordination and consultation. The National Energy Policy 2009 – 2030 (NEP) and Vision 2030 – Jamaica National Development Plan would be the guiding plans for operation.

69. The JEC would facilitate broad-based consultation among key energy sector stakeholders and expedite decision-making concerning the implementation of the NEP. The focus of the committee includes fuel diversification, energy security, renewable and indigenous energy source development, energy conservation and efficiency as well as opportunities to achieve and sustain price competitiveness for the business community, and for communication of progress of NEP implementation within their organizations. The specific focus of the Jamaica Energy Council would include the following areas in the energy sector:

    i. Energy Policies.
    ii. Energy Conservation and Efficiency and Public Education.
    iii. Electricity.
    iv. Development of renewable energy resources, alternative energy sources (e.g. nuclear and natural gas) and conventional energy resources (including oil, coal and petroleum coke).
    v. Oil and Gas Exploration.
    vi. Petroleum Refining.
    vii. Energy Access (Urban and Rural Electrification) and affordable prices.

70. An **Electricity Sector Enterprise Team (ESET)** was established on June 2nd, 2014 by the Cabinet which mandated it to lead and manage several critical initiatives related to the procurement and replacement of base load generating capacity and the review of various energy related policy and legislation. ESET is also to review the current procurement policy to make it consistent with best practices and responsive to national requirements and facilitate the significant reduction in the cost of electricity while ensuring diversification in the fuel supply mix in the short-term.

71. To date ESET has obtained a rapid assessment of the electricity sector and options for Least Cost Expansion Plan (LCEP) were explored as part of an Integrated Resource Plan (IRP) and recommendations were made to diversify base fuels (including gas and coal), renovate, relocate and replace generation. Renewable energy resources have not been highlighted as a priority for ESET.

72. ESET has also examined the business and regulatory environment to determine their impact on JPS' ability to deliver cheaper electricity in the short to medium term. To facilitate its work, ESET secured changes to the All Island Electricity License with the removal of condition 18 to allow JPS to replace obsolete equipment without having to face competition on the procurement of same and Condition 6.4 to allow JPS the right of first refusal to replace its obsolete equipment.

73. The electricity utility is comprised of a vertically integrated company, the **Jamaica Public Service Company Limited (JPS),** which owns the transmission and distribution grid and accounts for approximately 588 MW of gross power or over 66% of the total current generation capacity. Approximately 65 MW of intermittent power comes from renewable energy.

74. JPS which was government owned and operated, was privatized by the GoJ in 2001 at which time 80% of the common equity was sold to Mirant JPSCo (Barbados) SRL (Mirant). The GoJ retained a 20% shareholding in JPS. On August 9, 2007 Marubeni Caribbean Power Holdings, Inc., a wholly owned subsidiary of Marubeni Corporation of Japan, purchased Mirant's majority shares in JPS. On March 4, 2009 Marubeni transferred 50% of its shares in

Marubeni Caribbean Power Holdings Inc. to Abu Dhabi National Energy Company (TAQA) of the United Arab Emirates. TAQA has announced its decision to withdraw from the Marubeni TAQA Caribbean partnership in the first quarter of 2011. With the withdrawal of TAQA, 40% of the shares of Maurubeni were sold to Korea East-West Power Company. The current 3 primary shareholders are; the Government of Jamaica with 19.9% shareholding, Korea East-West Power Company Ltd and Marubeni Caribbean Power Holdings, Inc. hold 40% each and the remainder is held by individual shareholders[15].

75. The majority of the remaining generating capacity is provided by three main **independent power producers (IPPs).** JPS is also the exclusive license holder for transmission and generation and may grant grid access to other generators under the legislative framework. Currently the electricity utility has "the right together with other outside person(s) to compete for the right to develop new generation capacity" under the legislative framework and policies and has "the exclusive right to transmit, distribute and supply electricity throughout Jamaica for a period of 20 years"[16] (see section on Legislative Framework).

76. The **Environmental Management Division** within the Ministry of Water Land Environment and Climate Change has portfolio responsibility for the development of policies, programmes, and legislation to guide activities related to a wide range of regional and international environmental protocols and conventions including the UNFCCC.

77. The **Jamaica Productivity Centre** has a mandate to promote and support productivity improvement at the national, sectoral, industry and enterprise levels. The Centre is a tripartite organization comprising the Government of Jamaica, the Jamaica Confederation of Trade Unions, and the Jamaica Employers' Federation. JPC is currently undergoing a European Union funded Energy Services Company (ESCO) project which has advanced the creation of an ESCO industry. The ESCO project has similar themes as the UNDP-GEF project including institutional policy frameworks, capacity building, and financial mechanisms. For the success of the UNDP-GEF project, a training needs gap analysis is needed in 2015 to determine the competences of the current professional cadre in the Energy Efficiency industry and any need for training to deliver quality energy services consistently. The EU-ESCO project has also found that there is a gap in capacity development at the secondary, primary, and vocational levels (wide variations in content, levels, and skill produced in the curriculum) for future sustainability of the industry. There is an opportunity through this Deployment of Renewable Energy project to build on the work already started by the JPC as it relates to the ESO industry, as the abovementioned project will end by February 2016. One such opportunity is the need to advance the model ESCO performance contract (prepared by JPC) and to advance the supporting regulatory proposal from a green paper to a white paper by 2015. Without this ESCO's face various challenges in government procurement processes to deliver renewable and efficient goods and services.

78. **Jamaica Institute of Architects**[17] (JIA) is a non-profit professional body that seeks to promote the role of Architecture in the built environment in Jamaica. JIA was established in 1957 and now has over 100 members. The Institute is currently a member of several international organizations. JIA seeks to promote and increase the knowledge, skills and

15 www.jpsco.com

16 Jamaica Public Service Company Limited All-Island Electricity License, 2001.

17 http://jamaicanarchitects.com/about

proficiency of its members in the profession of Architecture in Jamaica. The JIA has five members on the Architects Registration Board of Jamaica which is mandated to register architects, regulate the practice of architecture in Jamaica, and to ensure the maintenance of acceptable standards of professional conduct of persons registered under the Architects Registration Act. Whereas participation of the JIA is not required for the UNDP-GEF project (primarily retrofitting of RE and EE), they should be considered for future project involving the original designing of energy efficient and self-sustaining public sector buildings. Also JIA should be included in discussions on the implementation of the National Building code.

79. **Incorporated Master Builders Association of Jamaica**[18] (IMAJ), is an advocacy association for building, civil engineering, specialist contractors and associated organizations. The Association promotes standards for the construction industry, develops the work force, and lobbies for legal and other matters affecting the industry. The Association was formed on October 11, 1952 and has (a) the Electrical Contractors Association of Jamaica, (b) the Jamaica Air-conditioning Refrigeration & Ventilating Association, (c) the Women's Construction Collective and (d) and the Association of Construction & Engineering Students as members of its Executive Council. Whereas participation of the Master Builders Association of Jamaica is not required for the current UNDP-GEF project (primarily retrofitting of RE and EE), they should be considered for future project involving the construction of energy efficient and self-sustaining public sector buildings. Also MBA of Jamaica should be included in discussions on the implementation of the National Building code.

80. **Jamaica Institution of Engineers (JIE):**
The Jamaica Institution of Engineers is a private association which seeks to promote and encourage the general advancement of the engineering profession and the practice and science of engineering, and to facilitate the exchange of information and ideas among the members of the Institution and its public[19]. The JIE began under various names since the 1940's and has representation on issues which affect engineers, including the Metrication Board, the Advisory Committees of the Faculty of Engineering at the University of the West Indies and the Faculty of Engineering & Computing at the University of Technology, the Professional Engineers Registration Board, and the Jamaica Bureau of Standards.

81. Since 1987 the Professional Engineers Registration Act was enacted for the registration of professional engineers and under the first schedule of the Act, JIE can nominate up to seven (7) persons to sit on the Board appointed by the responsible Minister, to administer the provisions of the Act. The JIE participation should be considered in consultations towards the implementation of the National Building code and standards development in Output 1.4, Outcome 2 (Regulatory developments for the deployment of RE and EE promotion in Jamaica's public sector). *(Note: JIE members are already dispersed among the technical personnel and engineers already employed by the public sector and some are RE/EE practitioners. They would therefore already be considered on an individual basis among public sector individual who would undergo the proposed technical training and sensitizations under the UNDP-GEF programme).*

18 http://imaj.org.jm/www/

19 http://www.jiejamaica.org/

82. **Training Institutions-** The current leading training institutions for renewable energy and energy efficiency systems installations includes:

- **HEART Trust/National Training Agency (NTA)** which offers a renewable energy and energy efficiency technology National Vocational Qualification (NVQ-J) Level 4 Programme for the industry. HEART/NTA is the GOJ post-secondary skills certification body in Jamaica
- **Vector Technology Institute-** is an established private training institution since 1997, offering theory and practical levels 1& 2 – Solar Photovoltaic Installer Training Programme approved by the Electronics Technicians Association
- **University of Technology-**has offered its first- Solar PV Systems Design and implementation course for practitioners
- **University of the West Indies, Physics Department** – offers a Certificate Course on Alternative Energy and Energy Management
- **Jamaica Society of Energy Efficiency Engineers-** has delivered a Certified Energy Managers (CEM) programme at the University of Technology (UTech).

Jamaica's Electricity Sector

83. Jamaica's current net installed capacity of all generation plants is 848.9 MW, of which almost 33% of the net thermal capacity is comprised of oil-fired plants with ages over 40 years. Jamaica Public Service Company Ltd has an oligopoly in the electricity generation sector with approximately 588 MW of gross power or over 66% of the total current generation capacity, of which 65 MW comes from renewable energy. Three hundred megawatts (300 MW) of this capacity has been provided by independent power producers (IPP) who sell power to JPS via power purchase agreements (PPA) for delivery into the grid. The other generation contributors are:

    - Jamaica Energy Partners (JEP) and its West Kingston Power Producers Ltd (WKPP) produced a combined 184 MW, which constitute 20 % of the generation market
    - Jamaica Private Power Company (JPPC) - 60 MW.
    - Wigton Wind Farm Limited - 38.7 MW.
    - Jamalco (bauxite company) - 11 MW.

84. The growing demand for power, has engendered the OUR, on behalf of the Energy Sector Enterprise Team (August 2014) to develop in the first phase, a Rapid Assessment and Least Cost Generation Expansion Plan. Apart from upgrade in non-renewable forms of energy electricity from renewable energy sources is also a critical part of the plan to add additional new generation capacity to the electricity mix.

85. By 2011, annual electricity generation from renewable energy sources accounted for approximately 5.6 % of total power generation, with contribution of 3.5% and 2.1 % from hydro and wind respectively. JPS recently added 3 MW of wind from its own generation and has a total of 21.3 MW of hydropower from previous generation plus some refurbished plants

86. Jamaica has a solar irradiation of 5.7 kWh/m^2/d, which is suitable for small to large-scale solar power generation. Solar power proliferation has been encouraged and facilitated by a Net

Billing Policy. The high price of electricity has stimulated some interest in the private sector for the provision of electricity. Wigton Wind Farm Ltd was Jamaica's first commercial scale wind park with an initial capacity of 20.7 MW (23 NegMicon x 900 kW) which later expanded to 38.7 MW (9 Vesta x 2 MW).

87. In 2010, JPS added 3 MW (4 UNISON U50 x 750 kW) wind power to its generation complement. Power from these wind resources are dispatched from the central grid control centre. Smaller capacity wind turbines of < 10 kW each has also been installed at both the residential and commercial levels. For example Digicel (telecommunications sector) has installed 3 Sky Stream 3.7 model (3 x 1.8 kW) wind turbines on the roof of its new headquarters as part of its energy efficiency and green objectives. Approximately 50 kW of small grid-tied wind systems have been installed and possibly 20 kW at commercial sites. Generally however distribute generation using small wind turbines have not been successful due to insufficient wind regimes onsite.

88. Small-scale onsite grid-tied generation projects for households and businesses (< 1 kW to 100 kW) has been the fastest growing segment of this market and will continue to proliferate rapidly under the Net Billing programme. An estimated capacity of > 400 kW of residential PV and in excess of 1,000 kW of Commercial PV has been installed, which accounts for < 1% of the country's annual energy demand from solar energy. The largest project currently in existence is a 1.6 MW system at the Grand Palladium (North Coast Hanover). However, other projects such as a 1 MW photovoltaic project in St. Catherine, > 2 MW in the broiler industry and an undetermined capacity for the National Water Commission could come on stream by 2015. WRB Enterprises Inc. will install a 20 MW plant in Content Village, Clarendon by 2016.

89. A 100-m^3 bio digester fed by domestic waste and animal manure is in operation at the St. John Bosco Boys Home in Manchester. This project was implemented at a cost of US$ 14,200 and produces over 50 m^3 of Methane gas per day (equivalent of about 300 kWh). The gas supplies cookers, stoves, water heaters and brooders and some electricity. There is however little interest in replicating this use of biogas for electricity at this time. Biomass cogeneration is applied in the sugar cane industry, but this power is not added to the grid. It is anticipated that by 2016 the sugar cane industry will contribute to the national power supply.

Baseline Analysis

90. The total public sector electricity bill for 2012 was J$15.41[1] billion (US$ 171.1 million) with energy consumption of approximately 476,776,978 kWh[1]. The health sector is responsible for approximately 6% of the total public sector electricity bill in 2012 at a cost of J$919.17[1] million (US$10.2 million) consuming 30 GWh/yr (an equivalent of 20.7 metric tons of CO_2 equivalent/annum).[20]

91. Electricity was the main fuel cost for the hospitals with total annual cost of J$167,019,490 (US$2,530,598) for total annual electricity consumption of 13,858,103 kWh and peak electrical demand of 3,445 kVA. Almost half of the cost (49%) was spent on electricity for air-conditioning and 23% on lighting. Air conditioning and lighting should therefore be considered for any planned interventions.

20 US EPA Clean Energy Calculator.

92. This financial burden on the public sector and high demands from the health sector bill has challenged the Government to adequately finance and maintain the health facilities and provide the desired level of care for the population. Energy savings and the use of renewable energy are solutions to this sector challenge.

93. Previous efforts in the health sector to assess and achieve greater energy efficiency utilizing renewable energy technologies and energy efficiency have not resulted in significant investments despite its importance. While various root causes exist for not achieving a reduction in energy consumption the UNDP-GEF project provides an opportunity to advance the efforts at energy efficiency, energy conservation and reduced contributions to the emissions levels from the hospital sector using the 3 platforms for the transformation:

    - Institutional knowledge and capacity improvements.
    - Regulatory development.
    - Economic and fiscal instruments.

94. As an external driving force, reduction of the public sector energy bill and increasing energy efficiency are components under the current agreements with the International Monetary Fund (IMF) and this may be a significant impetus for achievements in the current dispensation. The target for the public sector energy reduction is projected for as much as 15% using energy efficiency and the deployment of RE technologies an achievable target should the corresponding funding be available.

95. In 2006 UNDP funded the Environmental Management in Hospitals and Schools Programme (for 22 public hospitals and 1 private hospital) from which the Energy Efficiency Unit (EEU) of the Petroleum Corporation of Jamaica (PCJ) contracted Eco-Tech to conduct energy audits of the selected hospitals. Based on the report - "Hospital Energy Audit Project Summary & Efficiency Improvement Investment Packages". The hospitals energy efficiency investment package summarized approximately 33 energy efficiency measures (EEM) for the twenty-two hospitals and the associated recommended for implementation.

96. The audit also found that a basic necessity for hospitals being water heating systems for domestic hot water, laundries, kitchens, operating theatres, and various wards was absent in many of the hospitals. Alternatively, staff and patients sometimes heat water by using LPG or electric kettle and a few of the hospitals had isolated electric water heaters installed at these critical points of use. There is therefore a need to implement cost effective solar water heating systems to provide the needed facility and remove this electrical demand from the system. It is estimated that installation of SWH systems consisting of 73,840 gallons capacity per day and 25,638 square feet of solar panels would cost US$1,977,432 (2007). So the audits have not only exposed energy savings opportunities but incidences where project implementation will provide for the upgrading of facilities, improved services, and standards without increasing the energy demand of the hospital. The proposed SWH systems are intended to supply 50% of the hospital hot water requirement in critical areas. In advancing this UNDP 2006 study, PCJ in June 28, 2007 summarized 30 EEM under 10 separate categories for priority funding and implementation as follows (in no particular priority):

Table 3: Categories of Electricity End Use in Hospitals

1. Electric Power	2. Solar Water Heaters	3. Building Envelope
4. Lighting	5. Cogeneration	6. Compressed Air
7. Water Conservation	8. Steam & Heating Systems	9. Large Air Conditioning Systems
10. Refrigerators & Small Air Conditioning Units		

97. The total estimated implementation cost including water conservation measures was US$3,566,052 and projected annual cost saving for the total package proposed in 2007 was US$1,806,541.

98. To date, approximately 15 of these public hospitals have actually implemented energy efficiency measures, under various different programmes. To rationalize implementation and manage the process, PCJ has also proposed two (2) additional categories for energy efficiency technologies. Estimated GHG annual savings from the intervention was approximately 8,239 metric tons CO_2 with potential saving for 4 years of 32,956 metric Tons. Demand savings of 79,180 KVA per annum will significantly reduce the annual utility bill based on current demand charges applied by the utility.

Demand Forecast

99. Electricity demand since 2011 has trending downwards, with the normal demand load being approximately 420 MW and peak load of approximately 620 MW but is projected to grow at an average rate of 3.8% per annum over a twenty year (20) year planning horizon (2010 to 2029). Growth in 2014 was projected at 2.7% per annum. Over the next 20 years if there were no substantial increase in the uptake of renewable technologies, approximately 1,400 MW of new fossil fuel power plant capacity will have to be constructed in Jamaica including distributed generation systems, to meet the projected demand for electricity. Approximately 800 MW of this new capacity needs to be constructed in the coming decade.

Analysis of the Energy expenditure and Consumption in the Public Sector of Jamaica

100. Under the current agreement with the International Monetary Fund (IMF), the Government of Jamaica (GoJ) is required to cut public sector expenditures. Given Jamaica's high electricity prices, public sector electricity bills create a significant drain on government funds. For example, the total public sector electricity bill for 2012 was J$15.4 billion (US$171.1 million) with total energy consumption of approximately 477 GWh.

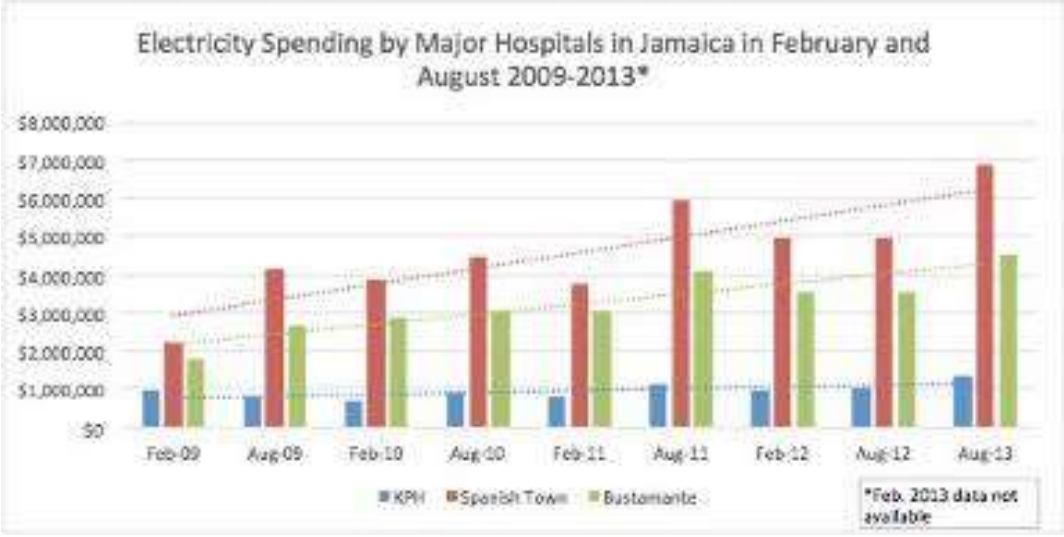
101. The GoJ plans to honour its IMF's commitments by reducing public sector energy consumption by 15% through significant improvements in energy efficiency (EE) and deployment of RE technologies (RETs). Investments in EE and RETs can serve as a buffer against oil price fluctuations, reduce electricity costs, and to provide greater predictability of government electricity expenses. Furthermore, reducing public sector electricity costs creates

greater fiscal space for investment in other critical areas including economic development, health care and education. Furthermore, reducing public sector electricity costs creates greater fiscal space for investment in other critical areas including in investments relating to economic development, health care and education. Given the potential for investments in RE and EE to reduce public sector expenditure and support IMF expenditure reduction requirements, the GOJ has set the target to reduce public sector energy consumption by fifteen percent through significant improvements in energy efficiency measures and through the deployment of RE technologies.

102. Through investments in EE, RE and awareness campaigns, the GoJ has reduced its annual consumption from 477 GWh in 2012 to 432 GWh in 2014. The coverage of the overall electricity infrastructure of 14,000 km for transmission and distribution results in over 95% electrification of the country. Total system losses inclusive of technical and non-technical losses declined from 23% in 2009 to an average of 22.3% in 2011.

103. As of January 2015, PCJ's primary funding source, a 1% commission for trading activities for crude and finished products imported through Petrojam, was reduced to 0.5%. This revenue reduction has led PCJ to pursue other revenue generation avenues. PCJ has historically provided essential services to the public sector in building retrofits through grant funding. This support has positively impacted the public sector in that, its projects are completed at minimal cost without having to go to the market to source other contractors at exorbitant cost. With the loss of its commission revenue PCJ will be unable to provide the services it provided before. An Energy Performance Contract (EPC) Model (see Annex lV), whereby an Energy Service Company (ESCO) provides building retrofits to a customer and is repaid through the customer's energy cost savings will provide benefits to the PCJ in addition to the aforementioned associated savings to government agencies.

Figure 3. Electricity Spending by Major Hospitals in Jamaica in February and August 2009-2013



Source: Ministry of Science, Technology, Energy and Mining, 2014

104. Given the country's high debt burden and economic challenges, it has been difficult for the GoJ to provide adequate and additional resources to defray the cost of its public sector

commitments. In particular, the government has fallen behind in upgrading public health facilities. This state of affairs has contributed to low power factor in hospitals, high and inefficient electricity consumption, or lack access to hot water, undermining the quality of service. As a consequence, the government is now focusing on public sector energy reduction measures in the health sector. In 2012, the health sector accounted for 6% of total public sector electricity bill at a cost of J$919.171 million (US$10.2 million), and 30 GWh/yr of energy consumption. The overall expenditure on electricity cost in major hospitals has been trending upwards (Figure 3).

105. In 2006, the Petroleum Corporation of Jamaica (PCJ), the implementing arm of the Ministry of Science, Technology, Energy and Mining (MSTEM), compiled a *Hospital Energy Efficiency Investment Package*. The package was a follow up to 26 energy audits conducted by the Jamaica Public Service (JPS). There was a Demand Side Management Programme which targeted 4 public hospitals and the UNDP funded Environmental Management Programme in 22 public hospitals and Schools respectively. Despite the findings of the audits[21] and PCJ's investment package, little investment in EE or RETs has taken place.

106. The EPC model has been a widely successful model for scaling up EE and RE investments in the public sector, particularly for government buildings, universities, hospitals and schools around the world. Stakeholder consultations revealed that there is:

a. Demand for public sector building retrofits but no appetite to take on additional debt;
b. RE and EE equipment providers are interested in alternate revenue models and have not tried the ESCO approach;
c. Hesitation to try the EPC model because it has not been applied in the Jamaican context; and
d. A desire for guidance with piloting the EPC model in order to reduce risks to the public sector and the equipment provider (i.e. "future ESCO").

Levers to Scale Up RE and EE

107. Governments have *four* main levers that can be used to promote the uptake of renewable energy and energy efficiency. These includes *regulations* such as mandates, RE generation policies and building codes or *tax incentives* such as exemptions, rebates and credits. Levers can also be in the form of *financial instruments* such as concessional financing, guarantees, lending programs, bulk procurement, and energy performance contracting. Governments can work with the private *utility* to offer incentives such as on-bill financing, rebates and demand management services. Table 4, below, summarizes which levers and instruments that are currently in place in Jamaica.

21 According to these audits, several public hospitals have low power factors, contributing to high and inefficient electricity consumption, or lack of hot water, undermining service quality.

Table 4: Jamaica Levers and Instruments Used to Support the RE/EE Market

Lever	Instrument	Current Status in Jamaica
Regulation *Mandates*	Targets	- RE to be 12.5% of energy mix by 2015, 20% by 2030 - CARICOM commitment of 47% RE by 2027 - 100% energy access by 2015
	Procurement	- Must comply with environmental regulations & standards - Recommended to consider life cycle cost & performance
	Standards	- Updating ENACT Guide to Green Procurement; unclear on enforcement - Bureau of Standards test imported appliances and determines baseline standards
Regulation *RE Generation Policies* **Regulation** *Codes*	RE generation policies	- Net Billing for installations <100kW at avoided cost rate - RFP pool for systems >100kW currently closed - Systems >100kW can interconnect but cannot feed excess power into grid - Mixed application of JPS standards on interconnection
	Building and energ codes	- Voluntary energy code - Energy Efficient Building Code - Adopted in 1996 by Jamaica Bureau of Standards
Tax	Exemptions	- Exemption from General Consumption Tax and Custom Duty for Energy Efficient products
Finance	Concessional finance & risk guarantees	- Series of lending programs available through the Development Bank of Jamaica
	Green loans	- Series of green mortgages, re-financing, and equipment loans offered to the commercial and residential market by various lending institutions
	Bond issuance	- Not an option given IMF requirements
	Bulk purchasing	- Updating Public Sector Green Procurement Guidelines - Awareness of guidelines, compliance and enforcement unclear
	Grant & rebate programs	- Development Bank of Jamaica Energy Audit Grants - Up to J$200,000 for MSME to pursue audits

Utility	Energy performanc contracting (EPC)	- PCJ plans to establish an ESCO model to provide public sector services - Ministry of Finance currently does not allow public sector RE/EE lease to purchase agreements because it treats it as a liability - GEF project to establish pilot ESCO model
	On-bill financing	- None
	Rebates	- None
	Demand management	- Had a demand side management pilot program (1996-1999) which included capacity building, public awareness campaign, CFL lighting distribution, commercial efficiency audits and implementation

Current Status of the Hospitals in Jamaica

108. Because of its historical high energy cost, the government of Jamaica has taken the initiative (through the newly established Energy Efficiency Unit (EEU) of Petroleum Corporation of Jamaica) to increase efficiency of public sector facilities. The hospitals have been targeted first as they are among the most energy intensive of the public sector facilities. To this end, the Hospital Energy Auditing Programme was conceived and developed by PCJ and funded by United Nation Development Programme (UNDP). The energy audits identified and documented cost effective energy and water savings opportunities and identify the implementation cost and return on investment[22.]

109. Due to Jamaica's public sector electricity bill, it has become extremely difficult for the GoJ to provide adequate and additional services and/or upgrade public health facilities. The country's high debt burden and economic challenges limit its ability to provide satisfactory healthcare to its population (according to the audits carried out on the 22 hospitals, several public hospitals have low power factors, contributing to high and inefficient electricity consumption, or lack access to hot water, undermining service quality). Many of the hospital plants were undergoing significant changes and developments. It was also recognised that some categories of staff particularly the maintenance staff need to become aware of many technical issues in order to have an effective maintenance system. In response, the programme built in training component.

110. There are 34 medical facilities in Jamaica 26 are public hospitals and 8 are private. Most of these hospitals offer basic services while others provide specialised health care services to the public. The hospitals are at various stages of health care delivery. In recent years, many of them have been upgraded to meet the current health care needs of the public, while others are undergoing structural changes to expand their service offerings or to address maintenance issues. Some hospitals are reclassified because they can no longer offer the services they were designed to provide partly because of financial reasons. For many hospitals, the cost of energy services is overwhelming and their survival is dependent on the

22 Hospital Energy Audit Project Summary & Efficiency Improvement Investment Packages

infusion of new technologies particularly in renewable energy technologies that can assist in reducing their energy bill.

111. The hospitals with RE and EE interventions would have reduced energy bill and less requirement for foreign exchange to purchase fuel. Energy efficiency can also impact the overall operating cost of the hospitals, thereby freeing up resources that can be used to fund other projects including purchasing of supplies for the hospitals. Local hospital staff will also benefit from this intervention by having improved working environment and possible implementation of other needed projects from savings that would be derived as a result of this project. The public or users of the hospital will benefit from improved services and amenities. The electric Utility Company stand to benefit from this project by having reduced peak demand on their supplies thereby reducing the need for additional capacities

Audits and Retrofits of the Selected Hospitals

112. The Petroleum Corporation of Jamaica (PCJ) has been instrumental in conducting energy efficiency retrofits for schools and hospitals primarily through grants. PCJ recently installed air conditioning retrofits in the Spanish Town and Annotto Bay hospitals and is exploring the possibility of retrofitting other hospitals. Possible sites for solar photovoltaic systems could include the Mandeville, May Pen and Black River Hospitals, but these are at the very early concept stage and are not yet approved. PCJ has plans to conduct lighting retrofit projects in four schools, Wolmers' High School for Girls in Kingston, St. Hugh's High School in Kingston, Munro College and Hampton High School in St. Elizabeth.

II. STRATEGY

Project Rationale and Policy Conformity

113. The Second National Communication (SNC) of Jamaica noted that there is a large increase (46%) in carbon dioxide emissions due to increases in fuel consumption in the manufacturing (bauxite and alumina industry) and transportation sectors. It also recognizes the fact that although developing countries, including Jamaica, do not have emission reduction targets, mitigation actions such as energy conservation and development of renewable energy sources can have positive impact in terms of economic, social, and environmental considerations23. The SNC also recognizes the fact that an infusion of renewable energy technologies in the economy will decrease the reliance on fossil fuel imports and assist in the reduction of the carbon emission. This project will help to address this matter.

114. The Sustainable Roadmap of Jamaica has stated that the heavy dependence on imported petroleum in Jamaica has impacted negatively on the country's economy. However it has also affected environmental sustainability and has reduced the ability of the Government of Jamaica to direct investments in key services such as health, education, and social protection. As a result, it requires a transition to a more sustainable energy

23 The second national communication of Jamaica to the united nations framework convention on climate change June 2011

technologies. End-use improvements and standards for key sectors can achieve significant additional energy savings24. In the National Energy Policy (2009-2030) the government has reaffirmed its commitment to provide a framework for the sustainable management of energy resources and for development of viable renewable energy resources, with the latter expected to represent no less than 20% of the energy mix by 203025. This is also in line with the Vision 2030 National Development Plan of the Jamaica, which has as Outcome # 10 Energy Security and Efficiency and the strategies under this outcome aimed at diversifying the energy supply and promoting energy efficiency and conservation.

115. On a regional level, there are similar UNDP initiatives from which this project can share lessons learned. Specifically, the Ten Island Challenge (TIC) aligns with general donor agency work to promote private sector investment toward improved energy efficiency and the removal of barriers to the introduction and transfer of renewable energy technology. Although Jamaica is not one of the targeted islands in this initiative, it is expected that there will be institutional sharing of implementation successes and challenges in an effort to enhance project outcomes and benefits. Additionally, through the exchange of these ideas and experiences, the effectiveness and responsiveness of UNDPs work in the region can be further optimized, in line with its strategic plan to scaled-up action on climate change adaptation and mitigation across sectors, and to adopt inclusive and sustainable solutions to achieve increased energy efficiency and universal modern energy access.

Country Ownership: Country Eligibility

116. Jamaica has signed on to the United Nations Framework Convention on Climate Change (UNFCCC) on September 6, 1996. As a party to the UNFCCC, Jamaica like all parties is subject to a number of commitments, which place obligations on the country to respond to the efforts to reduce phenomena that give effect to climate change. The proposed project is fully consistent with the current strategies and priorities of the Government of Jamaica. It will to contribute to the target of 20% of renewables in the energy mix by 2030. It is also aligned to the strategic energy priorities of the National Development Plan of Jamaica and other national policies. Besides its commitment to the Kyoto Protocol and United Nations Framework Convention on Climate Change, Jamaica has also signed on to the Sustainable Energy for All initiative in 2012 to provide universal access to modern energy services, double the rate of improvement in energy affiance, and double the share of renewable energy in the global energy mix.

Country Driven-ness

117. This project is being developed in close consultation with various key Ministries and departments of government. The Government of Jamaica attaches high priority to providing basic energy services to it rural communities, disadvantaged groups such as women, youths and the unemployed. One of the strategic objectives for the energy sector in Jamaica relates to reducing the fossil fuel dependency and promoting the use of renewable energy.

118. In support of the energy security, the government of Jamaica has devised several policy and programmes including:

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24 Jamaica Sustainable Energy Roadmap Pathways to an Affordable, Reliable, Low-Emission Electricity System

25 Jamaica's National Energy Policy 2009-2030

- **Jamaica Sustainable Roadmap** delineates opportunities for Jamaica to contribute to international efforts towards a more sustainable, climate-friendly development path. It describes the country's current electricity system as well as the key challenges to advancing this system toward greater independence and sustainability. It also examines existing barriers to a sustainable energy transition in Jamaica. The roadmap has identified opportunities for increased efficiency, examine a country's renewable resource potential for possible exploitation.
- **The National Energy Policy** sets out the policy framework for Jamaica as it seeks to advance the renewable energy agenda. It undertook a comprehensively assessment of the energy landscape of Jamaica and establishes areas for national priority.
- **Energy Efficiency Potential in Jamaica Challenges opportunities and strategies for Implementation**. This document examines a programme of energy efficiency improvement and energy diversification that are required for Jamaica to provide quality, affordable and environmentally friendly energy options, and to reduce the country's dependence on high imported oil.

Alternative GEF Scenario

The GEF alternative to the business-as-usual (BAU) scenario for this Project is summarized in Table 5

Table 5: Component comparisons of BAU and GEF scenarios

Component	BAU/Baseline scenario	GEF Alternative
1. Individual and institutional RE and EE knowledge and capacity strengthening in Jamaica's public sector	Several public investment packages in RE and EE have been identified, but the critical mass of local experts and entrepreneurs (i.e. ESCOs) required for the private sector to absorb additional public and industry demands for their energy performance services do not exist. Parallel initiatives (e.g. GEF/UNEP EE project) are only focused on building performance.	Capacity development efforts through training on RE and EE (e.g. solar water heating and solar photo voltaic, and energy efficient air conditioning and LED lighting) equipment, system and product installation, technical certification and inspection in the Jamaican health sector, will help raise awareness on the benefits (low carbon, energy savings, sustainable development) of undertaking similar investments in other hospitals. The focus on appliances broadens the training scope to students, technicians and entrepreneurs beyond buildings (e.g. architects), thus promoting employment
$956,483	*$856,483*	*$100,000*
2.Regulatory developments for the deployment of RE and EE promotion in Jamaica's public sector	The National Energy Policy Action Plan # 2 for the period 2013-2016 is set to implement Jamaica's 2009-2030 energy policy goal of fuelling the country's growth down a low carbon path. However, its priority project on strengthening the policy, legislative and regulatory framework provides for enforcement mechanisms that are yet to be developed	Introduction and enforcement of licensing, net billing, audit inspection, certification and minimum energy performance standards of RE and EE equipment, systems and products (e.g. solar water heating and photo voltaic, and energy efficient air conditioning & lighting) in the Jamaican health sector applicable to the rest of the public and commercial sector (e.g. private hospitals, public buildings, tourism) contribute to the effective implementation of national energy policies, and its contribution to sustainable low carbon development.
$784,887	*$584,887*	*$200,000*
3.1 Economic and fiscal instruments for the uptake of RE and EE	The PCJ and NHF are making provisions (approx. US $1.2m of which US$0.9m is cash and the remaining is PCJ's in-kind from the	De-risking measures introduced by the project to catalyse RE and EE programs nationwide (including bulk procurement, energy performance and savings contracts, amongst others to be confirmed during the

technologies in the Jamaica's public sector ***3.2*** **Investment packages funded for the health and other selected public sectors for the scale up of RE and EE**	US$5.5m national government contribution previously noted) to promote RETs and EE interventions that are insufficient to match the investment requirements estimated for the hospital packaged program. The available IDB funding window (US$4m) could address the shortfall with additional incentives in place to scale up the investment program.	preparatory PPG phase upon CEO endorsement), will contribute to the development of additional investment packages for the public and eventually the private sector that the critical mass of local companies (i.e. ESCOs) can absorb. The electricity cost savings realised (given the short payback period to recover the initial outlay) will help Jamaica address the macroeconomic risks and uncertainty over uptake of RE/EE technologies, given IMF's restrictions on government spending.
$10,262,371	*$9,307,384 (incl. PMC))*	*$954,987 (incl. PMC)*
$12,003,741	**$10,748,754** *(incl. PMC)*	**$1,254,987** *(incl. PMC)*

Project Objective, Outcomes and Outputs

119. This objective of this project is to advance a low carbon development path that would enable Jamaica to be less reliant on fossil fuels and thereby contribute to the reduction of the energy bill in the Jamaican public sector. . The public sector in general including specific sectors such as health and education sector have been impacted by the lack of trained technicians to maintain critical energy related equipment and thereby avoid regular breakdown. Moreover, these institutions have been unable to respond to the high energy consumption through targeted energy efficiency interventions because of a lack of resources and capacity[26]. The project will build relevant capacity in the public sector by increasing the knowledge base of its operatives on matters pertainent to RE and EE as well as developing the appropriate technical skills necessary to support investments in the sector. It will strengthen the regulatory framework that governs the development and deployment of RE and EE technologies. The project will also investigate and seek to establish a mechanism involving public private partnership (PPP) that will engender a greater uptake of RE and EE.

Project Component: 1: *Individual and institutional RE and EE knowledge and capacity strengthening in Jamaica's public sector*

This component is designed to address the lack of technical capacity in the public sector to support the renewable energy sector and in particular solar PV and SWH industry.

120. **Outcome 1: Increased knowledge in RE and EE for Individuals in the public sector and strong institutional capacity to support RE and EE development in Jamaica's public sector.**

121. ***Output 1. Technicians within the public sector trained and certified to acceptable industry standards in renewable energy technology and energy efficiency particularly in the solar photo-voltaic subsector*** It has been recognized that there is limited technical expertise in public sector institutions (particularly in Jamaica's health sector) tasked to oversee electricity equipment purchases and performance (e.g. quality standards, cost-

26 There are unconfirmed evidence that there are 13 electrical inspectors in Jamaica. As a result of an apparent lack of capacity, the GEI proposes to subcontract its RE and EE inspection activities.

benefit analysis). Some training and certification in capacity strengthening are on-going at the post-secondary, tertiary and professions levels under different projects. This output will however, provide targeted training in renewable energy technologies and energy efficiency with emphasis on solar photo-voltaic system and solar water heating design and installation, quality control and certification schemes, product performance and maintenance, and retrofitting of solar thermal systems and energy efficiency systems. Such training will build relevant technical capacity in the sector[27]. To avoid duplication, the project will support ongoing training programmes in the country.

122. In this regard, the HEART/NTA programme is recommended, due to its established local and international certification processes, comprehensive and practical syllabus and its status as a GoJ institution. Training from the HEART-Trust/NTA will support the project objectives by utilising the existing GoJ technical resources from the institution, ensuring both national and international installation standards are adhered to and promulgated in satisfying the GEI requirements for the industry and creating opportunities for unemployed post-secondary male and female youth. HEART-Trust/NTA has also indicated its interest to utilise a compilation of its shorter, customized modules for professionals who wish to enhance their competence on the job using a shorter programme delivery. The project can benefit HEART/NTA by supporting the programme's viability through new registrants, customisation of the training syllabus and promotion of the programme. Where possible the project may provide sponsorship for participation in the courses. The benefits to the project and HEART will provide sustainability by institutionalizing the capacity building opportunities at this early stage.

123. In support of developing a cadre of energy efficiency experts both the Development Bank of Jamaica and the Petroleum Corporation of Jamaica have maintained a database of energy auditors. It is appropriate for the PCJ to augment its database with new graduates of renewable and energy efficiency training programmes as outlined previously.

The project will support the following activities:

- Assist with the development of training programme modules and related materials to train key stakeholders (including system suppliers and installers) on technical and other quality criteria.
- Assist with developing a manual and template for PV system design and installation), including sizing (including relevant calculations), orientation and other technical requirements to be disseminate in soft copy format.
- Provide financial support to reputable training institutions in Jamaica such as the HEART Foundation, University of Technology, etc. for their ongoing training programmes in various aspects of RET and EE (in keeping with the objectives of the project); as well as to develop customized programmes to augment the technical skills of building inspectors, local government officers, NEPA representatives who approve development permits.
- Sponsor the training of a cadre of technicians to guarantee the participation of public sector maintenance engineers; women, youths, unemployed and other disadvantaged groups in installation, retrofitting of RE and EE systems, service guarantees and

27 Where there gaps in the programmes, the project will support curriculum enhancement.

maintenance contracts, thereby building capacity within the public sector to respond to the needs of the sector[28].

- Develop a gender disaggregated data base with information on the persons trained, so that they can be identified and deployed within the energy sector to provided related services when needed.
- Develop targeted awareness and information packages about renewable energy systems (main focus on solar PV) and RE programmes and their applications and benefits for the hospital sector.
- Assist the Jamaica Society of Energy Engineers in their certification of Energy Managers*:*
- Build capacity for monitoring, reporting and verification (MRV) among technical staff that are tasked with monitoring and reporting greenhouse emission (GHGEs),

124. ***Output 1.2: Selected staff from financial institutions, have increased knowledge in matters of RE, EE and Energy Performance Contracting***:

During research leading to the development of the Project Document, discussions were held with bankers and clients and there was unanimity in the view that many Jamaican financial institutions lack a full understanding of the risks, opportunities, and paybacks of RE/EE investments. This leads to the structuring of lending terms that are not optimally structured for such investments. This can lead to high interest rates, collateral requirements or short tenures which lead many consumers to decide whether a loan is not worthwhile. This situation proves especially challenging for the lowest income groups who lack access to finance and where savings in electricity costs could be especially beneficial. As a consequence, many potentially good projects have been over looked.

125. While Jamaica has made strides in improving the availability and accessibility of financing for RE/EE, there remains a lack of awareness among lenders on the benefits and financial performance of RE/EE technologies. In particular, lenders are not familiar with the energy performance contracting model. This lack of understanding could restrict access to financing hinder the development of the ESCO market and the ability for ESCO purchase the necessary equipment for efficiency upgrades.

126. It is therefore recognized that in order to address this barrier, training is required for selected staff of lending institutions to provide an understanding and appreciation of selected RE technologies and EPC (See Annex VI). The activities will:

- Deepen lender understanding of analyzing the risks, opportunities, returns on loans and the reality of favourable paybacks of RE/EE investments in a high cost of energy environment.

28 There have been failure of equipment in the Ministry of Health due to for a variety of reasons including lack of trained technicians, and knowledge about the system to effect on time maintenance intervention.

- Make lenders more comfortable with energy performance contracting including the role of the ESCO, the project financing component and the project savings guarantee
- Introduce lenders to the UNDP-GEF supported EPC projects and the proposed model
- Provide a forum for the various institutions involved in the EPC projects to meet including the future ESCOs, public institutions and potential lenders. Design specific training for operatives in the financial sector in the fundamentals of RE technology and EE programmes, project development and implementation, project risk
- Include organized field trips where participants can witness firsthand experience on installed PV systems and their applications to income generating activities.

127. ***Output 1.3: Awareness of senior management and maintenance staff at selected hospitals, other public institutions and NGOs and CBOs enhanced***:

The GoJ is working diligently to improve the energy management and performance of public buildings by encouraging energy efficiency upgrades and the use of renewable energy. For some time now, however, the issue of maintenance of energy equipment in the public sector (including hospitals has been a challenge. Notwithstanding the fact that some hospitals do not have a maintenance budget from which to effect timely maintenance, this matter is further compounded by a lack of trained maintenance personnel which are knowledgeable of RE of the EE systems. As part of the pilot program, UNDP-GEF will collaborate with the Ministry currently responsible for updating Jamaica's Sustainable Energy Procurement Guide. The objective of the awareness and training programme for building and facility managers is to build familiarity with RE/EE technologies, the financial benefits of these technologies, and the process for procuring, operating and maintaining these technologies (See Annex VI). The programmes will include:

- Creation of methodologies for creating an energy management plan including identifying, analysing and prioritizing RE/EE investments.
- Overview of Jamaica's Green Procurement Guide including the process of and best practices for procuring RE/EE technologies
- Post installation methods for monitoring, reporting and verifying the impact of the RE/EE upgrades on building energy use; methods for monitoring the performance of RE/EE technologies; and methods for operating and maintaining technologies

128. In addition, the other key target group of this training activity are NGOs/CBOs. In collaboration with the GEF SGP, this project will include training for NGOs and CBOs who are implementing RE and EE projects in community centres in rural and urban Jamaica.

129. ***Output 1.4: Relevant institutional capacity within public institutions strengthened to facilitate an increase in the scale-up of RE***:

Among other activities, this project is designed to build institutional capacity. Several public institutions including the Bureau of Standards of Jamaica (BSJ), the government electrical electorate, etc. have designated responsibility to perform services such as developing standards for testing and accreditation of energy services and products. More often than not, there is a dearth of resources with which to obtain the requisite equipment and systems to satisfactorily conduct quality and standards tests. In some cases, major equipment may

need to be placed or upgraded to function effectively. Systems within the energy services companies (ESCOs) also need to be strengthened to become more effective and competitive service providers. This project will assist in building the relevant capacity at selected public institutions. Among the interventions to be made are:

- Provision of additional support at the Bureau of Standards Jamaica (BSJ)[29] for the installation or upgrade of quality testing facilities for certification of renewable and energy efficient equipment to standard
- Assisting in the development of competence for testing and certifying critical renewable and energy efficient equipment.

Project Component 2: *Regulatory development for the deployment of RE and EE promotion in Jamaica's public sector*

130. **Outcome 2: A supportive legal and regulatory framework to facilitate the deployment of small decentralised RE power generation (notably solar PV) and EE programmes in Jamaica's public sector**

Despite the plethora of regulatory and policy instruments to catalyze RE and EE in Jamaica, it has not realized the level of penetration of renewable energy that was envisaged. The lack of appropriate legislation and the capacity to enforce policy initiatives is considered a barrier to advancing the energy agenda forward. The following activities with support from the GEF can assist in addressing this barrier.

131. ***Output 2.1: The legal and regulatory regime to facilitate scale-up of RE and EE reviewed and strengthened***.

During the facts finding stage of the project, a number of barriers were iidentified that impacted the uptake of RE and the deployment of EE in Jamaica. Among the bariers listed in the Project component, is the lack of appropriate legal and relagatory regime. For Jamaica to experience an uptake in RE and EE, an important step will be to prioritize the development of the necessary legal and the regulatory framework as a matter of urgency. In addition, current policies and laws need to be strengthened and enforced to facilitate the promotion of RE and EE in a sustained manner. In recent years, there have been a number of policy and regulatory changes in the energy sector as a matter of Government focus. In some cases, policies may need to be revised in keeping with new and emerging technologies and market conditions. The following actions are necessary to address these matters and can be supported by the GEF resources:

- Review ways to build upon the Jamaica Productivity Centre's ESCO project to support development of the institutional and regulatory framework, policy, protocol and regulations to govern the ESCO industry as well as standards and norms to achieve energy certification.
- Develop a codified system for licensing, Net Billing, inspection, licensing and certification of RE and EE equipment, systems and products (e.g. solar water

29 The World Bank is already providing some technical assistance to the Bureau of Standards for the upgrade of equipment and systems to perform a wider range of functions including testing of RE and EE equipment.

heating and photo voltaic, and energy efficient air conditioning & lighting) in the Jamaican health sector which can be applicable to the rest of the public and the commercial sector.

- An analysis of the current building regulations with a view to assist with legal fees 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 rooftop PV systems and energy efficiency applications in public buildings;
- An analysis of how these legal and regulatory instrument impact women.

Project Component: 3: *Economic and fiscal instruments to facilitate the uptake of RE and EE technologies in the Jamaica's public sector*

132. **Outcome 3: An operational Energy Performance Contracting mechanism to facilitate the development of ECSOs and their viability to support RE and EE scale-up in the public sector of Jamaica:**

For many decades, access to finance for renewable energy and energy efficiency projects has been identified as a major barrier to the public and private sectors as well as households in Jamaica. Multiple lending facilities and fiscal initiatives aimed at catalysing the RE sector exist (see Table 4 and Table 7) through the Development Bank of Jamaica and other commercial banks. Investments in the public sector, however, have remained limited due to their inability to access such loans and take on additional debt (see Paragraphs 101-107). Through support with the design and implementation of an Energy Performance Contracting pilot programme in the health sector in partnership with PCJ, the GEF project aims to scale up public sector investment in RE and EE in order to deliver the following:

133. ***Output 3.1: Uptake of renewable energy strengthened with the Energy Performance Contracting pilot programme:***

To overcome the barriers to public sector investment in RE and EE technologies that can reduce electricity consumption and greenhouse gas emissions, a de-risking mechanism in the form of a pilot programme for the hospital sector is proposed. Through the pilot program the hospitals would enter into agreements with Energy Service Companies (ESCOs) which would take the performance risk and implements the energy project. The hospital derives repayment towards the investment from energy savings. (*See Sustainable Energy Services Industry (ESCO) in Jamaica* Section below). Output 3.1 would involve the following:

- Conduct a baseline study to determine the level of RE uptake in Jamaica and the factors that have influenced that level of uptake
- Review existing financial mechanisms to identify gaps that might constrain the effectiveness of some financial schemes with the possibility of placing developers with small-scale RE projects at a disadvantage[30].

30 Cognisance must be given of the fact that due to the government of Jamaica's current arrangement with the IMF may restrict it from providing additional financial incentives for RE.

- Establish the Energy Performance Contract pilot programme mechanism using an ESCO Model with various institutional and market characteristics. Prepare associated documentation relating to process, contracting and reporting procedures. The EPC pilot programme will initially target public sector investments in building retrofits, lighting, small decentralised solar photovoltaic and solar thermal systems.
- Knowledge building between international consultant, local consultant and programme implementation unit so the EPC model can be scaled up or replicated independently in the future.
- Review of PCJ's outcomes from auditing done at each hospital, including:
  - Baseline consumption assessment of each hospital
  - Planned investment for each hospital and associated paybacks
- The review will ensure funding in the optimally applied to implementation gaps. Provide initial orientation training to familiarize EPC pilot program participants and key stakeholders (i.e. PCJ, hospital administrators and senior facilities managers, UNDP Jamaica) with the program's goals, processes, and support available. (See Annex VI)
- Provide on-going support, training and contract negotiation support to pilot programme participants and key stakeholders including PCJ, Ministry of Health and the private sector.
- Test and monitor the performance and impact of the pilot financing mechanism with a view to its future application and scale-up.
- Publicise and promote the EPC pilot and results of the programme

134. ***Output 3.2: Investments in Solar PV, solar water heaters and energy efficiency retrofits in the health sector encouraged:*** Through the EPC contracting model the PCJ and the GEF will jointly invest in EE and RE interventions in five hospitals (total cost of US$2.1 million) (See in Table 6 below and Annex III). GEF will contribute $650,000 in the form of an investment grant and the remainder will be invested by PCJ. The GEF investment grant will reduce the overall amount of investment that PCJ will need to recover through the energy performance contracts with each hospital. Investments in RE and EE interventions will deliver reductions carbon emissions, in electricity consumption and in electricity costs in the health sector.

135. *The Petroleum Corporation of Jamaica (PCJ)* will implement this component of the project. As a consequence, the PCJ implementing arm will then use the proposed Energy Performance Contract (EPC) Model and serve as an ESCO for the delivery of the outputs and cost recovery mechanism for the project. It is anticipated the amount budgeted for investment under this component will be assigned accordingly. The activities under this project:

- Provision of $650,000 investment grant from GEF to support a total investment of $US 2 million or greater in RE and EE interventions in five hospitals and health facilities.
- Pursue the following investments to address the energy cost and efficiency at the hospitals selected:

i. 150 KW solar PV installation for 2 hospitals (totalling 300KW) with batteries for two days backup power

ii. 40 sq ft Solar water heaters - 44,800 gallons for 5 hospitals

iii. Energy Efficiency Retrofits for 5 hospitals (See list as per Table in Annex lll)

Table 6: Proposed List of Hospitals for UNDP-GEF Interventions:

HOSPITAL	PARISH	TYPE
Kingston Public & Victoria Jubilee Hospital	**Kingston**	**A Type - Referral (Specialist/ training)**
Mandeville Regional Hospital	Manchester	A Type - Referral (Specialist/ training)
Savannah la mar Public Hospital	Westmoreland	Poly Clinic
Sir John Golding Hospital	St Andrew	Specialist (physical Handicap)
Bellevue Hospital	Kingston	Specialist Hospital (Psychiatric)

136. ***Output 3.3: Other renewable energy sources (wind energy) piloted in the public sector on a small scale***:

Traditional wind mapping exercises can take between one and two years to complete and as a result the levels of investment for small scale producers have been too high. Recently adapted methodologies, utilizing existing programmes and models to produce reliable data for wind mapping over much shorter periods presents an opportunity for Jamaica to review and assess the potential for small scale users. Under the UNDP funded Capacity Development for Energy Efficiency and Security project a total of twenty two sites were identified in the Wind Power for Domestic/Community Feasibility Study & Regulatory Review. The pilot of two wind turbines in two rural schools with be conducted under this project. The pilot will allow for the appropriate assessment and evaluation of the viability of wind energy for small scale domestic applications. The wind turbines are expected to have the following specifications:

- Optimum height of 60ft (18.3M) with annual wind availability exceeding 95%.
- IEC class I and based on proven technology able to withstand up to Category 4 hurricane
- Balance of Plant with communication systems and back-up power for the substation switchgear in the event of extended outages

137. The rationale for recommending the named hospitals for installation of investment packages are as follows:

- Hospitals where the recommended EEMs are ubiquitous to maximize overall reduction of GHG emissions and energy savings from available project funds.
- Hospitals which can benefit significantly from EEMs which can achieve high savings at low cost and with early payback timelines.
- Hospital which provide critical or specialized services.
- Hospitals which need high cost interventions, where interventions are at risk of not being done for an extended period due to the prevailing tight fiscal space under the IMF restrictions. These interventions may also not be done under any maintenance programme and where budgets are limited to essential upkeep only.

- Cases were EEMs are not readily resolved with behavioural changes and could be addressed under Component 1 – UNDP-GEF 2015.
- Hospitals with EEMs which are beyond simple appliances which could be purchased as individual all included packages by civil society and special interest health sector support groups.
- Where multiple interventions must be done together to maximize the benefits (e.g. hot water improvements and insulation of pipelines).
- Large public facilities with high capital and operational expenditure serving large numbers of patients.

Energy Efficiency System Modifications/Retrofits

Lighting System Modifications:

138. The lighting system modifications will affect only the fluorescent lamps used for internal lighting. These consist mainly of ordinary 40-watt 4-foot tubes, and 75- watt 6-foot tubes housed in 2-lamp and 1-lamp fixtures. The fixtures are equipped with magnetic ballasts.

139. **The first proposed modification** is to standardize the lamps by using only 4- foot lamps. This means that 4-foot fixtures will replace all the 6- foot fixtures. This change will make it easy to replace the lamps with more efficient lamps, since the energy efficient fluorescent tubes are manufactured mostly as 4- foot tubes.

140. **The second proposed modification** is to replace all ordinary fluorescent tubes with 32-watt 4- foot tubes, similar to Philips 6500K TL80 Long Life, daylight fluorescent tubes. These tubes are brighter than the ordinary tubes and consume 20% less power. Their efficacy (light output per watt) is 53% higher than the efficacy of the ordinary tubes. They also have a longer life than the ordinary tube, and a slightly better colour-rendering index.

141. **The third proposed modification** is to replace the standard fluorescent ballasts with electronic ballasts. An advantage of electronic over standard 1ballast is that a single electronic ballast can operate up to four lamps, whereas a standard ballast can operate only one lamp. Using electronic ballasts can therefore drastically reduce the number of ballasts required for a lighting system. Another advantage of the electronic ballast is that it reduces lighting power consumption by about 31%.

142. **The fourth proposed modification** is to install light switches in areas such as wards where there are no means of controlling the lights except from the breaker panels. This will provide flexibility in the use of the lights and allow for them to be turned off when not in use.

143. **The fifth proposed modification** is the installation of occupancy sensors to control the lights in individual offices. These will (a) automatically switch off lights when the occupants go out and remain out for a predetermined period of time, (b) hold the lights off when there is sufficient ambient light to make artificial lighting unnecessary.

144. The combined effect of the five modifications to the lighting system as described above, is an electricity saving of 149,700 kWh per year, and a cost saving of US$15,560 per year.

The percentage electricity cost saving is 9.7%. The implementation cost is US$33,350 for a simple payback of 2.1 years.

Hot Water System Modifications

145. The first proposed modification to the hot water system is to install 3 x 160 gallon (3 x 600 litre) and 3 x 240 gallon (3 x 900 litre) solar water-heating systems. These will supply hot water to the nursery, the dietary department and seven wards. At present, hot water is supplied to some of these areas by electric water heaters and the switch to solar water heaters would save 89,280 kWh per year with a cost saving of US$9,280 per year. The second modification to the hot water system is to install hot water supply piping from an existing hot water tank (connected to the heat exchanger on the new 30 ton A/C chiller) to the laundry. The implementation cost for the entire hot water project is US$29,700.

Steam Distribution System Modification

146. At present, there is about 200 feet of 2½- inch diameter steam supply lines, which are totally without insulation, and are therefore loosing much heat to the atmosphere. In addition, when the steam arrives at the point of use (for example the autoclave) a part of its heat energy is used and it condenses to water, but the hot condensate is not returned to the boiler. It is instead, allowed to flow down a drain. This represents a waste of energy and water treatment chemicals. However, while it is feasible to insulate the steam supply lines to reduce heat loss, calculations have shown that it is not feasible to return the condensate to the boiler, because the return lines would be too long and the cost of electricity to operate the condensate pumps would be more than the corresponding saving in boiler fuel.

147. The proposed modification to the steam distribution system is therefore to lag all the steam supply lines with insulation 1½ inch thick. Assuming a boiler efficiency of 80%, this modification would result in an energy saving of 64,543 Btu/Hr, which is equivalent to a fuel saving of 1.65 litres per hour. The boiler operates for about 12 hours per day, 365 days per year. So, the fuel saving would be 7,227 litres per year. At US$0.41 per litre, the cost saving would be US$2,963 per year. The implementation cost is about US$1,100 and the simple payback 4.5 months.

Power Factor Correction

148. The energy audit indicated that during the audit base year (August 1999 to July 2000), the power factor for the facility was an average of 0.66 while the power demand was 312 kW and the kVA demand 472.7 kVA. However, by 2004, most of the central air conditioning units were replaced by mini-split systems and the power factor for the facility increased to 0.79 while the kVA demand dropped to 288 kVA. There is still room for further improvement of the power factor by increasing it from the present value of 0.79 to 0.95. This would reduce the kVA demand from 288 kVA to 240 kVA. It is proposed that variable power factor correction capacitors of 101.1 kVAR be installed to achieve this result. The demand saving would result in a cost saving of US$7,740 per year and the implementation cost is US$19,640 for a simple payback of 2.5 years. Five hospitals have been identified for RE (solar PV and solar water heaters) and EE retrofits The rationale for their selection were discussed in paragraph 136 (See Annex lll):

III. SUSTAINABLE ENERGY SERVICES INDUSTRY (ESCO) IN JAMAICA

149. "There is an untapped potential for energy savings from energy efficiency retrofits and technology replacement as well as through renewable energy investments in the public and private sectors in Jamaica. This huge potential remains unrealized even though the financial returns to such investments are very strong. Despite the programmes that have been established to support investment in the energy services sector, the results are slow in coming and available energy funds remain largely unused. There is a limited number of private local actors and low capacity. The few EE and RE projects presented to banking institutions are unattractively packaged with long payback periods. It is evident that a more creative model or framework is needed to tap more aggressively into the wealth of available, financially attractive energy-saving renovation projects. Established institutional and regulatory framework, policy, protocol and regulations to govern the industry is lacking."[31]

150. The Energy Services Company (ESCO) industry that has the potential to create new businesses and new jobs, deliver savings in energy consumption and cost, and provide climate change mitigation through reduced carbon emissions. The savings can be delivered by the introduction of Energy Efficiency (EE) and Renewable Energy (RE) solutions which can be packaged to meet the needs of both public and private sector organisations. There is also the potential for replicating the model through creative packaging of the services to community based organizations for use in urban and rural communities as other parts of the region. The cost savings generated can then be diverted to finance other development needs of these organisations, particularly in areas that will further enhance productivity[32]. Financial sustainability will be secured by the savings delivered by ESCO projects. Institutional frameworks and protocols established will allow these savings to be identified and tracked.

151. The PCJ has expended considerable time, money and effort in preparing to go the ESCO route. The entity has sought and received local and international inputs from practitioners in the field and are undertaking further consultations. A recent survey conducted by the PCJ indicates that while knowledge is good, RE uptake by the public and institution is largely hampered by the cost of the interventions. These factors coupled with the fact that the PCJ cannot afford to do these projects for free any more served as drivers for the thrust towards an ESCO model.

[31] ACP-EU Energy Facility, Grant Application Form, 2010

32 ACP-EU Energy Facility, Grant Application Form, 2010

Proposed Financing Mechanism: Energy Performance Contracting

This section provides an overview of the EPC model and describes how it could successfully fit within the Jamaican context.

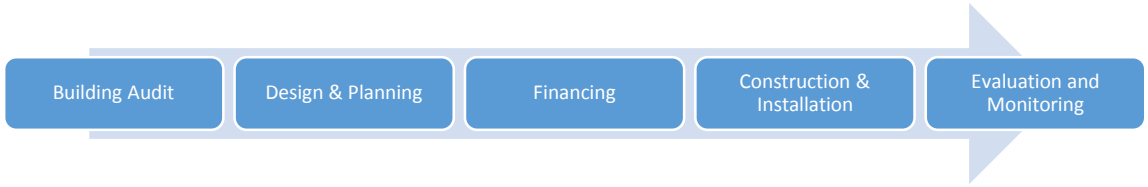
152. The public sector led by the Government of Jamaica has a clear mandate to reduce its electricity costs. Beyond simple conservation measures, investments in RE technologies are necessary, but the public sector does not have the resources to make the necessary investments in RE and EE Programmes. Additionally, investing in RE and EE carries its own risks. Government's role is to facilitate the process by providing the enabling environment through legal and policy instruments.

153. One of the primary decisions the public sector faces when financing energy efficiency is the level of risk for the performance of the energy efficiency measures they are willing to assume. Figure 4 provides a simplified view of the trade-offs between different energy efficiency procurement models, situating them along a spectrum of risk. On the left side, energy efficiency measures that the Jamaican public sector simply purchases and installs outright (i.e. design/build) would likely have the lowest cost over time. However, the public sector would also be fully responsible for ensuring that the systems operate as predicted and generate the projected savings. On the right hand of the spectrum are guaranteed energy performance contracts, under which an energy service company (ESCO) would guarantee that the efficiency measures would deliver a certain amount of savings over time. While guaranteed performance contracts transfer the operations risk of the project to the ESCO, they also cost more over time than design/build measures since the contractors will include a mark-up on each measure installed. The UNDP-GEF EPC Pilot Program, described in Figure 4 below, falls in the middle of the spectrum with the aim of falling in the middle of the spectrum of risk and cost.

Figure 4: Spectrum of Risk and Ownership

154. Energy Performance Contracting (EPC) is a turnkey service that provides customers with either a selection or a comprehensive suite of energy efficiency and renewable energy measures. An ESCO typically delivers an EPC project, providing services to the public sector including: conducting in-depth energy audits, designing and planning the upgrades, financing, construction and installation, as well as the evaluation and monitoring of energy use over time. As such, ESCOs can help public entities overcome the lack of time and expertise that local governments may face in identifying the right building upgrades, and implementing them. ESCOs can therefore be thought of as one way of approaching energy efficiency procurement (See Figure 5 below).

Figure 5: Overview of the Stages of EE and RE Procurement



155. Under traditional energy performance contracting, an ESCO finances the EE/RE investments and is repaid through one of two ways:

- **A guarantee** that an agreed-upon set of energy-saving measures will perform as stipulated in the performance contract. The ESCO typically guarantees a certain level of energy savings (or locks in historical energy costs) over a fixed period of time, based on a standard set of assumptions about building occupancy and usage. If the performance contractor does not deliver the promised savings, they are responsible to pay the difference. ESCOs earn their profits on the basis of the energy savings that the investments generate over time, as well as the mark-up they charge on component costs.
- **Shared savings** under which a certain level of performance is stipulated (but not guaranteed) and the customer pays the ESCO based on the projected savings over a fixed period of time. Repayment is typically based upon historical energy costs.

156. What generates value in this equation is the difference between pre-installation and post-installation energy costs. The key question is how this added value gets apportioned between the building owner (e.g. a Jamaican hospital), and the performance contractor.

157. The EPC pilot program would be structured to de-risk RE and EE investments in the public sector in several ways that align with UNDP's De-risking Renewable Energy Investment (DREI) Framework as described below:

Jamaican Challenge	Barrier(s) Addressed by EPC Pilot Program	Risk Category Addressed
• Fluctuating electricity consumption patterns • Fluctuating an unpredictable electricity bills	• Predictable energy payments when combined with energy conversation practices	Power Market
• Project approval and interconnection process, particularly for solar PV can be drawn out	• Close relationship between ESCO, public sector, utility, and lender can allow for fast-tracking of permitting	Permits
• Lack of knowledge in the public sector and among Jamaican residents and business of the benefits, savings and range of financing models for RE and EE investments	• Publicly demonstrate benefits & savings	Social Acceptance
• Need for standards for RE/EE equipment and service providers to ensure quality • Lack of coordination among the many training programs in existence in Jamaica	• UNDP-GEF support to the Bureau of Standards and associated installer training will improve quality of pilot program delivery and make it possible for the program to work only with certified suppliers to ensure consistent quality of technology and delivery of energy savings	Resource & Technology
• Jamaica has a growing electricity demand which requires additional investment in electricity resources, including fossil fuels	• Energy savings from performance contracts reduces grid utilization	Grid/ Transmission
• Public sector cannot access capital to make RE/EE investments due to IMF requirements	• Improved access to capital through EPC model and/or assumption of risk by ESCO	Financial Sector
• Changes in public sector leadership and goals can deter participation in RE/EE market	• ESCO acts as reliable partner for implementation of projects	Political
• Jamaica is facing high inflation and a weak currency	• Using J$ denomination will reduce currency risk • Increased public sector budget available, over time	Currency/ Macro-economic

158. Table 7, below, provides a selection of lending programs and products currently in existence in Jamaica. Stakeholders interviewed characterized Jamaica's lending market for RE/EE investments as small and indicated that the public is typically unaware of the products available, including those offered by the market's largest lender, the Development Bank of

Jamaica. Stakeholders also disclosed that most loans are structured as equipment loans that use the equipment as collateral (if required) and have tenures of less than 7 years. Through its on-lending to commercial lenders, the DBJ has been able to support lending to residential and commercial customers seeking RE and EE loans.

Table 7: Example Lending Products

Financial Institution	Loan Program/Terms
Development Bank of Jamaica	On-lending to commercial lenders with typical terms of: - Commercial: 9.5-10% (J$) or 7.5% (USD) for 7 years - Residential: 9.5% for 8 years - 90% debt for small enterprises, 70% debt for large projects - Usually secured; 12 mos. principal payment moratorium Loan guarantees to commercial lenders - Up to J$10 million for SMEs - 80% coverage for EE/RE projects with 1% annual fee
National Housing Trust	Solar Hot Water Heaters Loan Program - 3% interest rate, 5-year term - Loan to go toward system purchase and installation
Scotia Bank	125th Anniversary Loan Program - Alternative energy and equipment upgrades for SMEs eligible - 9.5%-11.5% up to 5 years
Jamaica National	Refinancing of residential loans secured by owner-occupied property - 9.4% interest rate - Up to 85% financing Refinancing of residential investment loan secured by land with building - 10.5% interest rate - 66.7% financing for amounts ≤ $25 million, 60% for >$25 million

IV. KEY INDICATORS AND RISKS

159. In keeping with the GEF Focal Area objective and Outcome 3, "Energy and Environment: Improved environmental sustainability of development processes." The key success indicators associated with this project include:

Indicators

- Extent to which policies and regulations for decentralised RE are adopted and enforced;
- Amount of investment mobilised; and
- Tons of CO2 equivalents avoided
- Number of technical personnel in the Ministry of Health and the private sector who can provide technical oversight on RE project development in Jamaica;
- Average monthly consumption of electricity drawn from the grid for each hospital with on-grid rooftop solar-PV panels and solar water heaters.
- Extent of codified system for net metering, licensing inspection of RET and EE systems established and customers benefitted from the scheme and investing in small, decentralised solar PV.

- Number of PV systems installed that meet the minimum established performance standards and investors' expectations.
- Extent to which long term financing mechanism established (EPC) including risk mitigation facility with collateral requirements accessible by the majority of targeted beneficiaries;
- Number of energy performance contracts signed
- Kilowatt-hours of solar-generation
- Number of managers from development and commercial banks trained in the fundamentals of RETs, EE programmes and project risk assessment and management are dedicated to the promotion of RE investments;
- Number of technicians trained and certified to construct, assemble, operate and maintain solar-PV technologies;
- Number of jobs created
- Number of women employed in the RE and EE industry

160. Table 8 provides a summary of the expected direct and post-project indirect GHG emissions from the Project.

Risks

161. The possible risks that could be associated with this project can be considered low. However, all possible efforts have been made in the design of this project to mitigate perceived project risks, there are inevitably some unavoidable residual risks that will have to be carefully monitored and managed to ensure project success. Project risks can be categorized as external (global and policy-related) and internal (risks inherent to the Project design that could be controlled by Project management). Internal risks and recommended mitigation measures are summarized in Annex 1

162. External risks include:

- An unstable financing environment in which different financial and fiscal incentives, cost recovery mechanisms and other supporting measures are introduced and removed at short notice in an unpredictable manner.
- Short term fiscal incentive would not allow the market to reach critical mass at which point it will begin to experience growth.
- Government of Jamaica's inability to introduce new incentive packages for RE uptake at this time based on its stringent IMF commitments.
- Inability to build the necessary institutional and local capacity during the Project period due to lack of qualified personnel;
- The continued reduction in the price of oil on the world market may likely give a false sense of security to the country's energy solution and therefore the gains made in the promotion of RE may lose some momentum in advancing the energy agenda forward.

- Failure to secure co-financing from potential project partners. This may result from the unforeseen diversion of government budgets and resources towards issues with more pressing priorities such as disaster relief and large infrastructure projects that would generate significant economic benefits.
- High upfront costs of PV systems may still pose a barrier to some targeted clients despite the proposed financial mechanism. Long-term and affordable financing (lending) mechanisms may be critical. High interest rates may undermine the attractiveness for financing RE investments.

Table 8: Summary of Direct GHG Emissions from Project Interventions

Intervention Description	Details	Lifetime Direct Emissions Reductions (Cumulative)
Grid-connected solar PV panels	150 kW systems in x 2 hospitals	**3,847** tCO_2
Solar water heaters	44,800 gallons of SWH on 5 hospitals	24,595 tCO_2
EE retrofits & system and equipment improvement	Various building and system retrofits to enhance efficiency	10,902 tCO_2
Totals:		***39,344*** tCO_2[33]

Direct Emission Reductions	Indirect Emission Reductions – Bottom-Up	Indirect Emission Reductions – Top Down
39,344	78,688	718,400

For the two 2KW wind turbines installed on two rural schools, an approximate 4.3tCO2/yr can be avoided if the wind regime is good. Assuming 20 year useful life for these investments, an incremental 86 tCO2eq can be avoided from this 4KW project.

Table 9: Internal Project Risks and Mitigating Actions

Risk	Level of Risk	Impact & Probability	Mitigating Actions
Lack of communication and to some extent coordination amongst various	Moderate	P = 3 I = 2	The project will ensure the coordination and integration in support of energy and climate change objectives, in line with Jamaica's National Energy Policy 2009-2030. It will be implemented using the DIM modality with then UNDP as the implementing agency and the PCJ the implementing agency for

[33] Lifetime assumptions: SPV 15 years, SWH 15 years, EE 10 years. NB GEF suggestions vary: BIPV 10 years, no explicit assumption for SWH, EE 5 years

stakeholders implementing similar projects Jamaica			Component 3 with guidance from MWLECC (climate change policy oversight). These three institutions are tasked to engage other beneficiary ministries and public entities. There will be a strong communication network with similar projects being implemented in Jamaica in order to build synergy and avoid duplication. This project will also engage the Bureau of Women's Affairs.
Delays in technical components of the project due to lack of relevant capacity in the sector	High	P = 2 I = 4	The Project is designed to build capacity at the technical level to strengthen the RE sector in Jamaica by providing trained personnel that can design, assemble, install and maintain solar PV, solar water heating and retrofit EE systems. It will build the necessary awareness and provide relevant training for selected personnel from the financial sector and the ESCO industry (who will be implementing the EPC) to facilitate financing for RE projects.
The uptake of RE project remains low notwithstanding grant funding investments for EE and EPC to facilitate up take of RE	Low	P = 1 I = 3	Despite several financial programmes that have been established to support investment in the energy services sector, the results are slow in coming and available energy funds remain largely unused. There is a limited number of private local actors and low capacity. The few EE and RE projects presented to banking institutions are unattractively packaged with long payback periods. The Energy Services Company (ESCO) industry using the proposed Energy Performance Contracting (EPC) has the potential to create new businesses and new jobs, deliver savings in energy consumption and cost, and provide climate change mitigation through reduced carbon emissions.
The inability of the government to broaden existing fiscal and financial incentives or to approve new incentives because of its IMF commitments	Moderate	P = 2 I = 2	This project will support the government's agenda to promote access to cleaner energy sources. As a consequence of the high electricity tariffs, and the costs to Jamaica's public sector (particularly the health sector), intervention in solar PV, solar water heating will redound to tremendous savings for the government.
Project Management risk.	Medium	P = 1 I = 4	Selection of staff without the appropriate skills may comprise the delivery of the project. To avoid associated risk, the selection of key project staff must be based on competitive selection procedures emphasising the skills and qualification requirements stipulated in the ToR.

Cost Effectiveness

163. The matter of cost effectiveness should be determined after all renewable energy technologies are examined within the context of what technology is most economically

applicable and available to be deployed for demonstration purposes in Jamaica. The geophysical make up of Jamaica give rise to hydro, wind and solar endowment. The exploitation of hydropower is a rather expensive undertaking. Traditionally, hydro power has been an important part of the energy mix of Jamaica accounting for about 23%. Moreover, the water resource may be oversubscribed if further exploitation were to be pursued. Notwithstanding the fact that hydropower is a cost effective technology in reducing greenhouse gas emission, the process is rather lengthy and cannot be done in the short term.

164. Solar photovoltaic is the most appropriate technology for small scale decentralised electricity generation options and for demonstration purposes, on the basis that it is less sensitive to site selection, easy to install and has demonstrated tremendous cost reduction over the last couple of years. Solar PV technology is modular and can be scaled for use on a household roof top, in medium-size settings such as resorts and industrial facilities, Solar PV can be deployed quickly with less risk than say wind energy or hydropower which require lengthy data gathering periods to justify the investment or as part of a large network of utility-scale PV farms Solar PV has a lifetime of over 20 years with limited annual maintenance.

165. In total, the cumulative lifetime direct emissions reductions from GEF investments made during the project will total 39,344 tCO_2 The GEF contribution allocated towards investment of solar panels on rooftops of 2 public hospitals with a combined generation capacity of 300 kW, will translate in a cumulative direct reduction in emission of 3,847 CO_2 eq tonnes over the lifetime of the project.
It is evident that the inefficient or non-functioning equipment and energy systems in the hospitals will have to be replaced in the short term. Given the economic constraints that the government currently faces, it is highly likely that hospitals and other public sector institutions will delay invest in new systems or revert to a business as usual scenario and replace these equipment and appliances with traditional outdated high energy consumption units. With GEF investment, the hospitals will install solar water heaters and several energy efficiency measures and retrofits including capacitor banks for power factor correction. The GEF contribution will increase the cost effectiveness of these equipment and systems, and will achieve the avoidance of 39,344 CO_2eq tonnes of lifetime direct C02 emissions. Revisions to project assumptions have resulted in an increase in project benefits. Based on these revisions, the cumulative GEF$/ton is **US$32/ton =** $1,254,987/39,344 (i.e. GEF contribution/ lifetime direct C02 emissions)

166. Similarly, wind energy development could also be cost effective but requires suitable land, and funding for such a venture may not be easily forthcoming. Wind energy also has some element of unpredictability particularly when the wind is low or there is no wind. However this project presents an opportunity to pilot the use of small scale wind energy systems for domestic and community level services.

167. Solar photovoltaic which is also cost effective can be implemented in the short term with smaller investment cost. The unit cost of PV is being reduced gradually. For the project in question, greenhouse gas reduction can be realized within a short time frame. On the other hand, investment in solar PV supplemented by EE intervention will offer more economical options towards greenhouse gas reductions.

168. The EPC pilot program includes an intensive training and orientation (i.e. on-boarding) process for all participants in the pilot program. Participants will be provided with the necessary tools and an associated support network to successfully participate in the program. Participation in the program will provide partners with the ability to be able to enter into future energy performance contracts, given their skill acquired through the pilot program. Additionally, the program's design and structure of training seeks to develop partnerships and a strong network among participations. This will serve to institutionalize the knowledge and use of the training curriculum in the future

V. SUSTAINABILITY AND REPLICABILITY

169. The project was designed to contribute to improved conditions for further investment in the energy sector and particularly the solar PV sub sector. Given all the legal and regulatory, capacity building and institutional strengthening, RE projects and specifically solar PV projects can be sustained over time within an environment that is amenable to growth

170. The project is supporting the Net Billing pilot project to enable the Office of Utilities Regulation (OUR) to conduct the various assessment and legal reviews so that when it is fully adopted, many more Jamaican can take advantage of the opportunity to invest in grid tie solar PV system, which will the sustainability of the PV market as well as provide return for their investment.

171. The pilot derisking mechanism 'Energy Performance Contract' is aimed at providing a sustainable source of financing that does not require substantial initial cost and stringent financial commitment. It offers a good opportunity for the public sector to enter into energy service contracts with ESCOs without having to provide high upfront investment but can pay for an investment through energy savings. It has excellent potential for scalability to other public sector institutions and replication in the Caribbean region.

172. The Model derisking mechanism 'Energy Performance Contracting' is aimed at providing a sustainable source of financing that does not require substantial initial cost and stringent financial commitment. It offers a good opportunity for developers to enter into energy service contracts with ESCOs without having to provide high upfront cost but can pay for an investment through energy savings.

173. From the supply side, the project will establish the basis for sustainability by developing a cadre of trained technicians to ensure that there is no dearth of technical skills in the country, which would be encouraging for foreign investors who want to enter the market. The market demand will be driven by the awareness programmes and by the success stories from the demonstration of solar PV and SWH on rooftops.

174. The programme includes a series of trainings for key audiences who will successfully support the development of a scaled-up RE and EE market: financiers, installers, building and facility managers and participants in the EPC pilot programme. Participation in the EPC pilot programme, and associated Jamaica's workforce will be strengthened through these trainings, resulting in higher quality delivery of RE/EE services and the potential for Jamaicans to be more competitive service providers in the region.

175. The EPC pilot program includes an intensive training and orientation (i.e. on-boarding) process for all participants in the pilot program. Participants will be provided with the necessary tools and an associated support network to successfully participate in the program. Participation in the program will provide partners with the ability to be able to enter into future energy performance contracts in the future, given their skill acquired through the pilot program. Additionally, the program's design and structure of training seeks to develop partnerships and a strong network among participations. This will serve to institutionalize the knowledge and use of the training curriculum in the future

Replicability

176. The display of solar panels on public hospital in Jamaica will be a source for first-hand experience in the technology. It will help to dispel doubts about renewable energy and its potential or development even at the community and household level. Given the fact that the project would establish many of the prerequisites for an increase in the uptake of RE, public demonstration, especially within the public sector, can have a potential replicating effect.

177. There are several lessons that would learnt from the use of solar photo voltaic technology on targeted public buildings such as hospitals, clinics, etc as well as small scale wind energy in rural locations aimed at reducing the electricity cost and energy efficiency programmes for saving energy. It is expected that other member states of CARICOM that are pursuing similar RET development and EE programmes may find useful lessons from which they can learn from this project. Close monitoring and evaluation of project implementation and results from such activities will also be of interest.

178. Energy Performance Contracting models are new to the Caribbean region but have been widely successfully internationally. Seventy-four percent (74%) of the US EPC market is in the municipal buildings, universities, schools and hospitals and approximately $4-6 billion deals are concluded annually.[34] GEF will be leading in the region by supporting the first successful demonstration of an EPC programme which includes robust skill and capacity building. These efforts make it possible for the programme to run independently in the future, scale to include more health facilities and other public sector buildings, and to be replicated to other jurisdictions in the Caribbean region.

It is anticipated that the UNDP-GEF EPC pilot programme will build demand for participation in the pilot or other similar models within the health sector and the Jamaican public sector (e.g. hospitals, schools, other government buildings with high electricity consumption patterns) in the near term. UNDP's role as a global development leader enables it to draw

34 DBCCA 2012.

from and share the experience of Jamaica with countries in the Caribbean region and beyond who could benefit from similar programmatic support.

VI. PROJECT IMPACT

179. The project will remove a number of barriers to enable wide scale application of selected renewable energy technologies and thereby reduce the incidence of GHG emissions. An increase in the use of renewable technologies will result in the reduction in the amount of fossil fuel that are required to generate electricity and would therefore reduce the amount of carbon emission that would emanate. A cumulative total of 39,344tCO_2 eq. of direct GHG emissions, will be avoided by the solar and energy efficiency measures. This will result in 3583 MWh of electricity saved annually. It is anticipated that with the removal of the barriers identified earlier, that there would be significant environmental benefits arising from the deployment of a greater proportion of renewable energy technologies and implementation of energy efficiency programmes.

180. The success of this project will encourage the development of a strong private sector involvement in Solar PV in Jamaica and thereby stimulate the growth of a sustainable PV market. The project results will also give confidence to the private sector to pursue RE technology and strengthen the resolve for further investments.

181. The project will raise awareness not only at the hospitals also in the private sector where electricity generated from solar PV can be used to power scalable projects for a variety of applications even at the domestic level. This awareness can open possibilities for small business development particularly at the community level using power generated from solar PV at an affordable cost. This of course will assist with poverty eradication.

182. Moreover, the energy sector of Jamaica will be enriched with an increased number of trained personnel in various aspect PV technology. These persons will form part of a data base for employment deployment and will therefore enhance the employment possibilities for disadvantaged groups like women (many of whom are bread winners in the home). Over 50 jobs will be created during project implementation and over 75 are estimated to be created at the end of the project.

183. The Energy Performance Contract (EPC) when fully marketed will result in tremendous post project benefits in terms of level of investment undertaken, jobs created and emissions reduced. It is anticipated that over 2,000 jobs will be created during the first 5 years after the end of project by virtue of a greater uptake of solar PV. See Table 11.

184. The programme includes a series of trainings for key audiences who will successfully support the development of a scaled-up RE and EE market: financiers, installers, building and facility managers and participants in the EPC pilot programme. Jamaica's workforce will be strengthened through these training, resulting in higher quality delivery of RE/EE services and the potential for Jamaicans to be more competitive service providers in the region.

Energy performance contracting has the potential to become the primary vehicle for public sector investments in the government, university, school and health sectors around the

world. Demonstrating its viability in a sub-set of the health sector will serve as a showcase for other public health facilities and publicly owned entities. Additionally, this project will:

- Remove a number of barriers to enable wide scale application of selected renewable energy technologies and thereby reduce the incidence of GHG emissions.
- Build a more robust workforce that is enabled to provide quality RE/EE services in Jamaica and in the region
- Raise awareness not only at the hospitals but also in the private sector about the opportunities of RE and EE investments
- It is estimated that over 50 jobs will be created through this project during implementation.

Table: 10: Project Beneficiary Profile

Socio-economic Groupings	Institutions	Direct Benefits		Estimated No of Beneficiaries
Institutions	hospitals	RE and EE interventions to reduce cost of electricity		5
	Financial institutions	Trained in the fundamentals of RE and EE, risk analysis to provide service to energy sector		50
	Schools	Wind energy demonstration, reduce cost of specific basic operation in schools		2
	Other public sector institutions	Trained technicians in maintenance of RE and EE equipment and systems (solar PV, SWH, etc), employed in the sector		60
Companies	Private Sector RE and &EE Installers, equipment supplier, audit companies, misc. consultants.	Trained and certified technicians in solar PV and SWH system design, installation and maintenance, engaged in ESCO operation		36
Academic	HEART, NCTVET, UTECH	Trained selected student population for the job market and to satisfy other tertiary level requirements		120
Private individuals	Private sector consultants, installers, auditors (see above)	Private employment and engagement in ESCO operation		5 EPC contracts signed implemented
State	Public sector professionals and Indirect beneficiaries are similar to above but vary based on level of direct/indirect involvement	State employed at various public sector institutions		

The table below provide an approximate guide in the calculation of employment requirement in Jamaica for various technology applications.

Table 11: Job Creation from Renewable Energy Facilities in Jamaica

Facility	Capacity	Construction & Installation Jobs	Construction Jobs per MW	O&M Jobs	O&M Jobs per MW
Wigton Phase I (wind)	20.7 MW	70–80	4	4	0.19
Wigton Phase lI (wind)	18 MW			2	0.11
Wigton Overall (wind)	38.7 MW				2
Residential Solar PV	3 kW; installations added on a regular basis	3–5 for installation; 2–3 full-time jobs	-	Self-maintained (systems are leased)	
Waste to Energy	21 MW	200	9.52	100	4.76

Source: *Jamaica Sustainable Energy Roadmap Pathways to an Affordable, Reliable, Low-Emission Electricity System, 2013*

185. It is anticipated that the interaction between financial institution and project developers will be more amenable from the point of view that financial institutions will display a greater level of understanding of the issues surrounding RE investment and risk for RE projects and will therefore be more supportive.

VII. PROJECT RESULTS FRAMEWORK

1. Helping countries to achieve the simultaneous eradication of poverty and significant reduction of inequalities and exclusion **2. Growth and development are inclusive and sustainable, incorporating productive capacities that create employment and livelihoods for the poor and excluded;** **3. Countries have strengthened institutions to progressively deliver universal access to basic services**					
Applicable GEF Strategic Outcome: Growth and development are inclusive and sustainable incorporating productive capacities that create employment for the poor and excluded.					
Applicable GEF Expected Outcomes: (i) Scaled up action on climate change adaptation and mitigation across sectors which is funded and implemented (ii) Inclusive and sustainable solutions adopted to achieve increased energy efficiency and universal modern energy access (especially off-grid sources of renewable energy)					
Applicable GEF Outcome Indicators: (i) Coverage of cost-efficient and sustainable energy, disaggregated by energy source and beneficiary, sex, rural/urban and excluded groups (ii) Extent of change in: a) energy efficiency, and/or b) modern energy coverage by users and specific sectors					
	Strategic Development Indicator	**Baseline**	**Targets End of Project**	**Source of verification**	**Assumptions**
Project Objective: [35] To advance a low carbon development path and reduce Jamaica's public sector energy bill through the introduction of renewable energy (RE) and improvement in energy efficiency (EE) in the health sector.	▪ Cumulative amount of reduced/avoided CO_2 emissions as a direct and indirect result of the investments, financed by the project	▪ 20.7 tonnes of CO2 reduced/avoided annually	Lifetime Direct: 39,344 cumulative tonnes of CO2eq reduced/avoided (Indirect Bottoms up and Top Down: 33,838 tCO_2 and 718,400 tCO_2 respectively).[36] Approximate Total energy produced annually : 3,583 (MWh)	▪ Project final report as well as annual report on energy consumption & reductions for each RE project. ▪ Annual report on hospital energy consumption and expenditure on electricity	▪ The country continues to experience economic growth Government is committed to supporting RE development in Jamaica. ▪ RE systems are in place and are functioning effectively.

[35] *Objective (Atlas output) monitored quarterly ERBM and annually in APR/PIR*

[36] GEF STP methodology suggests that The difference between the direct emissions during the projects implementation and the baseline emissions equals the direct emission reductions of the project. Therefore approximately a further 310.5 tC02 eq could be deducted from this value. See: P 9, 16B, http://www.thegef.org/gef/sites/thegef.org/files/documents/C.33.Inf_.18%20Climate%20Manual.pdf

Outcome 1 Increased knowledge in RE and EE for Individuals in the public sector and strong institutional capacity to support RE and EE development in Jamaica's public sector.	• Number of technicians from the health sector and the private sector with improved capacity to assemble, install, maintain and retrofit RE and EE systems and programmes in Jamaica by the end of project. • Number of persons employed in the RE and EE sector.	No formally trained technicians in the health sector to support solar PV	At least 5 trained technicians (35% women)75 persons employed (35% women)	• Gender disaggregated database on trained and certified technicians eligible to provide a range of RE and EE related services.	• Certified training programmes for technicians are recognized, well-funded and supported. • Capacity of government does not substantially delay approval of RE policies and RE projects.
	• Number of operatives from the health sector trained on RE and EE to enable them to function effectively	No health sector operatives with formal knowledge in RE and EE.	At least 40	• Database on trained and certified operatives	• Funding for training of operatives within the health sector are provided by the government, private sector and regional and international partners.
	• Number of persons (almost 40% of women) from financial institutions trained on the fundamentals (by evidence of those who have completed training and received certificates) of RE technology, EE programs, risk assessment, project development, implementation and evaluation	No persons from financial institutions trained	40 persons	• Annual report from financial institutions • Report on training activity • Database on trained financial personnel (as above)	•Financial institutions have demonstrated commitment to building the relevant capacity in supporting RE and EE.
Outcome 2: A supportive legal and regulatory framework to facilitate the deployment of small decentralised RE power generation (notably solar PV) and EE programmes in Jamaica's public sector	• Amount of electricity drawn from the national grid for hospital with on-grid rooftop solar-PV panels financed by the GEF funds	30 GWh/yr of electricity drawn from the national grid annually to service hospitals	0.0018 GWh of electricity drawn annually from grid tie PV system by the end of project	• Annual report on hospital energy consumption and expenditure on electricity	The proposed legal and regulatory improvements passing through the Government approval process without delays.

Outcome 3: An operational Energy Performance Contracting mechanism to facilitates ECSOs in their investments portfolio towards the scale up RE and EE in the public and private sector of Jamaica	• Pilot Energy Performance Contract established • No of contracts signed	Limited EPC/ESCO resources available to date aside for Model EPC contract prepared by JPC and ESCO gap analysis No active Energy Performance Contracts in place in Jamaica Zero companies operating as "true" ESCOs (see paragraph 48 for ESCO definition)	Establishment of resources to enable Energy Performance Contracting (e.g. contracting guidance documents) 5 Energy Performance Contracts signed during project implementation. PCJ, a major player in the energy sector, to develop "true" ESCO capabilities	• Executed EPC contracts • PCJ Annual Reports • RE/EE market reports & communications (e.g. from the Jamaican Renewable Energy Association)	• Successful EPC contract execution
	• Annual investment in RE and EE programmes	Approximately US240,000 investments annually in solar pv technology (and EE systems) to date in Jamaica	10%-15 % increase in solar PV systems and EE programmes[37] Greater public and private sector participation in the DBJ energy audit grant program	• Result of market survey on RE and EE in Jamaica • Record of performance Contracts processed ➢ • Financial institutions' annual Financial Report.	Adequate market size to support the supply-side of the RE and EE market. DBJ committed to sustained financing for RE and EE projects

37 Quality control criteria are built into contracts.

			DBJ disbursement of more than $6 million annually due to increased demand for RE/EE investments	• DBJ reporting of energy audit grant disbursement	

VIII. TOTAL BUDGET AND WORK PLAN

Award ID:	**00087974**	Project ID(s):	**00094832**
Award Title:		Deployment of RE and Improvement of EE in the Public Sector	
Business Unit:		JAM 10	
Project Title:		Deployment of RE and Improvement of EE in the Public Sector	
PIMS no.		4900	
Implementing Partner (Executing Agency)		United Nations Development Programme	

GEF Outcome/Atlas Activity	Responsible Party/ Implementing Agent	Fund ID	Donor Name	Atlas Budgetary Account Code	ATLAS Budget Description	Amount (USD) Year 1 2015	Amount (USD) Year 2 2016	Amount (USD) Year 3 2017	Amount (USD) Year 4 2018	Total (USD)	Notes
Outcome 1 Increased knowledge in RE and EE for Individuals in the public sector and strong institutional capacity to support RE and EE development in Jamaica's public sector	UNDP	**62000**	GEF	71300	Local Consultants	5,000	16,250	16,250	7,500	45,000	1
				72100	Contractual Services	10,000	57,648			65,387	2
				72100	Contractual Services	10,000	35,000			45,000	3
				75700	Training & Workshops		15,000			15,000	4
				72210	Machinery & Equipment		50,000			50,000	5
				71600	Travel		1,000	1,500		2,500	6
					Miscellaneous	261	1,000	1,000		3,000	7
					Total GEF Outcome 1	**25,261**	**173,637**	**18,750**	**7,500**	**225,148**	
					Total Outcome 1	**25,261**	**173,637**	**18,750**	**7,500**	**225,148**	
Outcome 2: A supportive legal and regulatory framework to facilitate the deployment of small decentralised RE power generation and EE programmes in Jamaica's public sector	UNDP	**62000**	GEF	71200	International Consultants						
				71300	Local Consultants	5,000	16,250	16,250	7,500	70,600	8
				72100	Contractual Services	10,000	43,000	25,000		78,000	9
				75700	Training Workshops		3,000			3,000	10
					Total GEF Outcome 2	**15,000**	**62,250**	**41,250**	**7,500**	**126,000**	
					Total Outcome 2	**15,000**	**62,250**	**41,250**	**7,500**	**126,000**	
Outcome 3:	PCJ/UNDP	**62000**	GEF	71200	International Consultants		20,000	25,000		45,000	11

An operational Energy Performance Contracting mechanism to facilitates ECSOs in their investments portfolio towards the scale up RE and EE in the public and private sector of Jamaica				71300	Local Consultants	6,000	19,500	35,750	16,500	77,750	12
				72300	Materials and Goods		400,000	250,000		650,000	13
				75700	Training Workshop		5,000			5,000	14
					Travel		5,000	5,000	2,000	12,000	15
					Total GEF Outcome 3	**6,000**	**449,500**	**315,750**	**18,500**	**789,750**	
					Total Outcome 3	**6,000**	**449,500**	**315,750**	**18,500**	**789,750**	
PROJECT MANAGEMENT (including Project Officer)	UNDP	**62000**	GEF	71200	International Consultants	0	0	0	5000	5000	16
				71300	Local Consultants and Local Staff	10,000	32,500	16,250	7,500	64,750	17
				75700	Training and Workshops	5,000					18
				72200	Equipment			5,000		5,000	19
				72400	Communications	600	500	900		2,000	20
				72500	Office Supplies	4,000	850	5,150		10,000	21
				74100	Audit			15,000		15,000	22
					Miscellaneous	739	2,000	1,000	2,100	4,400	23
					Total GEF Project Management	**20,339**	**35,850**	**43,300**	**14,600**	**114,089**	
					Total Project Management	**20,339**	**35,850**	**43,300**	**14,600**	**114,089**	
	GEF Total					**66,600**	**721,237**	**419,050**	**48,100**	**1,254,987**	

Budget Notes:

1. These costs include professional time for the (NPM, full time @USD 1,000/week for a total of 36 weeks Finance and Admin Assistant, part time @USD 500/week for 18 weeks).
2. Cost to specialized training services for the delivery of specialized training for system installers, public sector engineers, and the banking community; and development of curriculum for special programme for building inspectors, local government officers, NEPA representatives (Output 1.1, Output 1.2)
3. Training and awareness workshops for senior management and maintenance staff of hospitals, NGOs/CBOSs (GEF SGP) and other public sector institutions (Output 1.3)
4. Venue and refreshments for training and workshops (Outcome 1) USD3000 per workshop
5. For upgrade of facilities at the Bureau of Standards with the relevant systems and equipment to support the up-take of RE and EE.
6. Travel for National Project Manager
7. Miscellaneous costs for bank charges, insurance etc.
8. This cost includes professional time for the ((NPM @USD 1,000/week for a total of 36 weeks, ; Finance and Admin Assistant @USD 500/week for 18 weeks
9. This includes contractual fees for the legal and regulatory activities related to Outcome 2
10. Consultations sessions/workshops for review of codified system framework and ESCO industry legal and regulatory activities
11. This includes professional fees for international consultant related to providing expertise for EPC.
12. This includes professional fees for the ((NPM @USD 1,000/week for a total of 19 weeks and the Project Officer (PO), part time @USD 750/week for a total of 71 weeks;; Finance and Admin Assistant @USD 500/week for 9.5 weeks)
13. This constitutes investment funds vis a vis cost for professional services for (i) the purchase and installation of solar-PV panels and accessories, (ii) the purchase and installation of solar water heating systems and (iii) energy retrofits as detailed under Output 3.2 for the 5 hospitals.
14. For orientation and training relating to the roll-out of Energy Performance Contract Model
15. Travel for Project Officer
16. Professional fees for Mid-term and terminal evaluation (Int'l consult. USD @ 4,000/wk for 2wks.)
17. These are fees for the time that would be expended by the PMU on the project allocated as follows: NPM @USD 1,000/week for a total of 66 weeks; Finance and Admin Assistant @USD 500/week for 26.5 weeks
18. Inception Workshop

19-21 Office costs

22. Audit cost
23. These are for unforeseen cost such as bank charges on foreign exchange, etc.

Table12: Summary of Funds

Projects Co-financing	Year 1	Year 2	Year 3	Year 4	Total
PCJ (cash)- Letter expected		$ 680,620	$ 680,620		$ 1361,240
GEF SGP (associated)		$ 104,433	$ 104,433	$ 104,434	$ 313,300
Jamaica Productivity Centre (in-kind)		$ 120,000			$ 120,000
UNDP(cash)		$ 30,000			$ 30,000
Ministry of Health (in kind)		$ 21,600	$ 21,600	$ 21,800	$ 65,000
Development Bank of Jamaica (cash)		$ 163,690	$ 163,690	$ 163,690	$ 491,071
Development Bank of Jamaica (in parallel)*		$ 2789,381	$ 2789,381	$ 2789,381	$ 8368,143
TOTAL	**$ -**	**$ 3909,724**	**$ 3759,724**	**$ 3079,305**	**$ 10748,754**

* Assumes an additional USD$2,789,381 per annum from the DBJ based on a conservative allocation of DBJ financing to private sector investors implementing sustainable Energy Projects countrywide

IX. MANAGEMENT ARRANGEMENTS

Project Organization Structure

186. The project will be executed according to UNDP's Direct Implementation Modality (DIM), as per the DIM project management implementation guidelines agreed by UNDP and the Government of Jamaica. The UNDP will therefore also act as the *GEF Implementing Agency* and PCJ (proposed) will act a responsible party for Outcome 3. Under the DIM procedures, UNDP will be also responsible for (i) providing project assurance services (ii) the recruitment of project staff; (iii) overseeing financial expenditures against project budgets approved by Project Board; (iv) appointment of independent financial auditors; and (iv) ensuring that all activities including procurement and financial services are carried out in strict compliance with UNDP/GEF procedures.

187. The Government of Jamaica will provide in-kind support through the provision and Chairing of a Project Board, the use of a Project office, use of office equipment, facilities for meetings and the provision of a vehicle for transporting staff where this is appropriate and within scope of GoJ in-kind contribution.

188. UNDP will have overall management responsibility for Outcomes 1, 2 and 3 of the Project and PCJ will assume the responsibility for managing the implementation Outcome 3. The Project Management Unit (PMU) will consist of a National Project Manager (NPM), a Finance and Administrative Assistance (FAA), and a Project Officer to be housed at PCJ for oversee the implementation of Outcome 3. The organization structure of the Project is depicted on Figure 5. The Terms of Reference (ToRs) of PMU personnel are provided in Annex VI.

189. **Project Board** is responsible for making management decisions for the project particularly when guidance is required by the Project Manager. The Project Board plays a critical role in project oversightand quality assurance. It ensures that required resources are committed and arbitrates on any conflicts within the project or negotiates a solution to issues raised to the Board by the Project Manager. Based on the approved Annual Work Plan, the Project Board can also consider and approve the quarterly plans (if applicable) and also approve any essential deviations from the original plans.

190. In order to ensure UNDP's ultimate accountability for the project results, Project Board decisions will be made in accordance to standards that shall ensure management for development results, best value money, fairness, integrity, transparency and effective international competition. In case consensus cannot be reached within the Board, the final decision shall rest with the UNDP Project/ProgrammeManager.

The Board will perform the folowing roles:

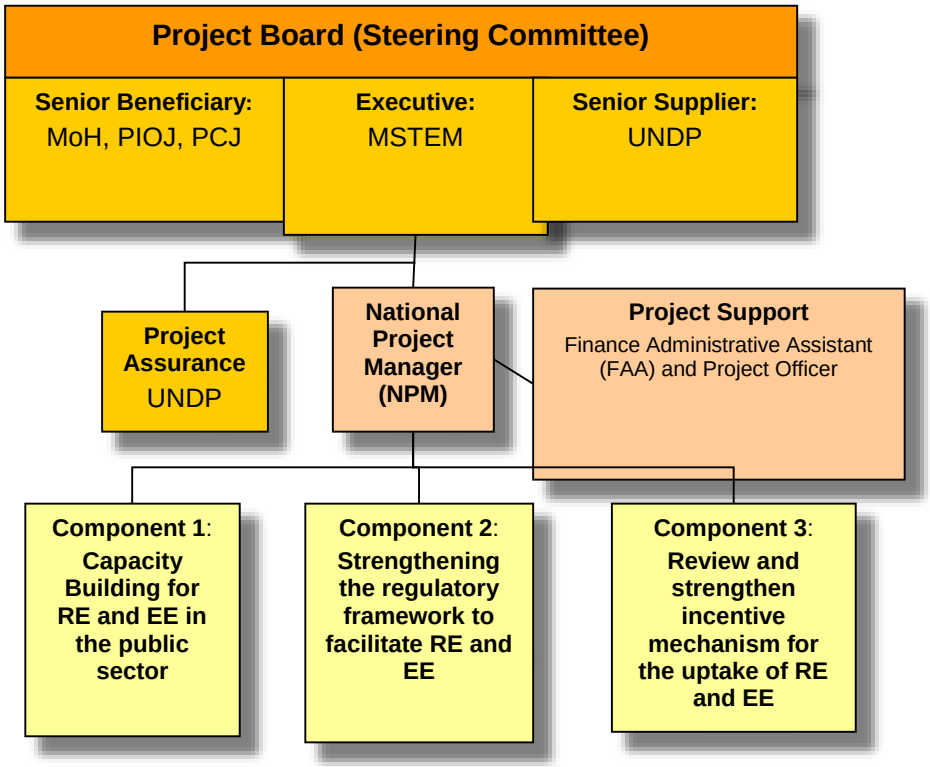
i. **An Executive**: individual representing the project ownership to chair the group.
   e.g. Representative of the Government Cooperating Agency or UNDP
ii. **Senior Supplier**: individual or group representing the interests of the parties concerned which provide funding for specific cost sharing projects and/or technical expertise to the project. The Senior Supplier's primary function within the Board is to provide guidance regarding the technical feasibility of the project.

e.g. Representative of the Implementing Partner and/or UNDP

iii. **Senior Beneficiary**: individual or group of individuals representing the interests of those who will ultimately benefit from 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.
e.g. Representative of the Government or Civil Society and representative of women's organization.

iv. The **Project Assurance's** role is to supports the Project Board Executive by carrying out objective and independent project oversight and monitoring functions. The Project Manager and Project Assurance roles should never be held by the same individual for the same project.
e.g. A UNDP Staff member typically holds the Project Assurance role.]

Figure 5: Project Organization Structure



191. The NPM will be responsible for the overall guidance of all components of the management of the project, including adherence to the Annual Work Plan (AWP) and achievement of planned results as outlined in the ProDoc, and for the use of UNDP funds through effective management and well established project review and oversight mechanisms.

192. The NPM also will ensure that there is adequate coordination with various Ministries and agencies and to provide guidance to the Project team. It will interface with the UNDP country office, review reports and manage administrative arrangements as required by the GoJ and

UNDP. This would include the contribution of office space within the premises of the PCJ to personnel in the Project Management Unit (PMU).

193. This Project has been designed as a benchmark project that will lead in the efforts of Jamaica efforts to promote the development of renewable energy. As such, the NPM in close collaboration with the Project's NPM will implement the activities of this Project towards the achievement if its objectives of catalyzing RE development in Jamaica. This will include outsourcing of technical services such as RE resource availability studies, specialized training and bankable RE feasibility studies that may include a report on setting up the rooftop solar PV program for private property owners.

194. UNDP will provide overall management and guidance from its Country Office (CO) in Jamaica and the Latin America Caribbean Regional Centre (LAC) in Panama City, and will be responsible for monitoring and evaluation of the project as per normal GEF and UNDP requirements. The PMU will manage the day-to-day activities of the Project under the guidance of the NPM. The PMU will have one full-time staff, the National Project Manager, and two part-time staff, Project Officer and a Finance and Administrative Assistant. Terms of reference (ToRs) for these PMU staff are contained in Annex Vl.

195. **Audit**: The project will be audited in accordance with the UNDP Financial Regulations and Rules and applicable audit policies

General

Collaborative Arrangements with Related Projects

196. The proposed Project will have collaborative arrangements with a number of other donor initiatives that support renewable energy the Caribbean, described as follows:

197. SIDS-DOCK Initiative provides a mechanism to help small islands developing states (SIDS) transform their energy sector, and to facilitate the sharing of experiences, pursuing of mutual goals, and sharing resources across regions and small island nations that remain dependent on imported fuels. SIDS DOCK has been developed to be the institutional mechanism that will support transformation of their energy sectors. The mechanism is a "DOCKing station," to connect the energy sector in SIDS with the global market for finance, sustainable energy technologies and with the European Union (EU) and the United States (US) carbon markets, and able to trade the avoided carbon emissions in those markets. Jamaica is eligible to grants as a SIDS DOCK member, and the project will engage the partners of the SIDS DOCK Caribbean Energy Efficiency Lighting proposal under formulation and start-up implementation in the second quarter of 2014.

198. GEF/UNEP's Promoting Energy Efficiency and Renewable Energy in Buildings in Jamaica. This project does not target the health sector, but intends to raise capacity for and interest in energy efficiency in public buildings leading to substantial uptake in the government sector.

199. The Renewable Energy and Energy Efficiency Technical Assistance (REETA) project is a four year project designed to support the institutional structure for the promotion of Renewable energies (RE) and Energy Efficiency (EE) in the Caribbean. The project is funded by the Government of Germany supported by the Energy Unit of the CARICOM Secretariat (CCS). The project will focus on regional institutional support for capacity building and private sector

cooperation. It is expected to build on the achievements of the Caribbean Renewable Energy Development Programme (CREDP), but will have a stronger focus on capacity development, energy efficiency and energy consumer needs.

200. This proposed Project will establish the necessary communication and coordination mechanisms through its PMU and PSC with the Project Management Board to ensure proper coordination between the various projects. UNDP office in Jamaica will also take the lead in ensuring adequate coordination and exchange of experiences. The Project will seek to coordinate its actions with other UNDP energy and climate change activities in the region; similar strategies of the proposed Project may extend an opportunity to share lessons and identify synergies, in particular in areas of harmonization and mutual recognition. The proposed Project will also seek to coordinate actions with other existing government and non-government initiatives and commitments.

201. The project is part of SIDS DOCK support programme project pipeline which will seek to catalyse the transition the transition to low carbon economies and sustainable energy through the provision of energy efficient (EE) lighting to communities in the Eastern Caribbean (SIDS DOCK Member countries). The project will help countries remove the policy, capacity and investment barriers to energy efficient (EE) lighting.

202. Jamaica Public Service Smart Energy Programme 2012. This project has the following components:

- Office energy efficiency programme
- Energy audit certification seminar
- Stakeholder education meetings
- Business customer energy management training programme

203. Public Sector Energy Conservation Project 2012–2015. Some J$396 million, allocated in the 2012/13 estimates of expenditure, is being spent on the Public Sector Energy Efficiency and Conservation programme, which was launched in May 2012. It is being funded by the Government of Jamaica and the Inter-American Development Bank (IDB) and is expected to conclude in December 2015. This project has a goal of 30% energy cost saving in the public sector through energy conservation through mainly retrofits. This GEF project will build on and complement this GOJ/IDB project. Project implementation funds will prioritize local companies; local bidders will win contracts if they are within 15% of foreign bids

204. Energy Efficiency and Conservation Programme is a 20 year project which was launched in 2012. It was initiated through an IDB loan of USD 20 million. The project is being executed by the Ministry of Science and Technology Energy and Mining (MSTEM). The objective of this Programme is to enhance Jamaica's energy efficiency and conservation potential through the design and implementation of cost savings Energy Efficiency (EE) and Energy Conservation (EC) measures in the public sector. The Program will: (i) strengthen the institutional capacity of the MEM for implementing EE and EC measures; (ii) invest in EE and EC measures in the public sector; and (iii) increase awareness and knowledge among key public and private stakeholders, together with demand-side management support. As a result of the IDB's intervention in the energy sector, it is envisioned that Greenhouse Gas (GHG) emissions will also be also be correspondingly reduced.

205. **Co-financing details are provided on Table 14 below.**

X. MONITORING FRAMEWORK AND EVALUATION

206. The project team and the UNDP Office in Jamaica supported by the UNDP-GEF Regional Coordination Unit in Panama City will be responsible for project monitoring an evaluation conducted in accordance with established UNDP and GEF procedures. The Project Results Framework provides performance and impact indicators for project implementation along with their corresponding means of verification. The GEF CC Tracking Tool will also be used to monitor progress in reducing GHG emissions. The M&E plan includes: inception workshop and report, project implementation reviews, quarterly and annual review reports and independent final evaluation. The following sections outline the principle components of the Monitoring and Evaluation Plan and indicative cost estimates related to M&E activities. The M&E budget is provided on Table 13.

207. *Project start*: A Project Inception Workshop will be held within the first 4 months of the project starting with those with assigned roles in the project organization structure, UNDP country office and where appropriate/feasible regional technical policy and program advisors as well as other stakeholders will be invited. The Inception Workshop is crucial to building ownership for the project results and to plan the first year annual work plan. The Inception Workshop would address a number of key issues including:

a) Assisting all partners to fully understand and take ownership of the project;
   Detailing the roles, support services and complementary responsibilities of UNDP CO and RCU staff vis-à-vis the project team;
b) Discussing the roles, functions, and responsibilities within the Project's decision-making structure including reporting and communication lines, and conflict resolution mechanisms. The Terms of Reference of project staff will be discussed again as required;
   Finalization of the first annual work plan based on the project results framework and the relevant GEF Tracking Tool if appropriate. A review and agreement on the indicators, targets and their means of verification will be required as well as a re-check of assumptions and risks;
c) Providing a detailed overview and reach consensus on reporting, monitoring and evaluation (M&E) requirements, the M&E work plan and budget;

Table 13: M&E Work Plan and Budget

Type of M&E activity	Responsible Parties	Budget US$ *Excluding project team staff time*	Time Frame
Inception Workshop and Report	▪ Project Manager ▪ UNDP CO, UNDP GEF	Indicative cost: 5,000	Within first four months of project start up
Measurement of Means of Verification of project results.	▪ UNDP GEF RTA/Project Manager will oversee the hiring of specific studies and institutions, and delegate responsibilities to relevant team members.	***To be finalized in Inception Phase and Workshop.***	Start, mid and end of project (during evaluation cycle) and annually when required.
Measurement of Means of Verification for Project Progress on *output and implementation*	▪ Oversight by CTA with support from the Project Manager ▪ Project team	***To be determined as part of the Annual Work Plan's preparation.***	Annually prior to ARR/PIR and to the definition of annual work plans
ARR/PIR	▪ Project manager and team ▪ UNDP CO ▪ UNDP RTA ▪ UNDP EEG	***None***	Annually by September
Project Board Meetings	Project Manager	***To be determined as part of the Annual Work Plan's preparation.*** ***Indicative cost:***	Following IW and annually thereafter.
Mid-term Review	▪ Project manager and team ▪ UNDP CO ▪ UNDP RCU ▪ External Consultants (i.e. evaluation team)	None	.
Periodic status/ progress reports	2. Project manager and team	None	Quarterly
Terminal Evaluation	1. Project manager and team, 2. UNDP CO 3. UNDP RCU 4. External Consultants (i.e. evaluation team)	Indicative cost : 5,000	At least three months before the end of project implementation
Audit	1. UNDP CO 2. Project manager and team	Indicative cost: 14,000(7000 x 2 years)	Yearly
Visits to field sites	• UNDP CO • UNDP RCU (as appropriate) • Government representatives	For GEF supported projects, paid from IA fees and operational budget	Yearly
Dissemination of lessons learnt	• Project Manager and team • Local consultant	None	At least three months before the end of the project
TOTAL indicative COST Excluding project team staff time and UNDP staff and travel expenses		Total: 24,000 approx. (GEF funded, not including co-financing resources)	

d) Discussion of financial reporting procedures and obligations, and arrangements for annual audit;
e) Planning and scheduling Project Board meetings;

f) Clarification of roles and responsibilities of all project organisation structures as well as planned dates of meetings where the first PSC meeting should be held within the first 12 months following the inception workshop.

208. ***An Inception Workshop Report*** **is a key reference document and must be prepared and shared with participants to formalize various agreements and plans decided during the meeting.**

209. ***Quarterly Progress Report*****: Contents of the QPR include:**

- Progress made as reported in the Standard Progress Report and monitored in the UNDP Enhanced Results Based Management Platform;
- Based on the initial risk analysis submitted, the risk log shall be regularly updated in ATLAS (if applicable otherwise outside ATLAS). Risks become critical when the impact and probability are high;
- Project Progress Reports as generated in the Executive Snapshot and based on the information recorded in Atlas;
- Other ATLAS logs that are used to monitor issues and lessons learned. The use of these functions is a key indicator in the UNDP Executive Balanced Scorecard.

210. ***Annual Project Review /Project Implementation Reports (APR/PIR)*****: APRs/PIRs are key reports prepared to monitor progress since project start and in particular for the previous reporting period (30 June to 1 July). The APR/PIR combines both UNDP and GEF reporting requirements, and includes, but is not limited to, reporting on the following:**

- Progress made toward project objective and project outcomes, each with indicators, baseline data and end-of-project targets (cumulative);
- Project outputs delivered per project outcome (annual);
- Lesson learned/good practice;
- AWP and other expenditure reports;
- Risk and adaptive management;
- ATLAS QPR;
- Portfolio level indicators (i.e. GEF focal area tracking tools) that are used by most focal areas on an annual basis.

211. *Periodic Monitoring through site visits*: UNDP CO and the UNDP RCU staff will conduct visits to project sites based on the agreed schedule in the project's Inception Report/Annual Work Plan to assess first hand project progress. Other members of the Project Board may also join these visits. A Field Visit Report/BTOR will be prepared by the CO and UNDP RCU and will be circulated no less than one month after the visit to the project team and Project Board members.

212. *End of Project*: An independent Final/Terminal Evaluation will take place three months prior to the final Project Board meeting and will be undertaken in accordance with UNDP and GEF guidance. The final evaluation will focus on the delivery of the project's results as initially planned (and as corrected after the mid-term evaluation, if any such correction took place). The final evaluation will look at impact and sustainability of results, including the contribution to capacity development and the achievement of global environmental benefits/goals. The Terms of Reference for this evaluation will be prepared by the UNDP CO based on guidance from the Regional Coordinating Unit and UNDP-GEF.

213. *The terminal Evaluation* should also provide recommendations for follow-up activities and requires a management response which should be uploaded to PIMS and to the UNDP Evaluation Office Evaluation Resource Centre. The relevant GEF Focal Area Tracking Tools will also be completed during the final evaluation. During the last three months, the project team will prepare the Project Terminal Report. This comprehensive report will summarize the results achieved (objectives, outcomes, outputs), lessons learned, problems met and areas where results may not have been achieved. It will also lay out recommendations for any further steps that may need to be taken to ensure sustainability and replicability of the project's results.

214. *Learning and knowledge sharing*: Results from the project will be disseminated within and beyond the Project intervention zone through a number of existing information sharing networks and forums. In addition:

a) The Project will participate, as relevant and appropriate, UNDP/GEF sponsored networks, organized for senior personnel working on projects that share common characteristics;

b) The project will identify and participate, as relevant and appropriate, in scientific, policy-based and/or any other networks, which may be of benefit to project implementation though lessons learned.

215. The project will identify, analyse, and share lessons learned that might be beneficial in the design and implementation of similar future projects. Identifying and analysing lessons learned is an on-going process and the need to communicate such lessons as one of the project's central contributions is a requirement to be delivered not less frequently than once every 12 months. UNDP/GEF shall provide a format and assist the project team in categorizing, documenting and reporting the lessons learned. To this end a percentage of project resources will also need to be allocated for these activities.

XI. COMMUNICATIONS AND VISIBILITY REQUIREMENTS

Full compliance is required with UNDP's Branding Guidelines. These can be accessed at http://intra.undp.org/coa/branding.shtml, and specific guidelines on UNDP logo use can be accessed at: http://intra.undp.org/branding/useOfLogo.html. Amongst other things, these guidelines describe when and how the UNDP logo needs to be used, as well as how the logos of donors to UNDP projects needs to be used. For the avoidance of any doubt, when logo use is required, the UNDP logo needs to be used alongside the GEF logo. The GEF logo can be accessed at: www.thegef.org/gef/GEF_logo. The UNDP logo can be accessed at http://intra.undp.org/coa/branding.shtml.

Full compliance is also required with the GEF's Communication and Visibility Guidelines (the "GEF Guidelines"). The GEF Guidelines can be accessed at: www.thegef.org/gef/sites/thegef.org/files/documents/C.40.08_Branding_the_GEF%20final_0.pdf. Amongst other things, the GEF Guidelines describe when and how the GEF logo needs to be used in project publications, vehicles, supplies and other project equipment. The GEF Guidelines also describe other GEF promotional requirements regarding press releases, press conferences, press visits, visits by Government officials, productions and other promotional items.

Where other agencies and project partners have provided support through co-financing, their branding policies and requirements should be similarly applied.

Agreement on Intellectual Property Rights and Use of Logo on Project Deliverables

139. To accord proper acknowledgement to GEF for providing funding, a GEF logo should appear on all relevant GEF-supported project publications, including among others, project hardware, if any, purchased with GEF funds. Any citation on publications regarding projects funded by GEF should also accord proper acknowledgement to GEF. Alongside GEF and UNDP logo, a GoJ logo may also be featured as the Implementing Partner of the proposed project.

Legal Context

216. This Project Document shall be the instrument referred to as such in Article I of the Standard Basic Assistance Agreement (SBAA), the Government of Jamaica and the United Nations Development Program, signed by the parties on 17 November 1993. The host country-implementing agency shall, for the purpose of the SBAA, refer to the government co-operating agency described in that Agreement.

217. Consistent with the Article III of the SBAA, the responsibility for the safety and security of the implementing partner and its personnel and property, and of UNDP's property in the implementing partner's custody, rests with the implementing partner.

•

218. **The implementing partner shall:**

•

a. Put in place an appropriate security plan and maintain the security plan, taking into account the security situation in the country where the project is being carried;

b. Assume all risks and liabilities related to the implementing partner's security, and the full implementation of the security plan.

219. UNDP reserves the right to verify whether such a plan is in place, and to suggest modifications to the plan when necessary. Failure to maintain and implement an appropriate security plan as required hereunder shall be deemed a breach of this agreement.

220. The implementing partner agrees to undertake all reasonable efforts to ensure that none of the UNDP funds received pursuant to the Project Document are used to provide support to individuals or entities associated with terrorism and that the recipients of any amounts provided by UNDP hereunder do not appear on the list maintained by the Security Council Committee established pursuant to resolution 1267 (1999). The list can be accessed via: http://www.un.org/Docs/sc/committees/1267/1267ListEng.htm. This provision must be included in all sub-contracts or sub-agreements entered into under this Project Document.

XII. ANNEXES

Annex I: Risk Analysis

OFFLINE RISK LOG

Project Title: Deployment of Renewable Energy and Improvement of Energy Efficiency in the Public Sector	**Project ID: 4900**	**Date:**

#	Description	Date Identified	Type	Impact & Probability	Countermeasures / Management Response	Owner	Submitted, updated by	Last Update	Status (compared with previous evaluation)
1	Lack of communication, and to some extent coordination amongst various stakeholders implementing similar projects Jamaica		Operational	P = 2 I = 2	The project will ensure the coordination and integration of activities in support of energy and climate change objectives, in line with Jamaica's National Energy Policy 2009-2030. It will be implemented using the DIM modality with the UNDP as the main implementing agency and the PCJ the implementing agency for Component 3 with guidance from MWLECC (climate change policy oversight). These three institutions are tasked to engage other beneficiary Ministries and public entities. There will be a strong communication network among similar projects being implemented in Jamaica in order to build synergy and avoid duplication.	Project Manager	Submitted by Project Proponent, updated by Project Manager		
2	Delays in technical components of the project due to lack of relevant capacity in the sector		Technical	P = 3 I = 4	The Project is designed to build capacity at the technical level to strengthen the RE sector in Jamaica by providing trained personnel that can assemble, install and maintain solar PV solar water heating and retrofit EE systems. The project will build the necessary awareness and provide relevant training for selected personnel from the financial sector	Project Manager	Submitted by Project Proponent, updated by Project Manager		

#	Description	Date Identified	Type	Impact & Probability	Countermeasures / Management Response	Owner	Submitted, updated by	Last Update	Status (compared with previous evaluation)
					and the ESCO industry who will be implementing the EPC.				
3	The uptake of RE project remains low notwithstanding the availability of grant funding investments for EE and soft loans provided by the DBJ		Financial	P = 3 I = 5	Implementation of a financial de-risking mechanism to minimised and manage risks associated with RE projects particularly solar PV and solar water heating projects. This will be designed to be a pilot project which will be monitored over the life of the project. This mechanism is intended to build confidence among project developers and catalyse the uptake of RE in Jamaica.	Project Manager	Submitted by Project Proponent, updated by Project Manager		
4	The inability of the government to broaden existing fiscal and financial incentives or to approve new incentives because of its IMF commitments.		Political	P = 3 I = 3	This project will support the government's agenda to promote access to cleaner energy sources. As a consequence of the high electricity tariffs, and the costs to Jamaica's public sector (particularly the health sector), intervention in solar PV, solar water heating will redound to tremendous savings for the government.	Project Manager	Submitted by Project Proponent, updated by Project Manager		

Submitted by Project Manager _____ Approved by UNDP Programme Analyst _____

ANNEX II: DETAILED CO2 CALCULATIONS AND ASSUMPTIONS

A. Baseline GHG Emissions from Jamaica

Table II-1: Emission Reductions from Solar PV Demonstration Project

ANNEX II: DETAILED CO2 CALCULATIONS AND ASSUMPTIONS

A. Baseline GHG Emissions from Jamaica

Table II-1: Emission Reductions from Solar PV Demonstration Project

Capacity Factor	18.8%													
Emissions Factor (tCO2e/MWh)	0.732													
			<<GEF Project Period>>											
		Project Total	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
Cumulative Installed kW		300	50	150	300	300	300	300	300	300	300	300	300	300
Annual Energy Production (MWh)		5256	82.1	246.4	492.8	492.8	492.8	492.8	492.8	492.8	492.8	492.8	492.8	492.8
Emissions Reduced (tCO2e)		3847	60.1	180.3	360.7	360.7	360.7	360.7	360.7	360.7	360.7	360.7	360.7	360.7

Deployment of Renewable Energy and Improvement of Energy Efficiency in the Public Sector in Jamaica

Activities contributing to direct emissions reduction will automatically be copied into the table opposite from the cover page

	Activities Contributing to Direct Emissions Reductions
1)	Training for technicians in RE (system designers, installers, etc) particularly solar pv to support RE scale up.

2)	Awareness raising programmes for the maintenance staff at selected hospitals.
3)	Training for selected staff at banking institutions in the fundamentals on of RE, risk assessment and management for RE projects, project development, etc.
##	
4	

Step 4	Determine the Baseline

Enter Description of the Project Baseline
Use of fossil fuels for generation of energy for electricity and power generation

Step 5	Determine the GEF Alternative

Enter Description of the GEF Alternative Scenario
Pilot installation of EE products and RE technologies in public buildings and public areas that will demonstrate the feasibility of generating GHG reductions in Jamaica

			Data Required:
Step 6	Enter the **annual quantity** of electricity generated by low GHG technologies in stalled, or energy saved through EE measures after all project investments have been made.	**A)**	**Annual Electricity Saved / Generated (MWh)**
Notes:	Direct electricity generation from solar PV installations on public hospitals		**3583**
Assumptions:			

Step 7	Enter the Emissions Factor of the marginal technology or national grid. Refer to IEA documented national emissions factors.	**B)**	**Emissions Factor (t CO2 / MWh)**
Notes:	Jamaica grid mostly on diesel, wind and hydropower		**0.732**
Assumptions:	http://www.gh.undp.org/content/dam/ghana/docs/Doc/Susdev/UNDP_GH_SUSDEV_2010GHGinventory_PDF.pdf http://aosis.org/wp-content/uploads/2014/11/Hugh-Sealy-Opportunities-in-the-Electricity-Sector-in-CARICOM-Final-paper-rev-2-KS.docx		

Step 8	Enter investment lifetimes. **See table below for standardized suggestions**. Projects technology may differ from these suggestions. If entering a non-standard useful investment lifetime, please provide justification in the assumptions box.	**C)**	**Average Useful Investment Lifetime**
Notes:	Solar PV lifetime improved to 15 yrs		**15**
Assumptions:			

Standardized Suggestions	
Technology	**Average Useful Investment lifetime (years)**
PV	15
Wind farm	20
Small Hydro	15
DH Improvement	15
EE lighting and appliances	5
Green buildings	30
cogeneration	10
Network upgrade	20
power plant retrofitting	20
Industrial Processes	7

Step 9	Sense check results
Notes:	Direct ERs taken from Solar PV investment worksheets
Assumptions:	

Results: Direct Emissions Reductions (A*B) / year
tons CO2 e
204
KT CO2 e
.204
MT CO2 e
.000204

Step 10	If the project includes a fund that will continue to operate after the project close, move to 'Direct Post Project' sheet. If it does not move directly to the 'Indirect Sheet'

Directions:	Read GEF CO2 Calculation Manual before attempting to use the spreadsheet
	Follow the steps on the left hand side of the spreadsheets
	Yellow squares require input
	Blue squares represent automatic outputs
	Tan squares are the instructional steps to follow

GHG Benefits of GEF Projects: Carbon Dioxide Calculator

Step 1	Insert Project Title. The results and key data tables will update automatically once all spreadsheets are complete.

Project Title
Deployment of Renewable Energy and Improvement of Energy Efficiency in the Public Sector in Jamaica

Results	**t CO2e**
Direct emissions reductions	**3,847 (PV)** **39,344(all techs)**
Direct post project emissions reductions	**-**
Indirect bottom-up emissions reductions	**78,688**
Indirect top-down emissions reductions	**718,400**

Key Data	
Annual electricity saved / generated (MWh)	**3583**
Emissions factor (T CO2 e / MWh)	**0.732**
Useful Investment Lifetime (years)	**15.00**
Revolving Fund Size ($)	**-**
Revolving Fund turnover factor (t)	**-**
Replication Factor	**-**
P10 (t CO2)	**1,796,000**
GEF Causality Factor (%)	**40**

Step 2	Enter Project Components leading to direct and indirect emissions reductions

	Enter Project Components (Commensurate with the Log Frame)
	Activities Contributing to Direct Emissions Reductions
1)	Training for technicians in RE (system designers, installers, etc) particularly solar PV to support RE scale up.
2)	Awareness raising programmes for the maintenance staff at selected hospitals.
3)	Training for selected staff at banking institutions in the fundamentals of RE, risk assessment and management for RE projects, project development, etc.
4	Building relevant institutional capacity within public institutions to strengthen the capacity for institutions liken the Bureau of Standards to support a growing RE (solar pv) market
	Activities Contributing to Indirect Emissions Reductions
1)	Awareness raising and knowledge dissemination of EE products and solar PV technology for the general public
2)	Review existing legal and regulatory framework with a view to making the necessary adjustments to facilitate the scale-up of renewable energy and energy efficiency
3)	Development and implementation of a Energy Performance Contract, a financial mechanism to facilitate investment in the ESCOS industry and scale up of RE.
4)	Investments in solar pv, solar water heaters and energy efficiency retrofits for selected hospitals.
5)	

Step 3	Move to the 'Direct' sheet

A. Direct Emission Reductions

There are three RE interventions that will lead to direct emission reductions during the proposed 3 year duration of the Project. These are:

- 300 kWp of rooftop solar PV installations on 2 hospitals (150 kW x 2 hospitals) from project funds as investment towards the generation of electricity and sale to the grid;
- 44,800 gallons of SWH for 5 hospitals
- Energy efficient retrofits and energy system enhancement and efficiency

B. Direct Post-Project Emission Reductions

There is no Direct post-project emission reductions.

- Scale up of RETs in Jamaica as a result of the Energy Performance Contract (EPC) that will be established during the Project implementation period will result in:

  ⇒ An estimated 120 private households and public buildings with investment in the installation of solar PV, solar water heaters and energy retrofits and enhancement, during the first 3 years after the EOP.

C. Indirect Emission Reductions

These are estimated using the GEF Manual for guidance on top-down and bottom-up factors.
The **bottom up indirect emission reductions** have been estimated with the formula $CO2_{INDIRECTBU} = CO2_{DIRECT} * RF$

The Replication Factor (RF) used is 2 for ESCO type projects (as suggested by the GEF guidance manual.
Therefore, $CO2_{INDIRECTBU} = 39,344 * 2 = 78,688$ tonnes

The **top down indirect emission reductions** have been estimated with the formula CO2indirectTD = P10 * CF, with P10 being the technical and economic potential of this application in the 10 years following the end of the project (1,796,000 tonnes) and a Causality Factor (CF) of 40% ("modest and substantial").

CO2indirectTD = 1,796,000 * 0.4 = 718,400 tonnes

ANNEX III- List of Hospitals Identified for RE and EE Interventions (Annual KWh Savings)

Table III- 1:

Names of Hospitals	Modular SWH System (kWh)	Heat Recovery (kWh)	Inst. Variable Speed Drive. Syst. with Effici. Motor (KWh)	Replace. Standard Electric Motor with High Efficiency Models (KWh)	Replace. Mercury Vapour 175W Security Light Fixt.w/ (KWh)	Replace. Stand. 4 X F40 T12 Fluores. Fixt. (Magnet Ball.) w/ Efficient 3 x LED Fluores. Fix (kWh)	Replace. Stand. 2 X F40 T12 Fluores. Fixt. (Magnet Ball.) w/ Efficient 2 x LED Fluores. Fix (kWh)	Replace R22 Refrig'nt Central AC Units w/ Hydro Carbon Blend Refrig'nt (kWh)	Install Solar PV System (kWh)
Mandeville	2,182		151,641	5,692	2,733	-	-	164,684	
Savana-La-Mar	1,583	-	-	-	-	9,504	17,878	47,778	139,612
Kingston Public Hospital	5,876	138,380	137,965	48,114	6,097	46,892	52,920	251,508	
Sir John Golding	1,231	-	-	-	-	-	2,976	4,189	139,612
Bellevue	8,832	-	-	-	2,088	-	40,970	13,618	
TOTAL	**19,704.77**	**138,380**	**289,606**	**53,806**	**10,918**	**56,396**	**114,744**	**481,777**	**279,224**

38EmissionFact:0.732
MWh

Annual kWh Saving =	**1,444,555**	**kWh**
Annual GHG Emissions Avoided=		**2622**
Gross GHG Emissions Avoided (at EOP)		**7868**
Gross GHG Emissions Avoided (lifetime)		**39344**

(0.732 tCO_2/MWh)

38 (https://cdm.unfccc.int/Projects/DB/SGS-UKL1323883065.28/view). Emission Factor:- Source is Wigton II CDM PDD (https://cdm.unfccc.int/Projects/DB/SGS-UKL1323883065.28/view).

Proposed UNDP-GEF Project Energy Efficiency and Renewable Energy Interventions 2015											
(**5 Hospitals** - *"Hospital Energy Audit Project Summary & Efficiency Improvement*											
Investment Packages" Report, 2006)											
(UNDP Funded; PCJ Implementer. Report Prepared by EcoTech Ltd. 2006)											
CAPACITOR BANKS											
HOSPITALS	**Units**	**Quantity** *to be Installed*				**Demand Saving (kVA)**		**Cost Savings (US$)**	**Estimated Installed cost (US$)**	**Simple Payback (Yrs)**	**ROI**
Mandeville	kVAr	190				86		12,693	26,539	1.8	56%
Savanna La mar	kVAr	55				22		3,065	7,042	1.97	51%
Kingston Public	kVAr	650				297		43,662	90,792	1.79	56%
Bellevue	kVAr	65				27		3,838	6,053	1.35	74%
Sub-Total	**-**	**960**	**0**	**0**	**0**	**432**	**0**	**63,258**	**130,426**	**1.7275**	**59%**
Replace R22 Refrigerant in Central AC Units with Hydro Carbon Blend Refrigerant Replacement.											
HOSPITALS	**Quantity** *(Size of AC Systems) (Refrigeration Tons)*	**Btu/hr**	**Tons of refigerant used**	**Light commercial AC equivalent (i.e. # of smaller AC units)**	**Demand Saving (kVA)**	**Energy Savings (kWh)**	**Reduction in tonnes of C02 (R-22)*** **	**Cost Savings (US$)**	**Audit Estimate Installed cost (US$)**	**Simple Payback (Yrs)**	**ROI**
Mandeville	209	2508,000	209	139	45	164,684	504	30,335	9,520	0.27	371 %
Savanna La mar	89	1068000	89	59	12	47,778	215	8,798	9,121	0.89	112 %
Kingston Public	414	4968000	414	276	128	251,508	999	55,835	47,946	0.74	136 %

Sir John Golding	3	36,000	3	2	1	4,189	7	620	782	1.08	92%
Bellevue	17	204,000	17	11	8	13,618	41	2,486	2,215	0.77	131 %
Sub-Total	**732**	8784,000	732	488	**194**	**481,777**	**1,767**	**98,074**	**69,584**	**0.75**	**168 %**
Replace Standard 2 x F40T12 Fluorescent Fixture (Magnetic Ballasts) with Efficient 2 x LED Fixture.											
HOSPITALS	**Super "T 8" 32W Fluorescent Tubes**		**32W Electronic Ballasts**			**Demand Saving (kVA)**	**Energy Savings (kWh)**	**Cost Savings (US$)**	**Audit Estimate Installed cost (US$)**	**Simple Payback Yrs**	**ROI**
	Units	**Quantity**	**Units**	**Quantity**							
Mandeville	Each		Each						0		
Savanna La mar	Each	302	Each	151		5.4	17,878	3,402	10,570	2.95	34%
Kingston Public	Each	1,307	Each	520		14.7	52,920	10,371	42,808	2.97	34%
Sir John Golding	Each	60	Each	30		0.6	2,976	658	2,100	2.45	41%
Bellevue	Each	826	Each	413		7.7	40,970	7,507	28,910	2.96	34%
Sub-Total	**-**	**2,495**	**-**	**1,114**	**0**	**28**	**114,744**	**21,938**	**84,388**	**2.8325**	**36%**
Replace Standard 4 x F40T12 Fluorescent Fixture (Magnetic Ballasts) with Efficient 3 x LED Fluorescent Fixture.											
HOSPITALS	**Super "T 8" 32W Fluorescent Tubes**		**32W**			**Demand Saving (kVA)**	**Energy Savings (kWh)**	**Cost Savings (US$)**	**Audit Estimate Installed cost (US$)**	**Simple Payback Yrs**	**ROI**
			Electronic Ballasts								
	Units	**Qty**	**Units**	**Qty**							
Savanna La mar	Each	69	Each	23		14	9,504	1,737	2,162	1.62	62%

Kingston Public	Each	656	Each	328		12	46,892	9,040	22,960	2.31	43%
Sub-Total		**1,819**		**351**		**26**	**56,396.00**	**10,777.00**	**25,122.00**	**1.965**	**53%**
Replace Mercury Vapour 175W Security Lights Fixtures with 50 W LED Security light Fixtures.											
HOSPITALS	**Complete 65W CFL Fixture w Photo Cell & Arm**					**Demand Saving (kVA)**	**Energy Savings (kWh)**	**Cost Savings (US$)**	**Estimate Installed cost (US$)**	**Simple Payback (Yrs)**	**ROI**
	Units	**Quantity**									
Savanna La mar	Each	6				0.4	2,733	464	336	1.57	64%
Kingston Public	Each	12				1.5	6,097	1,175	672	0.74	136 %
Bellevue	Each	3				0.3	2,088	367	168	0.57	174 %
Sub-Total	**-**	**21**				**2**	**10,918**	**2,006**	**1,176**	**0.96**	**125 %**
Replace Standard Electric Motors with High Efficiency Models.											
HOSPITALS	**Units**	**Quantities For Various Motor Sizes**				**Demand Saving (kVA)**	**Energy Savings (kWh)**	**Cost Savings (US$)**	**Estimate Installed cost (US$)**	**Simple Pay**	**ROI**
										back Yrs	
		2.4 - 25 hp									
Mandeville Regional	Each	6				2	5,692	1,131	3,492	2.65	38%
Kingston Public	Each	14				11	48,114	8,722	23,365	2.3	43%
Sub-Total		**20**				**13**	**53,806**	**9,853**	**26,857**	**2.475**	**41%**
Install Vari-Speed Drive Systems with High Efficiency Motors and Two Speed Motors.											

HOSPITALS	**Units**	**Quantities For Various Motor Sizes**				**Demand Saving (kVA)**	**Energy Savings (kWh)**	**Cost Savings (US$)**	**Estimate Installed cost (US$)**	**Simple Payback Yrs**	**ROI**
		2.5 - 25 hp									
Mandeville Regional	Each	17				4.9	151,641	22,953	37,879	1.42	71%
Kingston Public	Each	2				1.6	137,965	20,513	24,721	1.04	97%
Sub-Total	**-**	**19**				**7**	**289,606**	**43,466**	**62,600**	**1.23**	**84%**
Install Heat Recovery Systems.											
HOSPITALS		**Summary**				**Systems**	**Fuel Savings (kWh)**	**Cost Savings (US$)**	**Estimate Installed cost (US$)**	**Simple Payback** *Per Energy Audit Report*	**ROI**
		Scope of Work									
		Qty			**Description**						
Kingston Public	Each	2			Replace Coils	Steam Power Water Heaters			11,640.00		
Kingston Public	Each	2			Install Softener & Refurbish; Insulate lines; Replace pumps; Insulate Tank	Hot Water Heat Recovery System at the Chiller			23,280.00		

Kingston Public	Each	1				Install Heat recovery System to Incinerator to preheat Feed water and preheat combustion Air	48,840	2,153.10	6,280.00	2.51	40%
Kingston Public	Each	1				Install Economizer to Pre-heat Feed water to Boiler	89,540	3,870.50	7,141.00	1.59	63%
Sub-Total		**6**					**138,380**	**6,024**	**48,341**	**2.05**	**52%**
Install Modular Solar Water Heating Systems											
HOSPITALS	**Units**	**Quantity**					**Energy Savings (kWh)**		**Estimate Installed cost (US$)**		
	Qty	**Gallons**									
Mandeville	62	4,960					2,182		26,772		
Savanna La mar	45	3,600					1,583		112,465		
Kingston Public	167	13,360					5,876		286,205		
Sir John Golding	35	2,800					1,231		92,541		
Bellevue	251	20,080					8,832		594,763		
Sub-Total	**560**	**44,800**					**19,704.77**		**1,112,746**		

2 100 kW Solar PV Systems											
HOSPITALS	**Units**	**Quantity** *(Size of System)*				**Demand Saving (kVA)**	**Energy Savings (kWh)**	**Cost Savings (US$)**	**Estimate Installed cost (US$)**	**Simple Payback Years**	**ROI**
Savanna La mar	1	100					139,612		450,000	6.5	
Sir John Golding	**1**	100					139,612		450,000	6.5	
Sub-Total	**2**	**200**				**-**	**279,224**	**-**	**900,000**	**7**	
GRAND TOTALS	**(Per Annum)**						**3,583,277**	**255,396**	**2,461,240**		
Emission Equivalent (at EOP)	**(per annum)**						**1,057**	**tons CO2**			
Emission Equivalent (at EOP)	**(gross)**						**3,172**	**tons CO2**			
Notes:											
** values approximated.											
Emission Factor	Source is Wigton II CDM PDD (https://cdm.unfccc.int/Projects/DB/SGS-UKL1323883065.28/view).								**0.732**	**tCO2/MWh**	
*** Further gross reductions in C02 emissions possible if alternative refrigerant is used. Please see scenario table below for potential value.											

2006 costs were updated to 2015 values @ a US$ cumulative rate of inflation of 16.4% from 2006 to 2015 .(Source: http://www.usinflationcalculator.com/)											
						-	-	-			
***Direct and Indirect GHG emissions of refrigerants and avoided tCO2 emissions analysis for alternative refrigerants - Project: Replace R22 Refrig'nt Central AC Units w/ Hydro Carbon Blend Refrig'nt (kWh)											
Potential reduction in tons of CO2	R-22 (baseline)	R-32 (alternative)	R-290 (alternative)								
Mandeville	504	92	1								
Savanna La mar	215	39	0								
Kingston Public	999	183	2								
Sir John Golding	7	1	0								
Bellevue	41	8	0								
Total reduction	1,767	323	3								
Assumptions:											
UNDP/GEF reference: "Discussion Note on GEF-5 project "Indonesia-Promoting Energy Efficiency for Non-HCFC Refrigeration and Air Conditioning (PENHRA)".											
Assuming 2 times recharge of refrigerant during the life of a A/C unit (12 years) and that a 1.5 TR Unit needs between 1,25 kgrs of refrigerant.											

As it can be noted, significant reductions can be achieved by switching to low GWP A/C alternatives. In the case of choosing refrigerants R-32 and R-290 shown in this analysis, or similar eco-friendly cooling refrigerants available in the market, the GWP gain is 323 and 3 tons of CO2, respectively, over a 12-year useful life for the 5 combined central AC units. Please note that a typical 18,000 BTU A/C unit was used as a basis for the calculation of these large hospital units that ranged between 36,000 Btu and 4.9 million Btu							
No qualified assumption for large scale central units. Therefore referencing smaller units analyzed in Honduras and Indonesia case studies representing 18,000 btu/hr cooling per unit. Btu of large hospital units converted (http://www.rapidtables.com/convert/power/ton-to-btu.htm) and then divide by 18,000 for an equivalent unit calculation							

ANNEX IV-Proposed Structure – EPC MODEL

Implementing the pilot EPC program requires several steps:

1. Preparation of pilot program
2. Confirming selected public sector buildings (See UNDP Project Document)
3. Conducting energy audits to determine or re-confirm proposed RE/EE interventions and conducting baseline consumption assessments
4. Selection of service providers (ESCOs and/or PCJ)
5. Agreement preparation and execution
6. Ongoing support and training to participants and key stakeholders

The specific contracting model would vary based upon the solution proposed by the ESCO, however, the basic model is summarized below in Table 6. An ESCO, in this case, the PCJ would enter into an agreement with a public hospital or clinic, which would repay the ESCO through shared and/or guaranteed savings. To reduce the total cost of the building retrofits and hence the risk to the public sector and the ESCO, the UNDP-GEF program would offset 10-20% of the total cost in the form of a grant. Depending on the terms proposed by the ESCO, borrowing from a lender might be necessary. The PCJ has indicated that access to financing would not be necessary for their participation in the pilot program. In such instances, the UNDP-GEF grant would further reduce the debt burden on the service provider and client, thereby reducing risk to the lender.

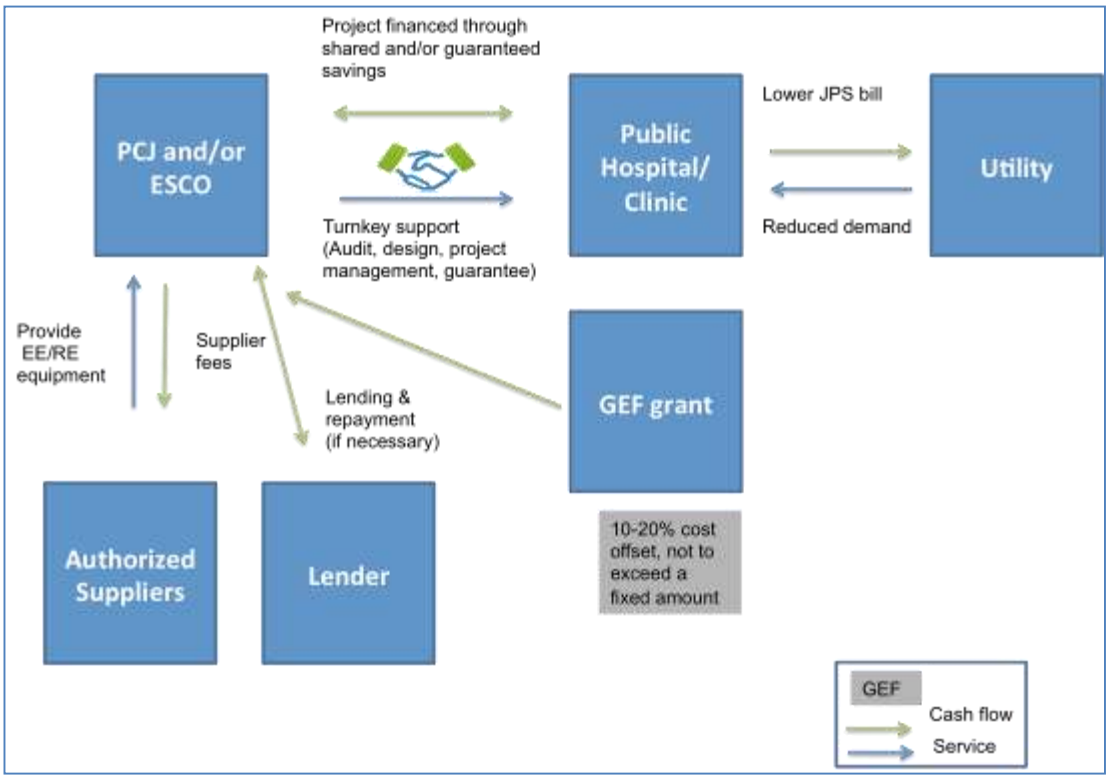
FINANCING DE-RISKING MODEL - PROPOSED STRUCTURE

Parties consulted to prepare this concept, in addition to the overall programme's other interventions include:

Stakeholders Consulted During Project Document Preparation
• **Association of Bankers**
• **Bank of Nova Scotia**
• **Bureau of Standards Jamaica (BSJ)**
• **Citi Bank**
• **Development Bank of Jamaica (DBJ)**
• **First Caribbean International Bank**
• **GEF Small Grants Programme**
• **Government Electrical Inspectorate (GEI)**
• **HEART Trust NCT-VET**
• **Inter-American Development Bank (IDB)**
• **International Finance Corporation**
• **Jamaica Solar Energy Association (JSEA)**
• **Jamaica Money Market Brokers**
• **JPS Co**
• **Min. of Land, Environment, Water & Climate Change (MLEWCC)**

• **Ministry of Health (MoH)**
• **National Health Fund (NHF)**
• **National Tools Institute (NTI)**
• **Office of Utilities Regulation (OUR)**
• **Petroleum Corporation of Jamaica (PCJ)**
• **Planning Institute of Jamaica (PIOJ)**
• **PowerGen Ltd.**
• **Private Sector Organization of Jamaica (PSOJ)**
• **Scientific Research Council (SRC)**
• **The Jamaica Institute of Financial Services**
• **University of Technology**

UNDP-GEF Energy Performance Contracting Pilot Program



For successful implementation, UNDP-GEF should consider:

- Creating a list of pre-approved retrofits and authorized suppliers
- Establishing standard contract(s) for Energy Performance Contracting
- Developing Measurement and Verification Guidelines
- Creating a dispute resolution mechanism
- Requiring the public sector partner to include its obligation to the ESCO in its budget throughout contract duration

- Obtaining public sector partner commitment to play an active role in communication of outcomes and provision of a communication plan

SUPPORT & TRAINING FOR KEY PILOT STAKEHOLDERS

In order to successfully pilot the energy performance contracting model, discussed above, key players will require support and training. The section below describes three target audiences that will require training: financial institutions, facility managers and procurement officers, and administrators involved in implementation of the pilot program.

While Jamaica has made significant strides in improving the availability and accessibility to financing for RE/EE, there remains a lack of awareness among lenders on the benefits and financial performance of RE/EE technologies. In particular, lenders are not familiar with the energy performance contracting (EPC) model. This lack of understanding could hinder the development of the ESCO market and the ability for ESCO to access financing required to purchase the necessary equipment for efficiency upgrades.

Annex V - EPC Training Plan

In order to successfully pilot the energy performance contracting model, discussed above, key players will require support and training. The section below describes three target audiences that will require training: financial institutions, facility managers and procurement officers, and administrators involved in implementation of the pilot program.

6.1 An Introduction to Energy Performance Contracting for Lenders

Background: While Jamaica has made significant strides in improving the availability and accessibility of financing for RE/EE, there remains a lack of awareness among lenders on the benefits and financial performance of RE/EE technologies. In particular, lenders are not familiar with the energy performance contracting model. This lack of understanding could hinder the development of the ESCO market and the ability for ESCO to access financing required to purchase the necessary equipment for efficiency upgrades.

Trainings and Workshops: One training and one workshop is proposed.

Year 1 Training Objective: The first training would be a full day training and would have four main objectives:

1) to deepen lender understanding of analyzing the risks, opportunities and paybacks of RE/EE investments
2) to make lenders more comfortable with energy performance contracting including the role of the ESCO, the project financing component and the project savings guarantee
3) to introduce lenders to the UNDP-GEF supported EPC projects and the proposed model
4) to provide a forum for the various institutions involved in the EPC projects to meet including the future ESCOs, public institutions and potential lenders

Topics covered in the training would include:

1. Overview of RE/EE investments
    a. Market snapshot
    b. Lending risks and opportunities
    c. Calculating paybacks for various technologies
2. Overview of EPCs including:
    a. The role of the ESCO
    b. The types of turnkey services provided
    c. The project financing component and role of the lenders
    d. The project savings guarantee
    e. 1-2 case studies of a successful EPCs
3. Review of the UNDP-GEF supported project
    a. Rational behind the project
    b. The specific EPC model
    c. The program participants
        i. ESCO(s)
        ii. Public institutions
        iii. Project financier(s)
    d. The program timeline
4. Q&A and discussion with lenders and project participants
    a. Would lenders provide project financing?
    b. What concerns or remaining questions do lenders have about this model?

Year 2/3 Workshop Objective*:* The workshop would be a half-day public event that would provide an opportunity for lenders to gain an understanding of how the EPC model under the UNDP-GEF EPC pilot program is working in practice. The workshop would take place after the pilot program has launched and the projects are underway. It is envisioned that the ESCOs and public sector partners participating in the program would present the results to date to a broad group of lenders and provide an opportunity for lenders to ask questions about the program thus far. If this workshop proves useful, a similar workshop could take place in year 3.

The workshop would include:

I. Presentation by the ESCO providers and public sector partners on the status of the projects
   a. Results thus far
   b. Challenges faced
   c. Plans going forward

Target Audience: Financial institutions in Jamaica active in RE/EE lending.

The participants would include representatives from various financial institutions in Jamaica such as:

Commercial & Merchant Banks	Other Approved Financial Institutions & Agents	Micro Finance Institutions
• Bank of Nova Scotia (BNS) • National Commercial Bank (NCB) • Capital & Credit Merchant Bank (CCMB) • Citibank N/A • First Caribbean International Bank (FCIB) • First Global Bank (FGB) • RBC Royal Bank (RBTT) • Sagicor Bank (PCB)	• Jamaica Co-operative Credit Union League (JCCUL) – All Credit Unions • Jamaica Money Market Brokers (JMMB) • National People's Co-operative Bank (NPCB) • National Export Import Bank (EXIM) • AGENT: Jamaica Business Development Corporation (JBDC)	• Access Financial Services • Jamaica National Small Business Loans • Nation Growth Microfinance Limited • Micro Credit Limited • Churches Co-operative Credit Union • St. Elizabeth Co-operative Credit Union • St. Thomas Co-operative Credit Union • McKayla Financial Services Limited • First Union Financial Services Limited

Participants would also include the selected ESCOs for the UNDP-GEF supported program and the public institutions participating in the program.

Partners: In planning and organizing this training and workshop, UNDP-GEF would work closely with the Development Bank of Jamaica, the selected ESCOs including PCJ, the selected public institutions and the Jamaica Institute of Financial Services.

Outcomes:

- Lenders leave the workshop feeling more comfortable with the EPC model including the goal of EPCs, how they work, the roles of the various institutions involved in an EPC, and the specific UNDP-GEF supported EPC program.
- Financial institutions in Jamaica are more comfortable with providing financing for EPC's in the future.
- At least one financial institution that attends the training provides financing for an EPC.

6.2 Improving Building Energy Management and Performance for Building and

Facility Managers

Background: The Government of Jamaica is working diligently to improve the energy management and performance of public buildings by encouraging energy efficiency upgrades and the use of renewable energy. However, building and facility managers are sometimes unfamiliar with RE/EE technologies, the financial benefits of these technologies, and the process for procuring, operating and maintaining these technologies. As part of the pilot program, UNDP-GEF will collaborate with the Ministry currently responsible for updating Jamaica's Sustainable Energy Procurement Guide.

Year 1 Training Objective: A full day training is proposed. The training would be led by the authors of the procurement guide with inputs from the selected ESCOs. The objective of the training would be to educate building and facility managers on:

1) Methodologies for creating an energy management plan including identifying, analyzing and prioritizing RE/EE investments:
    a. Estimate baseline energy use intensity
    b. Commission an energy audit
    c. Consider interactions between systems
    d. Financial analysis of possible investments
        i. Net present value, return on investment and simple payback period
    e. Prioritize options for investment
    f. Evaluate financing options
    g. Selecting an investment
2) Overview of the procurement guide including the process of and best practices for procuring RE/EE technologies
3) Post-installation: methods for monitoring, reporting and verifying the impact of the RE/EE upgrades on building energy use; methods for monitoring the performance of RE/EE technologies; and methods for operating and maintaining technologies
4) Strategies to reduce non-financial barriers to RE/EE investments including relating to:
    a. Organizational Support and Engagement: buy-in from top-level leadership, employee support and dedicated staff to lead energy management programs
    b. Access to Energy Information: facility and building managers have access to energy information to begin developing an energy management plan
    c. External factors: infrastructure limitations, landlord/tenant split incentives, focus on short-term investments
5) Developing an energy management plan:
    a. Participants will spend the last portion of the workshop outlining the steps they would need to take to begin developing and implementing an energy management plan for their specific facility or institution.

Target Audience: Primary: Individuals responsible for energy management and procuring energy equipment at public institutions such as building and facility managers. Secondary: Private sector building and facility managers.

Partners: The UNDP-GEF would work with the Ministry currently responsible for updating Jamaica's Sustainable Energy Procurement Guide to organize the workshop along with the ESCOs, Regional Health Authorities and public institutions selected to participate in the program. The organizers would partner with other relevant ministries and private sector entities to publicize the workshop.

Outcomes:

- Energy managers of public and private buildings feel empowered to develop an energy management plan.
- At least two participants in the workshop develop energy management plans and procure RE/EE technologies.

6.3 On-going Support to Program Participants

Background: The public institutions selected to participate in the UNDP-GEF supported program will likely be unfamiliar with the EPC model. It will be important to provide them with an "on boarding" workshop that introduces them to the UNDP-GEF EPC pilot program goals, expected outcomes, participant roles and timeline.

Objective: To provide an initial "on boarding" workshop to launch the program followed by on-going support to program participants. The goal of the first workshop will be to familiarize the public sector program participants with the EPC model, the specific UNDP-GEF supported program model, and provide an opportunity for all program participants to meet with one another. The training will include:

1. Overview of EPCs including:
    a. The role of the ESCO
    b. The turnkey services provided
    c. The project financing component and role of the lenders
    d. The project savings guarantee
    e. 1-2 Case Studies of a successful EPCs
2. Review of the UNDP-GEF supported project
    a. Rational behind the project
    b. The specific EPC model
    c. The program participants
        i. ESCO(s)
        ii. Public institutions
        iii. Project financier
    d. The program timeline
3. The role of each of the program participants
4. On-going support available to program participants
5. An opportunity for program participants to meet one another
6. Q&A and discussion project participants

Target Audience: UNDP-GEF EPC pilot program participants including the selected public institutions and ESCOs (financial institutions, if relevant).

Outcomes: Participants are:

- Comfortable with the EPC model
- Understand the respective roles and responsibilities
- Are aware of the program process, timeline and on-going support available
- Build relationships with one another
- Workshop lays a foundation for participants meet regularly (both informally or formally) to share their experiences and lessons learned along the way

Additional Support/Training/Workshops: Throughout the three-year program, the UNDP-GEF may want to sponsor an annual event to bring together program participants to share progress to date, challenges experienced and lessons learned.

ANNEX VI- Local Project Appraisal Committee (LPAC) Minutes

UNDP Strategic Plan 2008-2013 Secondary Outcome:	N/A
UNDP Strategic Plan 2014-2017 Secondary Outcome:	
Expected CP Outcome(s):	Energy conservation and efficiency increased and synergies between energy policies and human development considerations ensured
Expected CPAP Output (s):	Output 5: Strengthening the Policy Framework and Institutional Arrangements for Climate Change Adaptation and Mitigation Output 6: Capacity Development for Energy Efficiency and Security in Jamaica to reduce energy consumption

Programme Period:	2012-16
Atlas Award ID:	TBC
Project ID:	TBC
PIMS #	4900
Project Start date:	September 2015
Project expected End Date:	August 2018
Proposed Management Arrangements	☒ NEX ☐ DEX

Total resources required (total project funds)	USD 1,308,987
Total allocated resources (UNDP managed funds)	USD 1,308,987
Regular (UNDP TRAC)	USD 24,000
GEF	USD 1,254,987
Other (partner managed resources)	To be confirmed
o Government (In-Kind)	USD To be confirmed
o NGOs	USD 0
o Other [complete, if applicable]	USD 0

Executing Entity/Implementing Partner	United Nations Development Programme
Implementing Entity/Responsible Partners:	Petroleum Corporation of Jamaica (PCJ)

1) Decisions of the LPAC **[tick the applicable boxes, if these have been endorsed by the LPAC]**	x X ☒ X	**General endorsement of the Project's strategy:** - Objective, Outputs and Activities - Logframe indicators (see Strategic Results Framework) - Management Arrangements
	☒	Specific endorsement of the project's budget (
	☒	Specific endorsement of the proposed project staff complement and the project's organigramme (if included)
	☒	Endorsement of the TOR for key project staff
	X	Endorsement of the proposed strategy for stakeholder engagement
Remarks on the above	LPAC endorsed proposed management structure, objective, outputs and activities. LPAC offered no objections to the project staff, proposed budget or TORs for project staff.	

2) Engagement of Implementing Entity/Responsible Partners			
Will the project engage entities other than the national Executing Entity/Implementing Partner?			x Yes ☐ No
If YES, which and for what purpose?	Planning Institute of Jamaica ☒ Government department ☐ NGO Academia / centre of excellence Other	The Planning Institute of Jamaica is the government agency responsible for coordination of external cooperation and will be a signatory to the project document	
	Government department ☐ NGO ☐ Academia / centre of excellence ☐ Other		
	[name] ☐ Government department ☐ NGO ☐ Academia / centre of excellence ☐ Other	[purpose]	
Is the pre-selection of these partners in line with UNDP procedures and has this been fully endorsed by the LPAC?			☐ Yes ☐ No
Remarks	All responsible partners were not confirmed at the meeting, but suggestions were made and partners such as University of Technology and HEART/VTDI expressed an interest in formalising a partnership to assist in executing the Training and Capacity component of the project.		

3) General and Specific Recommendations of the LPAC

General

- Project must be well coordinated to ensure no overlap with already ongoing projects managed by other international organizations and GOJ Ministries and Agencies
- Concerns expressed over the lengthy GOJ procurement process and enquiries were made as to whether UNDP might be able to assist in this area. UNDP indicated that a specific request for support with procurement would have to be submitted to UNDP. UNDP would then be in a position to provide procurement support.
- PCJ's capability to manage the project was questioned. UNDP responded that MSTEM recommended the PCJ as the implementing partner. In addition, UNDP has formally invited the PCJ to be the implementing partner and is waiting for a response, so nothing is confirmed. If the response is favourable, UNDP will need to undertake a capacity assessment for the Implementing Partner before it is confirmed.
- University of Technology and HEART/VTDI expressed an interest in becoming partners on the project.

*** Note that subsequent to the LPAC, UNDP engaged in further negotiations/discussions with PCJ and a decision was made for UNDP to implement the project as Direct Implementation Modality (DIM) and PCJ to be a responsible party for Outcome 3

Outcome 1

- GEF Small Grants Programme recommended including the community-based and non-governmental organizations that are currently implementing GEF SGP projects on renewable energy and energy efficiency. It was further stated that this could also be considered as parallel financing support.
- Local government officers, building inspectors and representatives from the National Environment and Planning Agency should be included in training programs.

Outcome 2

- Recommendation was made for the activities under this Outcome to be more clearly defined.
- It was highlighted that net billing is in pilot stage and is currently under review and so this could present an obstacle in moving it to a codified system as well as with Outcome 3 of the project which includes actual RE and EE installations in health facilities. The ongoing, critical net billing project should move from a pilot to a codified project as soon as possible. Much more work is required in this area.

Outcome 3

- The project design should take into account differences of scale in the facilities that will be targeted, particularly in relation to the net billing restrictions.

Apologies for Absence:
Dr. Peter Ruddock, Petroleum Corporation of Jamaica
Mr Christopher Brown, Development Bank of Jamaica
Ms. Gillian Guthrie, Ministry of Water Land Environment and Climate Change

ANNEXES

LPAC Agenda
Detailed minutes of LPAC Meeting: March 5, 2015
Attendance Sheet

Local Project Appraisal Committee Meeting
To review draft Project document for GEF 5 -Deployment Renewable Energy and Energy Efficiency Project
United Nations Development Programme, Kingston
March 5, 2015

MINUTES

Purpose of Meeting: To present the Draft Project Document for the Deployment of Renewable Energy and Energy Efficiency in the Public Sector project for recommendations and endorsement

In attendance:

Chair: Dr. Elsie Laurence-Chounoune, Deputy Resident Representative, UNDP

Jacqueline Bisasor McKenzie, Acting Director/Emergency Medical Services, Ministry of Health
Asha Bobb-Semple, Program Associate – Policy Support, UNDP Jamaica
Horace Buckley, Director/Project Management, Ministry of Science, Technology, Energy & Mining (MSTEM)
Dorlan Burrell, Director, Environment & Risk Management Division, Ministry of Water, Land, Environment & Climate Change (MWLECC)
Roger Chang, Immediate Past President, Jamaica Solar Energy Association
Okley Coke, Project Assistant, Planning Institute of Jamaica (PIOJ)
Stephen Dennis, Consultant, PowerGen Limited
Hyacinth Douglas, National Coordinator, GEF Small Grants Program
Keith Garvey, Director, Rural Electrification Program, Jamaica Public Service Co.
Shana Lee Jeans-Lamb, Operations Associate, UNDP Jamaica
Richard Kelly, Program Specialist, UNDP Jamaica
Dwight Lewis, Head of Department, HEART Trust/NTI
Gerald Lindo, Senior Technical Officer, Climate Change Division, MWLECC
Paul Lue Lim, Consultant, PowerGen Limited
Joseph Lunan, Program Coordinator, HEART Trust/NTI
Kimberly McGregor, Project Officer, Petroleum Corporation of Jamaica (PCJ)
Novia McKay, Program Associate, UNDP
Gail Nelson, Science & Technology Planner, PIOJ
Dr. Ruth Potopsingh, Associate Vice President/Sustainable Energy, University of Technology (UTech)
Upul Ranaweera, M&E Expert, UNDP Jamaica
Claon Rowe, Senior Project Engineer, PCJ
Dr. R. Alston Stoddard, Renewable Energy Specialist; International PPG Team Leader – Clean Energy Policy & Capacity Development
David Barrett, Consultant/Enbar Consulting; Clean Energy Specialist, PPG Team
Christina Becker-Birck, UNDP Consultant/Meisters Consultants Group; Clean Energy Economics & Finance Expert, PPG Team

Emma Lewis, Rapporteur

Welcome and Introductions – Chair

Dr. Laurence-Chounoune (Chair) welcomed attendees and invited all attendees to introduce themselves. Asha Bobb-Semple apologized for absence for Dr. Peter Ruddock, PCJ, as well as Mr. Christopher Brown, Development Bank of Jamaica. In addition, the GEF Operational Focal Point indicated that she will be arriving late.

Chair noted the intention of the meeting was to obtain stakeholders' views and comments, and to make sure that proper consultations have been made and all views received before producing the final draft of the project document. She said she hoped all had the time to review the first draft document before the meeting. It was further indicated that the presentation to be shared today is an updated version of the Project Document that was shared with all participants on 26 February 2015.

The three-person team focusing on the project comprises Christina Becker-Birck (Clean Energy Economics and Finance Expert), David Barrett (Clean Energy Specialist); and Dr. Alston Stoddard (International PPG Team Leader – Clean Energy Policy & Capacity Development)

Chair gave a quick review of the key critical issues for stakeholders' consideration, as follows:

- Is the project relevant and of sufficient importance to stakeholders?
- Is it feasible in terms of results, considering all the challenges?
- Is there sufficient commitment from all concerned parties, and is the intended implementing partner the best choice for the project?
- Is there sufficient accountability in the management plan for the project?
- Is the project cost-effective?
- Is there sufficient sustainability built into the project beyond its lifespan?
- Will there be any social or environmental impacts from the project?
- Have all possible risks been taken into account?
- Is there an adequate Monitoring and Evaluation (M&E) plan in place?

Presentation of Draft Project Document- PPG Consultants

Dr. Stoddard presented an overview of the draft project document entitled *"Deployment of Renewable Energy and Improvement of Energy Efficiency in the Public Sector."* Dr. Stoddard outlined the project's broad goal which is to develop a low carbon pathway to lower energy costs, greater use of renewables and increased energy efficiency in Jamaica. It is a medium-sized project and will be implemented over 3 years.

For the project to move forward, CEO Endorsement and Letters of Commitment from stakeholders are now critically important to show support for the project. Dr. Stoddard noted this does not have to be a commitment of funds, but support in terms of a complementary project under way, for example. Stakeholders' consultations have already taken place in recent months.

Dr. Stoddard provided some background information on the challenging energy environment in which Jamaica currently finds itself. Last year, Jamaica spent J$17.5 billion on electricity, and charges have been volatile. The

International Monetary Fund (IMF) also requires a reduction in public sector electricity costs; overall the Jamaican Government is seeking a 15 per cent reduction in its energy bill.

Dr. Stoddard reviewed the objectives of the project: to reduce greenhouse gas (GHG) emissions and the cost of electricity in the public sector; to improve energy efficiency and use of renewables to the necessary quality standards, codes and procedures; to install energy efficient, carbon-friendly equipment; and to build awareness through a public education program.

The total project cost required to achieve the desired outcomes, is US$1,254,987, in addition to proposed co-financing from key partners The three proposed project outcomes are: Technical knowledge and capacity strengthening; legal instrument developed and enforced to promote renewables and energy efficiency; and financial de-risking in support of these investments.

The PPG Team leader shared barriers to investment in RE and EE technologies, identified during project preparation stage. He further presented initial recommendations that the PPG Team developed in response to a few of these barriers. These included:

- Skills training at the institutional and community level to support coordination and consistency with the quality of training delivered. The proposed partner will be the HEART Trust /Vocational Training Development Institute (VDTI). Training will target key audiences, including maintenance and ancillary staff at hospitals, who need to understand how systems work.
- Assistance with the establishment of standards and codes as currently the quality of equipment and service varies considerably. This results in inconsistency; customers need assurances of higher standards. Building codes also need updating, especially in solar photovoltaic (solar PV). The proposed partner will be the Bureau of Standards of Jamaica (BSJ).
- Assistance with developing and/or enforcement of legislation (eg on Net Billing) in support of increased investments in renewable energy and energy efficiency. A sector-wide review is currently under way, but it is going slowly and needs to be expedited. The key stakeholder for this activity would be the Office of Utilities Regulation (OUR),
- UNDP will coordinate and collaborate with efforts involving international agencies already under way, including the Jamaica Productivity Centre/EU Energy Services Company (ESCO) project; the BSJ's energy efficiency programs with the World Bank; and the Development Bank of Jamaica's (DBJ) lending program, among others.

UNDP consultants Christina Becker-Birck (Clean Energy Economics & Finance Expert) and David Barrett (Clean Energy Specialist) continued the presentation and provided information on the three key components of the project. These included:

- Training and capacity building; the various categories of trainees were listed including lenders and ESCOs, building and facilities managers of hospitals selected for retrofitting, RE and EE installers and maintenance technicians.
- Policy and regulatory component. Additional support will be provided through the project in the development/testing of standards and codes for RE and EE; codifying the net billing policy framework following the review of the pilot; supporting the development of the legal framework for the ESCO industry and updating the carbon trading sub-policy as there are no emission reduction targets set.

- Financing mechanisms to support Investments in RE and EE- The project will implement an Energy Performance Contracting Project (EPCP) pilot. As the public sector cannot take on additional debt, the health institution could enter into a contract with an ESCO that pays for the costs up-front. The savings (approx. 3 – 5 per cent) can be costed out and repaid as the project progresses. This will reduce bills and demand. As an incentive, the GEF would provide a grant (15 – 20 per cent of the cost). This will reduce the amount the hospital has to repay. This will take place in 2 – 5 public hospitals/clinics (to include training in project sustainability for key partners, on-call guidance and thorough results reporting There will also be an awareness raising activity attached to this component to promote the potential successes and impact of the EPC model on public facilities with scope for expansion to the private sector. Participants were also informed of the opportunity under the project to install small wind demonstration projects in two rural schools

Mrs. Becker-Birck also explained the key conditions for the project (retrofits, inclusion in long-term budgets, etc.) and the operational and execution requirements.

Dr. Stoddard outlined the broad benefits to the public sector, and to the Jamaican market, of the proposed project. This includes the development of ESCOs as financing conduits, not as sources of capital.

He noted the proposed approach should be able to address hurdles such as the availability of funds for energy projects; an inadequate legal/regulatory framework; the capacity of institutions and people; awareness and communication; and monitoring, enforcement and evaluation.

The UNDP will act as the GEF Implementing Agency. The Petroleum Corporation of Jamaica (PCJ) is the proposed local Implementing Partner. A Project Steering Committee consisting of critical stakeholders will guide the process.

Dr. Stoddard also gave details of the M&E process and a tentative budget, including co-financing. He also presented a list of questions to be considered by the PPG team, including further research and data needed.

Questions, Discussion and Recommendations

The Chair asked participants whether they had any questions or required clarification.

- **QUESTION:** Gerald Lindo/Senior Technical Officer/Mitigation, Ministry of Water, Land, Environment & Climate Change (MWLECC) asked how the proposed project would intersect with programs such as the Inter-American Development Bank's (IDB) ongoing climate change projects, and others.
- Asha Bobb-Semple noted that discussions had already taken place on this matter with MSTEM.
- Horace Buckley/Director of Project Management, MSTEM said that some institutions might overlap in the area of implementation of energy efficiency programs, and more groundwork needs to be done, but there is a lack of funding for this.
- Christina Becker-Bircks added that the project will make interventions, *"bridging gaps"* in existing projects – for example, in its support for the OUR. She confirmed to Mr. Lindo that this Government agency will be involved and on board.
- She noted that Letters of Commitment would also help to identify the roles of the different organizations and institutions in the project, stressing their importance.

- The Chair noted Mr. Lindo's concern but pointed out that many early consultations with key partner institutions had already taken place.

- **QUESTION:** Will the project have to go through the Government of Jamaica's procurement process? There are many potential delays in that area.
- The Chair said the PCJ might ask the UNDP for support in this area. However, this is normally the responsibility of the Implementing Partner (tentatively the PCJ).

- **QUESTION:** Hyacinth Douglas/National Coordinator, GEF Small Grants Program described her work in rural communities, working with community-based and non-governmental organizations (NGOs) on renewable energy and energy efficiency projects. She said there are gaps in the capacity of communities and more training is needed, including standards certification. She expressed the hope that a larger project such as this could include NGO input, and asked how the project could encompass these smaller initiatives.
- The Chair took note, suggesting that the details of the Small Grants Program's involvement could be discussed later in a separate meeting. This was agreed on.

- **QUESTION:** Gail Nelson/Planning Institute of Jamaica suggested that local government officers should be involved in training – for example, on building codes and standards.
- Dr. Ruth Potopsingh/University of Technology added that not only building inspectors, but also representatives of the National Environment & Planning Agency (NEPA) often want to be involved.
- Dr. Stoddard said he would add local government officers to the list of trainees.
- In response to Dr. Potopsingh's comment, the Chair noted that a Social and Environment Screening Procedure will be required for projects over $500,000, and this should take care of the matter.

- **QUESTION:** Gerald Lindo/MWLECC asked what the legal instrument would be – something new?
- Dr. Stoddard said a revision of legislation (the Electricity Act) may be necessary and that one of the outcomes of the project is to make provision for this.
- David Barrett noted that the 1958 legislation does not mesh with the later 1984 legislation and that this needs attention. He said the BSJ is already working on this, with support from the World Bank.
- He noted that collaboration with stakeholders was critical, to develop a *"finished product"* and identify gaps, in cooperation with international partners.
- Horace Buckley/MSTEM said the Electricity Act *"will be passed shortly"* and that all these concerns are embedded in the Act.

- **QUESTION:** Horace Buckley/MSTEM asked what are the specific areas of concern as it relates to the policy and regulatory component of the project.
- David Barrett said the net billing process as it now stands is *"inconsistent"* and needs to be tightened. He noted this was a potential barrier that must be removed. He added that *"enforceability"* is a major challenge, adding that BSJ standards must be embedded in any legislation to ensure this does not

remain an issue. [He added, however, that the project would not necessarily work on the details of legislation].

- Roger Chang/Vice President, Jamaica Solar Energy Association pointed out that net billing is itself still in the pilot stage and is currently under review. He wondered whether this would be an obstacle and asked whether the UNDP is working with the OUR, which should be a major stakeholder.
- Dr. Stoddard asked if he was suggesting that the UNDP could help in moving net billing from the pilot stage. If so, he said the UNDP could help provide funds for this.
- David Barrett noted discussions with OUR Director General Albert Gordon were already under way. He agreed that the net billing project must move from a pilot to a codified project. He observed that the health sector could benefit significantly from net billing.
- Roger Chang noted that a large hospital like Kingston Public Hospital cannot participate in net billing currently – 100KW would be relatively insignificant given the size of the facility.
- Christina Becker-Birck noted that the UNDP is aware of differing scales, suggesting net billing might be more suitable for smaller hospitals and clinics. David Barrett noted that Savannah-la-Mar Hospital (a medium-sized facility) and the Sir John Golding Rehabilitation Centre (a small facility – 42 beds) were under consideration for net billing, but no decision had been made yet. Dr. Potopsingh added that the University of Technology (UTech) was working well with 100KW but smaller entities may need to be taken on board.
- Chair noted this was an issue (and a potential barrier) to take into consideration.

- **QUESTION**: Is the PCJ the most suitable Implementing Partner, based on track record? Roger Chang asked whether the PCJ *"had the capability"* to undertake the project and whether it was *"ideal."* He asked whether a private sector player could partner in the project.
- Chair responded that MSTEM recommended the PCJ. UNDP has invited the PCJ, and is waiting for a response, so nothing is confirmed. The UNDP remains open to other suggestions, although MSTEM seemed the *"natural partner."* The UNDP will need to undertake a capacity assessment for the Implementing Partner before it is confirmed; and will do a continuous assessment, she added.
- MSTEM said it did not foresee any problems with the PCJ, but conceded timely procurement procedures might be a challenge.
- Chair responded that a special agreement would have to be discussed for support on procurement procedures to take place, but MSTEM/PCJ could request support.
- She reminded the meeting that a **proposed** Project Steering Committee will be constituted, and that the LPAC will be disbanded as of this date.
- An independent consultant will conduct an evaluation of the project, she added, noting that monitoring will be ongoing throughout the project as it will be necessary to track its impact.
- On the budget, she noted that most of it would be channeled towards purchasing hardware for the health facilities under Outcome 3.
- The project had to be moved from four to three years, the Chair noted, so partners should budget for staffing accordingly. She stressed that the the project would support existing training and not reinvent the wheel
- The Chair reiterated that Letters of Commitment were crucial for buy-in to the project; a draft letter template is available. In-kind contributions from partners would be welcomed.

) List of participants in the LPAC

Name	Institution	Title	Email
David Barrett	Enbar Consulting	Consultant/Clean Energy Policy	dbarrett2@gmail.com
Christina Becker-Birck	Meisters Consultants Group	Consultant/Clean Energy Economics & Finance	christina.becker-birck@mcgroup.com
acqueline Bisasor McKenzie	Ministry of Health	Acting Director, Emergency Medical Services	mckenziej@moh.gov.jm
Asha Bobb-Semple	Program Associate/Policy Support	UNDP Jamaica	asha.bobb.semple@undp.org
Horace Buckley	Ministry of Science, Technology, Energy & Mining (MSTEM)	Director, Project Management	hbuckley@mstem.gov.jm
Dorlan Burrell (on behalf of Gillian Guthrie, GEF OFP)	Ministry of Water, Land, Environment & Climate Change (MWLECC)	Director, Environment & Risk Management Division	dorlan.burrell@mwlecc.gov.jm
Roger Chang	Jamaica Solar Energy Association	Immediate Past President	roger@cwjamaica.com
Okley Coke	Planning Institute of Jamaica (PIOJ)	Project Assistant	okley.coke@pioj.gov.jm
Stephen Dennis	PowerGen Limited	Consultant	denniss@powergen.com
Hyacinth Douglas	GEF Small Grants Program	National Coordinator	gefgp@undp.org
Keith Garvey	Rural Electrification Program/Jamaica Public Service Company	Director	kgarvey@jpsco.com

ihana Lee Jeans-Lamb	Operations Associate	UNDP Jamaica	shanalee.jeans@undp.org
Richard Kelly	UNDP Jamaica	Program Specialist	richard.kelly@undp.org
Dwight Lewis	HEART Trust	Head of Department	dwight_lewis@heart-nta.org
Gerald Lindo	MWLECC/Climate Change Division	Senior Technical Officer, Mitigation	gerald.lindo@mwlecc.gov.jm
Paul Lue Lim	PowerGen Limited	Consultant	luelimp@powergen.com
oseph Lunan	HEART Trust	Program Coordinator	joseph_lunan@heart-nta.org
Kimberly McGregor	Petroleum Corporation of Jamaica (PCJ)	Project Officer	kimberly.mcgregor@pcj.com
Novia McKay	UNDP Jamaica	Program Associate	novia.mckay@undp.org
Gail Nelson	PIOJ	Science & Technology Planner	gnelson@pioj.gov.jm
Ruth Potopsingh	University of Technology	Associate Vice President/Sustainable Energy	ruth.potopsingh@utech.edu.jm
Upul Ranaweera	UNDP Jamaica	Monitoring & Evaluation Expert	upul.ranaweera@undp.org
Claon Rowe	PCJ	Senior Project Engineer	claon.rowe@pcj.com
Alston Stoddard	UNDP	Renewable Energy Specialist; PPG Team Leader	alston.stoddard@undp.org

Annex VII: Letter of Agreement (LOA) PCJ/UNDP

Re: Letter of Agreement between UNDP and the Petroleum Corporation of Jamaica on the implementation of *OUTCOME 3* of the *DEPLOYMENT OF RENEWABLE ERNGY AND IMPROVEMENT IN ENERGY EFFICIENCY IN THE PUBLIC SECTOR PROJECT* WITH UNDP SERVING AS IMPLEMENTING PARTNER

1. Reference is made to the consultations between officials of the United Nations Development Programme (hereinafter referred to as "UNDP") in [JAMAICA] and officials of *[Petroleum Corporation of Jamaica*] with respect to the realization of activities by Petroleum Corporation of Jamaica in the implementation of the project [Deployment of Renewable Energy and Improvement in Energy Efficiency in the Public Sector project], as specified in Project Document, to which UNDP has been selected as implementing partner.

2. In accordance with the Project Document and with the following terms and conditions, we confirm our acceptance of the activities to be provided by *[Petroleum Corporation of Jamaica]* towards the project, as specified in Attachment 1: Description of Activities (hereinafter referred to as "Activities"). Close consultations will be held between *[Petroleum Corporation of Jamaica*] and UNDP on all aspects of the Activities.

3. [*Petroleum Corporation of Jamaica*] shall be fully responsible for carrying out, with due diligence and efficiency, all Activities in accordance with its Financial regulations, rules and other directives, only to the extent they are consistent with UNDP's Financial Regulations and Rules. In all other cases, UNDP's Financial Regulations and Rules must be followed.

4. In carrying out the activities under this Letter, the personnel and sub-contractors of *[Petroleum Corporation of Jamaica*] shall not be considered in any respect as being the employees or agents of UNDP. UNDP does not accept any liability for claims arising out of acts or omission of *[Petroleum Corporation of Jamaica*] or its personnel, or of its contractors or their personnel, in performing the Activities or any claims for death, bodily injury, disability, damage to property or other hazards that may be suffered by *[Petroleum Corporation of Jamaica*], and its personnel as a result of their work pertaining to the Activities.

5. Any subcontractors, including NGOs under contract with *[Petroleum Corporation of Jamaica*], shall work under the supervision of the designated official of *[Petroleum Corporation of Jamaica*]. These subcontractors shall remain accountable to *[Petroleum Corporation of Jamaica*] for the manner in which assigned functions are discharged.

6 Upon signature of this Letter, UNDP will make payments to *[Petroleum Corporation of Jamaica*], according to the schedule of payments specified in the Annual Work Plan (AWP), the first of which will be prepared at Project Initiation. The model copy to be utilized is set out below in Attachment 2.

7. *[Petroleum Corporation of Jamaica*] shall not make any financial commitments or incur any expenses which would exceed the budget for the Activities as per Outcome 3 of the Project Document and the total budget (inclusive of co-financing from UNDP) as detailed below in Attachment 3. *[Petroleum Corporation of Jamaica*]] shall regularly consult with UNDP concerning the status and use of funds and shall promptly advise UNDP any time when *[Petroleum Corporation of Jamaica*] is aware that the budget to carry out these Activities is insufficient to fully implement the project in the manner set out in the Attachment 1. UNDP shall have no obligation to provide *[Petroleum Corporation of Jamaica*] with any funds or to make any reimbursement for expenses incurred by *[Petroleum Corporation of Jamaica*]] in excess of the total budget as set forth in Attachment 339.

8. *[Petroleum Corporation of Jamaica*] shall submit a cumulative financial report each quarter (31 March, 30 June, 30 September and 31 December). The report will be submitted to UNDP through the UNDP Country Director or UNDP Resident Representative within 30 days following those dates. The format will follow the standard UNDP expenditure report [a model copy of which is provided as Attachment 4. UNDP will include the financial report by *[Petroleum Corporation of Jamaica*] in the financial report for [Deployment of Renewable Energy and Improvement in Energy Efficiency in the Public Sector, Project ID# 00094832]

9. *[Petroleum Corporation of Jamaica*]] shall submit such progress reports relating to the Activities as may reasonably be required by the project manager in the exercise of his or her duties.

10. *[Petroleum Corporation of Jamaica*]] shall furnish a final report within 12 months after the completion or termination of the Activities, including a list of non-expendable equipment purchased by *[the Government ministry/institution/IGO*]] and all relevant audited or certified financial statements and records related to such Activities, as appropriate, pursuant to its Financial Regulations and Rules.

11. Equipment and supplies that may be furnished by UNDP or procured through UNDP funds will be disposed as agreed, in writing, between UNDP and *[Petroleum Corporation of Jamaica*]].

12. Any changes to the Project Document which would affect the work being performed by *[Petroleum Corporation of Jamaica*] in accordance with Attachment 1 shall be recommended only after consultation between the parties.

13. For any matters not specifically covered by this Letter, the Parties would ensure that those matters shall be resolved in accordance with the appropriate provisions of the Project Document and any revisions thereof and in accordance with the respective provisions of the Financial Regulations and Rules of the [*Petroleum Corporation of Jamaica*] and UNDP.

14. The arrangements described in this Letter will remain in effect until the end of the project, or the completion of activities of *[Petroleum Corporation of Jamaica*]] according to Attachment 1, or until terminated in writing (with 30 days' notice) by either party. The schedule of payments specified in the Annual Work Plan (AWP) to be prepared at project initiation and subsequently at the start of each Year

39 UNDP acknowledges the cash co-financing contribution of USD1, 361,240.00 to be provided by the Petroleum Corporation of Jamaica to support the implementation of Outcome 3, Output 3.2 of the project.

would remain in effect based on continued performance by *[Petroleum Corporation of Jamaica*]] unless it receives written indication to the contrary from UNDP.

15. Any balance of funds that is undispersed and uncommitted after the conclusion of the Activities shall be returned within 90 days to UNDP.

16. Any amendment to this Letter shall be effected by mutual agreement, in writing,

17. All further correspondence regarding this Letter, other than signed letters of agreement or amendments thereto should be addressed to [Dr Arun Kashyap, *Resident Representative, UNDP*].

18. *[Petroleum Corporation of Jamaica*]] shall keep the UNDP Resident Representative fully informed of all actions undertaken by them in carrying out this Letter.

19. UNDP may suspend this Agreement, in whole or in part, upon written notice, should circumstances arise which jeopardize successful completion of the Activities.

20. Any dispute between the UNDP and [*Petroleum Corporation of Jamaica*] arising out of or relating to this Letter which is not settled by negotiation or other agreed mode of settlement, shall, at the request of either party, be submitted to a Tribunal of three arbitrators. Each party shall appoint one arbitrator, and the two arbitrators so appointed shall appoint a third arbitrator, who shall be the chairperson of the Tribunal. If, within 15 days of the appointment of two arbitrators, the third arbitrator has not been appointed, either party may request the President of the International Court of Justice to appoint the arbitrator referred to. The Tribunal shall determine its own procedures, provided that any two arbitrators shall constitute a quorum for all purposes, and all decisions shall require the agreement of any two arbitrators. The expenses of the Tribunal shall be borne by the parties as assessed by the Tribunal. The arbitral award shall contain a statement of the reasons on which it is based and shall be final and binding on the parties.

21. If you are in agreement with the provisions set forth above, please sign and return to this office two copies of this Letter. Your acceptance shall thereby constitute the basis for your *Petroleum Corporation of Jamaica* participation in the implementation of the project.

Yours sincerely,
Signed on behalf of UNDP

Arun Kashyap, Resident Representative

Date 30 June 2015

ANNEX VIII: CO-FINANCING LETTERS

12th Floor Air Jamaica Building
72 Harbour Street, Kingston, Jamaica
Telephone: (876) 922-1598, 948-6168
Email: jpc@cwjamaica.com

24th March 2015

Dr. Arun Kashyap
Resident Representative
United Nations Development Programme
1-3 Musgrave Road
Kingston 5
Jamaica

Subject: Proposed Collaboration with UNDP-GEF Project: "Deployment of Renewable Energy and Improvement of Energy Efficiency in the Public Sector"

Dear Sir:

The Jamaica Productivity Centre (JPC) wishes to thank you for inviting us to participate as a stakeholder in the above captioned UNDP-GEF project, which is designed to assist in Jamaica's ongoing thrust towards a low carbon development path and reduce the country's energy bill through the introduction of renewable energy (RE) and energy efficiency (EE) improvements in the public sector.

As you are aware, the JPC is currently implementing a project: "Developing an Energy Services Company Industry in Jamaica" with funding from the Government of Jamaica the ACP-EU Energy Facility. Through a series of conversations with your Project Preparation Grant Team (PPG Team), we understand that the UNDP-GEF project will:

1. Develop and deliver a series of trainings for a range of audiences:

- Provide two trainings for RE/EE technicians in renewable energy particularly in the solar photovoltaic (PV) sector simultaneously with training for the Electrical Division (Government Electrical Inspectorate) and local government inspectors and environmental inspectors. This training will target renewable and energy efficient technologies with emphasis on solar photovoltaic (PV) systems and solar water heating design and installation, quality control and certification schemes, and retrofitting of solar thermal and energy efficiency systems;

- Provide two trainings to selected staff from financial institutions in matters to build knowledge relating to the benefits, real and perceived risks, and financial performance of RE/EE technologies, risk evaluation, and on energy performance contracting models. The training will also provide an overview of the program's pilot project, which will be to test energy performance contracting (EPC) in the public sector.[40]

- Provide two trainings for procurement, building and energy managers to familiarize them with RE/EE technologies, the financial benefits of these technologies, and the process for procuring, operating and maintaining these technologies. This training will build relevant institutional capacity within public institutions that are participating in the EPC pilot project.

2. Support Jamaica's ongoing regulatory, legislative and policy efforts:

- Review and strengthen the legal and regulatory regime to facilitate scale-up of RE and EE technologies and programmes;

- Support the development momentum of a national ESCO industry by providing assistance to various efforts to development of legislation, regulations, policy and tools (such as procurement procedures and ESCO contracts) necessary for quality assurance, verification and delivery of energy services; and for monitoring and enforcement of the energy services contracts and deliverables.

- Support the ongoing efforts to the Net Billing Programme to provide appropriate quality service standards, simplifying and standardizing the grid connection steps, and supporting efforts to harmonise applicable existing legislation regarding licensing, inspection and grid technical interconnection requirements,

- Collaborate with the Bureau of Standards and Government Electrical Inspectorate to develop laboratories and standards for energy efficiency equipment, testing protocols and certification; and amendment and promulgation of various building legislation in support of equipment quality assurance, enforcement and building design for mandatory inclusion of RE and EE in the structures,

- Support the Bureau of Standards regarding the standards and legislative requirements for labelling RE and EE equipment for consumer decision-making.

3. Demonstrate the viability of RE/EE investments through installed demonstration projects in 5 hospitals as follows:

- Install two 2kW wind projects on two rural schools in partnership with MSTEM.
- Two 100 KW solar PV installation for 2 hospitals
- Five units of solar water heaters 73,480 gallons for each of 5 hospitals

40 Energy Performance Contracting (EPC) is a turnkey service that provides customers with either a selection or a comprehensive suite of energy efficiency and renewable energy measures. An ESCO typically delivers an EPC project, providing services to the public sector including: conducting in-depth energy audits, designing and planning the upgrades, financing, construction and installation, as well as the evaluation and monitoring of energy use over time.

- Replacement of R22 refrigerant with hydrocarbon refrigerant in central air conditioning units (gross 732 tons) and small Refrigerators & Small Air Conditioning Units; insulate 570 ft of refrigeration lines; replace six individual air-conditioning units with high efficiency models; and install one thermal ice-storage with screw chillier.
- Install one Cogeneration (CHP system).
- Large Air Conditioning Systems retrofit/replacements.
- Insulate 427 ft of Steam & Heating System piping.
- Install six heat recovery systems
- Install 960 kVArs of capacitor banks to improve the power factor.
- Replacement of 4335 lighting units with energy efficient LED light bulbs and tubes.
- Replace electric motors with 39 high efficiency models including variable speed drive and 2-speed motors.
- Apply 25,521 sq ft of roof insulation,

4. Demonstrate the viability of RE/EE investments through an EPC pilot project:
    - Enable the public sector to make investments in RE/EE using an energy performance contracting model, whereby an Energy Service Company (ESCO) audits and installs RE and EE building retrofits and is repaid by the participating customer over time based on the reduction of energy savings (kWh).

    - Provide support to EPC pilot project participants throughout the three-year program. Support would include an initial “on board” workshop to launch the program, procurement and contracting guidance, troubleshooting and an annual meeting that brings together all pilot project participants to share progress to date, challenges experienced and lessons learned.

    - UNDP-GEF funds would financially support investments in solar PV, solar water heaters and energy efficiency retrofits in the health sector (five hospitals and clinics) by providing an investment grant of up to 15-20% of the RE/EE investment cost. This investment grant would offset a portion of the investments in RE/EE by the hospitals which is anticipated to be in the range of US$ 4-4.5 million.

When implemented, this UNDP-GEF project will bring added benefits and increase the confidence of all Jamaicans in renewable energy and energy efficiency technologies and related investments. This project aligns with the Government of Jamaica’s efforts to reduce greenhouse gas emissions, meet its 2030 renewable energy targets and reduce public sector spending. Our organisation welcomes this project as a means of augmenting our own efforts to reduce the cost of electricity and improve energy security in Jamaica.

In support of this UNDP-GEF Project, the JPC will provide a co-financing commitment in the form of parallel activities that are underway. This support is tied to the foregoing activities and is valued at USD 120,000. Co-financing support provided by the JPC would be provided in the time window of July 2015 through February 2016 and includes:

1. Parallel activity: The Jamaica Productivity Centre will be conducting a gap analysis to identify key audiences and training needs in order to develop the Jamaican ESCO market

(US$74,000). The findings from this research can be used to inform the training priorities of the UNDP-GEF program.

2. Additionally, JPC is developing a Model Energy Performance Contract (EPC) suitable for Jamaica (US$46,000) which can be used to support the implementation of the EPC pilot.

We look forward to the delivery of this project with all the environmental and social benefit it is envisaged to provide for Jamaica. We sincerely look forward to working with UNDP, Jamaica and other stakeholders on this most important project.

Sincerely yours,

Charles Douglas, Ph.D.

Chief Executive Director

TEL: (876) 929-5380-9 FAX: (876) 929-2409
EMAIL: ica@pcj.com
www.pcj.com

May 15, 2015

Dr. Arun Kashyap
Resident Representative
United Nations Development Programme
1-3 Musgrave Road
Kingston 5

Dear Dr. Kashyap,

Re: Letter of Commitment for Co-Financing for Global Environment Facility *Deployment of Renewable Energy and Improvement of Energy Efficiency in the Public Sector* Project
(GEF PIMS# 4900; Project ID: # 00094832)

This letter confirms the Petroleum Corporation of Jamaica's (PCJ) endorsement of a national project entitled **Deployment of Renewable Energy and Improvement of Energy Efficiency in the Public Sector** proposed through the UNDP for funding by the Global Environment Facility. The time period for the project is September 2015-June 2018.

The PCJ participated in the development of the Project Identification Form (PIF) and now the Project Preparation Grant (PPG) phase of the project and intends to act as a Responsible Party for Outcome 3 of the project.

We recognise that the project is designed to assist in Jamaica's ongoing thrust toward a low carbon development path and reduce the country's energy bill through the introduction of renewable energy (RE) and energy efficiency (EE) improvements in the public sector.

In this regard the PCJ will provide co-financing (cash) in the amount of USD 1,361,240.00.The estimated cost of the Energy Performance Contracting pilot (under Outcome 3) of the project is USD 2,011,240.00 to be jointly financed through the captioned GEF project. The GEF component estimated at US$650,000 will be expended along with the PCJ contribution of **US$1,361,240.00** over the life of the project. We expect the modality of cash transfer to PCJ to be finalized at project initiation.

This component of the project is geared towards investments in RE and EE installations and retrofits using the Energy Performance Contracting model which allows for the recovery of a portion of the spend from the energy savings. The co-financing will be allocated over the three year life of the project.

Yours sincerely,
PETROLEUM CORPORATION OF JAMAICA

Winston L. Watson
Group General Manager

PETROLEUM CORPORATION OF JAMAICA
36 TRAFALGAR ROAD
BOX 579, KINGSTON 10, JAMAICA.

Development Bank 11A-15 Oxford Road, P.O. Box 466, Kingston 5, Jamaica W.I.
Tel: (876) 929-4000; 618-4000

Re: UNDP's Deployment of Renewable Energy and Improvement of Energy Efficiency in the Public Sector Project

The Development Bank of Jamaica believes that this project will augment our efforts to increase the adoption of sustainable energy technologies and practices in Jamaica. We will continue to provide financing for private sector investments in sustainable energy technologies. Based on our historic performance, it is expected that we will disburse funding of US$6M annually to private investors implementing sustainable energy projects in Jamaica. We will also make available to private investors, a non-reimbursable energy audit grant programme where a pool of US$40,000 is made available to conduct at least 25 energy audits annually.

In addition to the above, we will request an approval from our Board of Directors during May 2015 to support the project through in-kind and cash contributions. Once we have received the direction form our Board members we will update you and your project preparation team.

We look forward to close collaboration with the UNDP-GEF project for the fulfillment of the project objectives and improve the adoption and utilization of energy efficiency and renewable energy projects.

Yours sincerely,

Milverton Reynolds
Managing Director

MINISTRY OF HEALTH
OFFICE OF THE PERMANENT SECRETARY
24-26 GRENADA CRESCENT
KINGSTON 5, JAMAICA W.I.

ANY REPLY OR SUBSEQUENT REFERENCE TO THIS COMMUNICATION SHOULD BE ADDRESSED TO THE PERMANENT SECRETARY AND THE FOLLOWING REFERENCE QUOTED

Tele: (876) 633 7905 /633 7934/633-7931
Email Address: harveyk@moh.gov.jm

Ref No. PS/I7

April 27, 2015

Dr. Arun Kashyap
Resident Representative
United Nations Development Programme
1-3 Musgrave Road
Kingston 5
Jamaica

Subject: Proposed Collaboration between UNDP-GEF Project with "Deployment of Renewable Energy and Improvement of Energy Efficiency in the Public Sector)"

Dear Sir:

The Ministry of Health wishes to thank you for inviting us to participate as a stakeholder in the above captioned UNDP-GEF project, which is designed to assist in Jamaica's ongoing thrust towards a low carbon development path and reduce the country's energy bill through the introduction of renewable energy (RE) and energy efficiency (EE) improvements in the public sector.

As you are aware, the Ministry of Health is deeply committed to reducing our energy bill and has already been implementing programmes to introduce renewable energy and energy efficiency improvements in public health facilities. Through a series of conversations with your Project Preparation Grant Team (PPG Team), we understand that the UNDP-GEF project will:

1. Develop and deliver a series of trainings for a range of audiences:

- Provide two trainings for RE/EE technicians in renewable energy particularly in the solar photovoltaic (PV) sector simultaneously with training for the Electrical Division (Government Electrical Inspectorate) and local government inspectors and environmental inspectors. This training will target renewable and energy efficient technologies with emphasis on solar photovoltaic (PV) systems and solar water heating design and installation, quality control and certification schemes, and retrofitting of solar thermal and energy efficiency systems;

- Provide two trainings to selected staff from financial institutions in matters to build

Dr. Arun Kashyap
Resident Representative
United Nations Development Programme

Re: **Proposed Collaboration between UNDP-GEF Project with "Deployment of Renewable Energy and Improvement of Energy Efficiency in the Public Sector)"**

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4. Demonstrate the viability of RE/EE investments through an EPC pilot project:
   - Enable the public sector to make investments in RE/EE using an energy performance contracting model, whereby an Energy Service Company (ESCO) audits and installs RE and EE building retrofits and is repaid by the participating customer over time based on the reduction of energy savings (kWh).

   - Provide support to EPC pilot project participants throughout the three-year program. Support would include an initial "on board" workshop to launch the program, procurement and contracting guidance, troubleshooting and an annual meeting that brings together all pilot project participants to share progress to date, challenges experienced and lessons learned.

   - UNDP-GEF funds would financially support investments in solar PV, solar water heaters and energy efficiency retrofits in the health sector (five hospitals and clinics) by providing an investment grant of up to 15-20% of the RE/EE investment cost. This investment grant would offset a portion of the investments in RE/EE by the hospitals which is anticipated to be in the range of US$ 4-4.5 million.

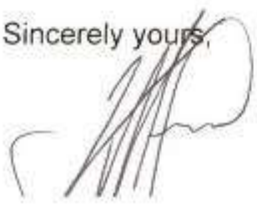
When implemented, this UNDP-GEF project will bring added benefits and increase the confidence of all Jamaicans in renewable energy and energy efficiency technologies and related investments. This project aligns with the Government of Jamaica's efforts to reduce greenhouse gas emissions, meet its 2030 renewable energy targets and reduce public sector spending. Our organisation welcomes this project as a means of augmenting our own efforts to reduce the cost of electricity and improve energy security in Jamaica.

In support of this UNDP-GEF Project, the MoH will provide a provisional co-financing commitment in the form of in-kind support. This support is tied to the foregoing activities and is valued at approximately USD 65,000.00. Co-financing support provided by the Ministry of Health would be provided over the four year planning and implementation period and includes:

1. Participation in planning and implementation Committees and meetings.
2. Provision of technical and operations support at the selected hospital locations.

We look forward to the delivery of this project with all the environmental and social benefit it is envisaged to provide for Jamaica. We sincerely look forward to working with UNDP, Jamaica and other stakeholders on this most important project.

Sincerely yours,



United Nations Development Programme

RR/2015/520

20 May 2015

Dear Ms. Dinu,

Re: Letter of Commitment for Co-financing for Global Environment Facility *Deployment of Renewable Energy and Improvement of Energy Efficiency in the Public Sector* Project

The United Nations Development Programme Country Office hereby confirms its commitment of US$30,000 to the implementation of the UNDP-GEF ***Deployment of Renewable Energy and Improvement of Energy Efficiency in the Public Sector*** project. This will be in the form of cash contribution to be administered throughout the project and allocated in the second year of the project.

We look forward to successful completion of this valuable project.

Yours sincerely,

Arun Kashyap
UN Resident Coordinator
UNDP Resident Representative

Ms. Adriana Dinu
GEF Executive Coordinator
United Nations Development Programme
One United Nations Plaza
New York, NY 10017

Delivery Address: 1-3 Lady Musgrave Road, Kingston 5, **Postal Address:** P.O. Box 280, Kingston, JAMAICA.
Telephone: (876) 978-2390-9. **Fax:** (876) 946-2163, **E-mail:** registry.jm@undp.org

April 16, 2015

Dr Arun Kashyap
Resident Representative
United Nations Development Programme
1-3 Musgrave Road
Kingston 5

Dear Dr Kashyap,

Re: Letter of Commitment for Parallel Investment for Global Environment Facility Deployment of Renewable Energy and Improvement of Energy Efficiency in the Public Sector Project

The GEF Small Grants Programme (Jamaica) wishes to thank you for inviting us to participate in the above captioned UNDP-GEF project, which is designed to assist in Jamaica's ongoing thrust towards a low carbon development path and reduce the country's energy bill through the introduction of renewable energy (RE) and energy efficiency (EE) improvements in the public sector.

As you are aware, GEF SGP Jamaica is involved in promoting renewable energy through awarding of grants to local urban and rural based NGOs/CBOs. In support of this UNDP-GEF Project, the GEF SGP will provide parallel investment through our local implementing partners in 5 renewable energy and energy efficiency projects in school and community centres used for training, social services and income generation (benefitting over 11,000 persons) over the period 2015-2017. The combined value of these projects is **US$423,800** and the total amount to be expended over the 2015-2017 is **US$313,300**.

Yours sincerely,
GEF SMALL GRANTS PROGRAMME (JAMAICA)

Reverend Gary Harriott
Chairman

NB: Please note that this is no way co-financing towards the project.

United Nations Development Programme (UNDP) Building
1-3 Lady Musgrave Road, Kingston 5, Jamaica. Tel: (876) 978-2390-9
Website: http://sgp.undp.org
"GEF SGP: Thinking Globally, Acting Locally"

Department of Energy
Washington, DC 20585

Dr. Arun Kashyap
Resident Representative
United Nations Development Programme
1-3 Musgrave Road
Kingston 5, Jamaica

April 1, 2015

Subject: Proposed Collaboration between UNDP-GEF Project with "Deployment of Renewable Energy and Improvement of Energy Efficiency in the Public Sector"

The Office of Energy Efficiency and Renewable Energy (EERE) of the U.S. Department of Energy wishes to thank you for including us as a stakeholder in the above captioned UNDP-GEF project. I am glad to know that the above-mentioned submission has been selected for funding, as I understand that its aims for the deployment of renewable energy (RE) and energy efficiency (EE) technologies align closely with projects in my portfolio.

I will continue to provide resources to the several projects within my portfolio, including the *Islands Playbook* and *Island Energy Scenario Tool* that will help ensure the success of the project. While this letter is not a commitment to provide funding to the project, I do look forward to collaborating with the PPG Team to ensure its successful delivery.

Sincerely yours,

Jennifer DeCesaro

Jennifer DeCesaro
Director, Technology-to-Market
U.S. Department of Energy
Office of Energy Efficiency and Renewable Energy

Asha Bobb-Semple

From: DeCesaro, Jennifer <Jennifer.DeCesaro@ee.doe.gov>
Sent: 10 April, 2015 08:38
To: Christina Becker-Birck
Cc: Elsie Laurence-Chounoune; Asha Bobb-Semple
Subject: RE: DOE & UNDP Jamaica Cooperation

Christina-

As a follow-up to our call earlier this week, I want to reiterate that DOE plans to provide technical assistance support to the UNDP-GEF Jamaica project. Although when we first spoke I thought it would not be a problem to include such language in the co-financing letter, after speaking with our procurement lawyers, learned that we are unable to do so. However, that does not alter our commitment to the project.

Please let me know if you would like to discuss further.

All the best,

Jenn

Jennifer DeCesaro | U.S. Department of Energy | O: 202.586.1989 | M: 202.368.6143 | jennifer.decesaro@ee.doe.gov

Executive Assistant | Carla Ford | O: 202.586.9197 | carla.ford@ee.doe.gov

---

From: Christina Becker-Birck <christina.becker-birck@mc-group.com>
Date: Friday, April 3, 2015 5:40 PM
To: Jennifer DeCesaro <Jennifer.DeCesaro@ee.doe.gov>, Asha Bobb-Semple <asha.bobb.semple@undp.org>, Elsie Laurence-Chounoune <elsie.chounoune@undp.org>
Subject: Re: DOE & UNDP Jamaica Cooperation

Hi Jenn,
Thank you for DOE's co-financing letter to support this UNDP Jamaica project. We'd previously discussed that DOE may be able to access support from NREL in the form of technical assistance. Is this still a possibility and if so, could it be stated more explicitly in the letter?
Regards,
Christina

From: <DeCesaro>, Jennifer DeCesaro <Jennifer.DeCesaro@ee.doe.gov>
Date: Wednesday, April 1, 2015 4:18 PM
To: Christina Becker-Birck <christina.becker-birck@mc-group.com>, Asha Bobb-Semple <asha.bobb.semple@undp.org>, Elsie Laurence-Chounoune <elsie.chounoune@undp.org>
Subject: RE: DOE & UNDP Jamaica Cooperation

Christina-

Please find attached DOE's co-financing letter for this effort. I hope this meets the needs/requirements for this effort.

We look forward to working with everyone on this very important initiative.

All the best,

Jenn

Jennifer DeCesaro | U.S. Department of Energy | O: 202.586.1989 | M: 202.368.6143 | jennifer.decesaro@ee.doe.gov

Executive Assistant | Carla Ford | O: 202.586.9197 | carla.ford@ee.doe.gov

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From: Christina Becker-Birck [mailto:christina.becker-birck@mc-group.com]
Sent: Monday, March 23, 2015 9:47 AM
To: DeCesaro, Jennifer; Asha Bobb-Semple; Elsie Laurence-Chounoune
Subject: Re: DOE & UNDP Jamaica Coooperation

Dear Jenn,
As promised, attached you'll find the detailed Project Document (draft) to serve as further detail for your conversations with DOE colleagues about cooperation with the UNDP Jamaica office on this project. I'm also reattaching the template co-financing letter which provides a high-level overview.
Look forward to catching up about this in St Thomas this week.
Regards,
Christina

From: Christina Becker-Birck <christina.becker-birck@mc-group.com>
Date: Wednesday, March 18, 2015 7:47 PM
To: Jennifer DeCesaro <Jennifer.DeCesaro@ee.doe.gov>, Asha Bobb-Semple <asha.bobb.semple@undp.org>, Elsie Laurence-Chounoune <elsie.chounoune@undp.org>
Subject: DOE & UNDP Jamaica Coooperation

Dear Jenn, Elsie & Asha,

I'm glad we were all able to connect yesterday. Looping all of you together so you have each other's contact information. Per our call yesterday:

- Jenn to review the attached co-financing letter template and to begin having conversations with DOE folks about the program and areas where DOE could provide support
- We will send you the updated Project Document ASAP (likely Friday) for Jenn to identify areas where technical assistance could be provided (e.g. With regards to developing the training program). In the meantime, attached is an excerpt of the training program so far.
- Jenn to share updates with us on conversations with CDB as they progress

Let's plan to catch up next early week – whether it's in person, Jenn, or as a group to discuss next steps.

All the best,
Christina

Christina Becker-Birck
Director
Meister Consultants Group, Inc.
745 Atlantic Ave, 3rd Floor
Boston, MA 02111 | USA
Office: +1.617.209.1980 | Mobile: +1.518.312.2313 | www.mc-group.com

Development Bank of Jamaica Limited
11A-15 Oxford Road, P.O. Box 466, Kingston 5, Jamaica W.I.
Tel: (876) 929-4000; 619-4000
Fax: (876) 929-6055
Website: www.dbankjm.com

July 2, 2015

Dr. Arun Kashyap
Resident Representative
United Nations Development Programme
1-3 Lady Musgrave Road
Kingston 10, Jamaica

Dear Dr. Arun Kashyap:

Re: UNDP's Deployment of Renewable Energy and Improvement of Energy Efficiency in the Public Sector Project

The Development Bank of Jamaica (DBJ) has received an approval from our Board of Directors to provide in-kind and cash contributions towards the captioned programme in amounts equivalent to J$55M. The counterpart funding will be allocated in the following categories:

Co-financing activities for the project	Value	Contribution Type	Description
I. Establish an Energy Line for Credit for ESCOs to access (this will be a subset of our existing Energy Line)	J$ 50M	Parallel Investment	The product should have the same terms (interest rate and tenure) as our current energy line of credit. It is proposed that this line of credit will be supported by our CEF product.
II. Energy Audit Grants seperate from our Energy Audit Grant Programme	J$ 3M	Grant Funding	A pool of grant funds of J$3M is made available to conduct enery audits at the health facilities under the project.
III. Capacity Building Suport	J$ 2M	Grant Funding	To build the capacity for AFIs and industry players. It is proposed that this activity be coordinated by the DBJ.

Prior to signing the Co-Financing Agreement with the UNDP, the DBJ reserves the right to make amendments and recommendations to specific conditions in the agreement.

We expect that the project will have the following benefits to the wider economy and individual beneficiaries:

- ✓ An increase in the use of renewable technologies will result in the reduction of fossil fuel usage for electricity production and a reduction in the amount of carbon emissions.
- ✓ Increase the uptake of the DBJ's energy fund by project developers

Annex IX: Terms of Reference for Project Staff and Consultants

National Project Manager (NPM) (142 weeks):

Duties and Responsibilities:

The incumbent will be responsible for implementation of the project, including mobilization of all project inputs, supervision of project staff, consultants and oversight of sub-contractors. The PM will be the leader of the Project Team (PT) and shall liaise with the government, UNDP, and all stakeholders involved in the project. S/he will be specifically responsible for (a) overall management of the project, (b) work closely with project stakeholders and ensure the project deliveries as per project document and work plan, (c) ensure technical coordination of the project and the work related to legal and institutional aspects, (d) mobilize all project inputs in accordance with UNDP procedures and GEF principles, (e) finalize the ToR for the consultants and subcontractors and coordinate with UNDP Procurement for recruitment, procurement and contracting, (f) supervise and coordinate the work of all project staff, consultants and sub-contractors, (g) ensure proper management of funds consistent with UNDP requirements, and budget planning and control, (h) prepare and ensure timely submission of monthly reports, quarterly consolidated financial reports, quarterly consolidated progress reports, annual, mid-term and terminal reports, and other reports as may be required by UNDP; (i) submit the progress reports and key issue report to the **National Steering Committee**, (j) prepare quarterly and annual work plan, (k) provide regular input to UNDP corporate system ATLAS for financial and program management on project progress, financial status and various logs, (l) arrange for audit of all project accounts for each fiscal year (m) undertake field visit to ensure quality of work, and (n) undertake any activities that may be assigned by UNDP and **National Steering Committee**.

Qualifications and Experience:

The incumbent should have a minimum Bachelor degree in Engineering with MBA/Master degree or Masters in energy/environment or other relevant academic discipline and profession qualifications with at least ten (10) years professional experience at senior level. S/he should have extensive experience and technical ability to manage a large project and a good technical knowledge in the fields related to private sector development, climate change, energy efficiency and institutional development and/or regulatory aspects. S/he must have effective interpersonal and negotiation skills proven through successful interactions with all levels of project stakeholder groups, including senior government officials, financial sectors, private entrepreneurs, technical groups and communities. S/he should have ability to effectively coordinate a complex, multi-stakeholder project and to lead, manage and motivate teams of international and local consultants to achieve results. Good capacities for strategic thinking, planning and management and excellent communication skills in English are essential. Knowledge of UNDP project implementation procedures, including procurement, disbursements, and reporting and monitoring will be an added advantage.

Additional roles and responsibilities include:

- In close collaboration with the CTA, provide a baseline for skills and absorptive capacity within the ECRE to promote and regulate RE development, and with prospective RE managers, operators and plant personnel to manage an RE plant or an RET diffusion program;

- Consult with relevant institutions, government officers, financial institutions, and the consulting industry on the RE knowledge gaps of these stakeholders;
- Design and deliver appropriate training materials and workshops on RE planning, design, implementation, operation and maintenance as well as financing of RE projects.

Finance and Admin Assistant (AA) Part time- 71 weeks:

Duties and Responsibilities:

The incumbent will be responsible to provide overall administration and financial services of the project such as processing payments, raising requisition, purchase order, projects logs etc. using UNDP corporate software ATLAS. S/he will be responsible to provide information to UNDP Project web, RRMC reporting and administrative trouble shooting. S/he will also perform (a) word processing, drafting routine letters/messages/reports, mailing (b) arrange travel, itinerary preparation for project related travels, (c) assist to arrange workshops/seminar/training programs and mailing, (d) work at reception desk and make appointments and schedule meeting, (e) assist in work-plan and budgeting, (f) photocopying, binding and filing, (g) maintenance of all office equipment and keeping inventory/records of supplies and their usage and any other duties assigned by Project Manager or concerned officials.

Qualifications and Experience:

The incumbent should have at least a Bachelor degree in any discipline from a recognized university. S/he should have at least 3 years relevant working experience with foreign aided projects or international development or organizations. Computer proficiency in MS Office (Word, Excel and PowerPoint) and other common software is a prerequisite. Diploma in computer/secretarial science is desirable but not essential. Basic knowledge in procurement, petty cash handling, logistics supports, and filling systems is a basic requirement. Knowledge of UNDP project implementation procedures, including procurement, disbursements, and reporting and monitoring is preferable. Fluent both in written and spoken English is required.

Key Short-term Consultants

Detailed TORs of the national and international consultants will be developed during the Project Inception period, in the first 3 months after project start-up, by the NPM in consultation with UNDP and the implementing partners.

International Consultant – Energy Performance Contracting Expertise

Duties & Responsibilities

The Energy Performance Contracting (EPC) International Consultant will be responsible for supporting the design of the UNDP-GEF EPC pilot programme. The consultant will build upon the framework established by UNDP-GEF in the Project Document with the aim of:

- Provide a comprehensive baseline of international and regional experiences in EPCs
- Designing a sustainable pilot programme that enables its participants to have the tools and resources to enter into energy performance contracts during the pilot programme's implementation period and in the future.

- Creating a strong network in Jamaica that fosters knowledge sharing among pilot program participants.
- Promoting the pilot programme's experience, successes and lessons learned in order to create demand for the use of performance contracting models in the Jamaican public sector (health sector and beyond).
- Working together with project partner41 to build capacity and institutionalize knowledge in Jamaica to ensure future programme scale-up.
- Formulating a robust training program together with the National Consultant, PCJ and UNDP-GEF that aligns with pilot program participants needs and supports wider scale up of the EPC pilot programme in Jamaica.
- Collaborate with PCJ, JPC and DBJ to update the existing EPC model contract template

Tasks of the International Consultant include:

1. **UNDP-GEF EPC Pilot Program Design**
    a. Conduct a gap analysis. Building on work conducted in parallel with the Jamaica Productivity Centre, identify gaps (e.g. regulatory, financial, social) that might constrain the effectiveness of the EPC pilot programme and develop associated mitigation approaches.
    b. Conduct an assessment to determine the extent to which RE and EE projects benefit or are disadvantaged under the current financial mechanisms, demographics of the potential borrowers, and an assessment of the potential real demand/appetite for ESCO financing
    c. Prepare pilot programme design and associated documentation which will include:
        i. A detailed pilot programme plan including steps, milestones, implementation timelines, key documents and roles of key partners
        ii. A final model EPC contract (task includes reviewing and modifying model EPC contract prepared by JPC, if needed)
        iii. Review of monitoring & evaluation framework prepared by the National Consultant
        iv. Review of PCJ's auditing outcomes and proposed implementation plan for each energy performance contract (lead reviewer is National Consultant)
2. **Development of Training Materials & Delivery of Associated Trainings**
    a. Training curriculum for financial institutions. Develop and deliver a training curriculum for financial institutions that aims to:
        i. Deepen lender understanding of analyzing the risks, opportunities and paybacks of RE/EE investments
        ii. Make lenders more comfortable with energy performance contracting including the role of the ESCO, the project financing component and the project savings guarantee
        iii. Introduce lenders to the UNDP-GEF supported EPC projects and the proposed model
    b. Training/orientation curriculum for pilot programme participants. Develop and deliver a training curriculum for EPC pilot program participants and key

41 Pilot programme participants include the Petroleum Corporation of Jamaica (implementing agency), EPC pilot programme participants, the programme's National Consultant and UNDP-GEF.

stakeholders (i.e. PCJ, hospital administrators and senior facilities managers, UNDP Jamaica) that aims to:

i. Familiarize participants the program's goals, processes, and support available.
ii. Provide participants with necessary tools and resources for successful execution of EPC contracts

c. Ongoing support to EPC pilot programme participants, as needed. This support could include provision of on-call support (e.g. with contract negotiation, review of hospital plans).
d. Work with Project Office to ensure effective pilot programme monitoring and evaluation

Qualifications & Expertise

The consultant or firm shall have at least 5 years of experience with renewable energy, finance and programme development in the Caribbean region. The consultant will be knowledgeable on:

- Public sector project finance and energy performance contracting
- Programme design, implementation and local capacity building
- Development and/or review of energy performance contracts and associated project contracting materials
- International best practices on energy performance contracting, investment de-risking approaches, and programme design
- Designing and delivering trainings to public administrators, policymakers, and regulators on renewable energy and finance topics.

This project will be conducted in English and an excellent command of written and spoken English is necessary.

Legal Expert - Legal and Regulatory Review

Overall Objective The objective of this consultancy is to review the current energy and electricity sector laws of Jamaica to make recommendations for supporting policy and regulatory framework in particular in areas related to the ESCO industry; codified system for licensing, Net Billing, inspection, licensing and certification of RE and EE equipment, systems and products; and building regulations, thereby making the legislation relevant to sustainable energy development in Jamaica.

Purpose

To review existing legal and regulatory framework with a view to making the necessary adjustments to facilitate the scale-up of renewable energy and energy efficiency develop in Jamaica. The review will engender a number of legal and regulatory adjustments aimed at creating an enabling framework to augment the exploitation of RE particularly solar photovoltaics and to promote greater efficiency of energy use. The Consultant will be required to provide appropriate recommendations where necessary

Duties and Responsibilities

The Consultant will be required to undertake the following activities to fulfil his/her obligations under this contract:

- Participate in a briefing meeting with the implementation agency of the project (the UNDP Country Office);
- Submit an Inception Report with must include work plan, time scale, methodology, etc.
- Conduct a desk research to review various project documentations, policy documents, studies, reports etc. on previous and ongoing work in renewable energy and energy efficiency in Jamaica to be familiar with the developments in RE so that the information gathered can inform the completion of the assignment;
- Interface with key stakeholders such as the Office of Utilities Regulations (OUR), MSTEM/PCJ, BSOJ, etc. to ascertain the status of RE in the Jamaica;
- Review ways to build upon the Jamaica Productivity Centre's ESCO project to support development of the institutional and regulatory framework, policy, protocol and regulations to govern the ESCO industry as well as standards and norms to achieve energy certification.
- Develop a codified system for licensing, Net Billing, inspection, licensing and certification of RE and EE equipment, systems and products (e.g. solar water heating and photo voltaic, and energy efficient air conditioning & lighting) in the Jamaican health sector which can be applicable to the rest of the public and the commercial sector.
- An analysis of the current building regulations with a view to assist with legal fees 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 rooftop PV systems and energy efficiency applications in public buildings;

Qualifications and Experience

(i) Candidate must possess post graduate qualifications and experience in legislative drafting with a sound knowledge of Energy including seven years (7) standing at the Bar.
(ii) Candidate must possess a sound knowledge the current energy issues, trends and perspectives, including a the range of RE options and possibilities in respect of the Caribbean and Jamaica in particular
(iii) Candidates should be fluency in the English Language with excellent analytical and communication skills. He/she must be computer proficient in MS Office Suite and a digital project management tool such as MS Project.

Project Officer (to be based at PCJ)- Part time 71 weeks

Duties and Responsibilities:

The Project Officer will be responsible for the implementation of Component 3 of the project, responsibilities include including:

- General monitoring of project progress to ensure that it meets the overall goal and objectives and that they continue to be in line with national development objectives;
- Responsibility for logistics and administrative support of project implementation, including administrative management of the project budget, required technical support, etc.
- Maintaining up-to-date business and financial documentation in accordance with UNDP and other project reporting requirements;
- Organising meetings, business correspondence and other communications with the project stakeholders;
- Disseminating relevant information to stakeholders and network with similar projects to develop areas of collaboration
- Preparing and updating projects documents and preparing the required
- financial and other reports required for monitoring and supervision of project progress;
- Developing Terms of Reference for the hiring of consultants, ensure contracts are prepared accordingly and in a timely manner, organising correspondence and in ensuring effective implementation of the project.

Expected Qualifications:

(i) Candidate must have at least a first degree in civil engineering or a related field and a post graduate degree in project management.
(ii) Candidates should be fluency in the English Language with excellent analytical and communication skills. He/she must be computer proficient in MS Office Suite and a digital project management tool such as MS Project.
(iii) Demonstrated experience and success of working in a similar position;
(iv) Good administration and interpersonal skills;
(v) Ability to work with other and effectively under pressure;
(vi) Familiarity and prior experience with UNDP and GEF requirements and procedures are considered an asset.

Annex X: GEF OFP Endorsement and Project Identification Form (PIF)

MINISTRY OF WATER, LAND, ENVIRONMENT, AND CLIMATE CHANGE

16A HALF WAY TREE ROAD, KINGSTON 5, JAMAICA W.I.
TELEPHONE: (876) 926-8583, (876) 633-7500, FAX: (876) 920-7267

ANY REPLY OR SUBSEQUENT REFERENCE TO THIS COMMUNICATION SHOULD BE ADDRESSED TO THE PERMANENT SECRETARY AND THE FOLLOWING REFERENCE NUMBER QUOTED:

May 22, 2015

Ms. Adriana Dinu
Officer-In-Charge and Deputy Executive Coordinator
UNDP-GEF
304 East 45th Street, 9th Floor
New York, NY 10017 USA

Dear Ms. Dinu,

Endorsement for Deployment of Renewable Energy and Improvement of Energy Efficiency in the Public Sector Project

In my capacity as GEF Operational Focal Point for Jamaica, I confirm that the captioned project proposal: (a) is in accordance with my government's national priorities and our commitment to the relevant global environmental conventions; and (b) was discussed with relevant stakeholders, including the global environmental convention focal points.

I am pleased to endorse the preparation of the abovementioned project proposal with the support of the United Nations Development Programme (UNDP). If approved, the proposal will be prepared and implemented by the UNDP/Petroleum Corporation of Jamaica (PCJ). I request the GEF Agency to provide a copy of the project document before it is submitted to the GEF Secretariat for CEO endorsement.

The total financing (from the GEFTF) being requested for this project is US$1,483,710, inclusive of project preparation grant (PPG), if any, and Agency fees for project cycle management services associated with the total GEF grant. The financing requested for Jamaica is detailed in the table below.

Source of funds	GEF Agency	Focal Area	Amount in US$			
			Project Preparation	Project	Fee	Total
GEF Trust Fund	UNDP	CC	100,000	1,254,987	128,723	1,483,710
Total GEF Resources			**100,000**	**1,254,987**	**128,723**	**1,483,710**

I consent to the utilization of funds for this proposal from Jamaica's allocation for climate change in GEF-5 as defined in the System for Transparent Allocation of Resources (STAR).

Sincerely,

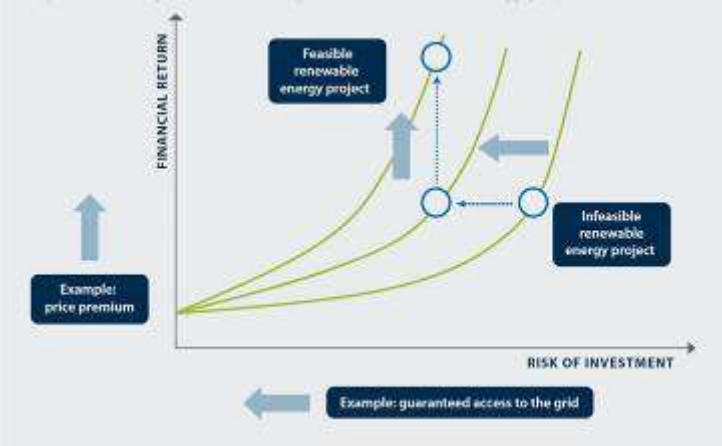
Gillian Guthrie (Miss)
for Permanent Secretary

2

ANNEXES

I. UNDP-GEF DE-RISKING APPROACH:

1. The project will mainly focus on policy de-risking measures (see figure below) to address the fiscal constraints associated to the IMF restriction on public expenditure in Jamaica; thereby, shifting the risk-reward profile of proposed financial incentives to RE/EE investments:



Source: UNDP

Annex XI. Social and Environmental Screening Template

The completed template, which constitutes the Social and Environmental Screening Report, must be included as an annex to the Project Document. Please refer to the Social and Environmental Screening Procedure and Toolkit for guidance on how to answer the 6 questions.

Project Information

Project Information	
1. Project Title	Deployment of Renewable Energy and Improvement of Energy Efficiency in the Public Sector
2. Project Number	4900
3. Location (Global/Region/Country)	LAC/Jamaica

Part A. Integrating Overarching Principles to Strengthen Social and Environmental Sustainability

QUESTION 1: How Does the Project Integrate the Overarching Principles in order to Strengthen Social and Environmental Sustainability?
Briefly describe in the space below how the Project mainstreams the human-rights based approach
The project recognises the human rights of all the persons it is likely to impact. The right to agree and disagree, to choose, respect for everyone including the disadvantaged and marginalised are core principles promoted by the project. It was launched by engaging the participation of a wide cross section of stakeholders to elicit feedback with respect to the project concept and modality and any issue of human rights that may likely to arise. There was a second stakeholders' consultation in which detailed discussions on various aspects of the proposed project document was held. The views and opinion were noted and addressed in the final document within the objectives of the project. The project is designed with an extensive awareness component targeting institutions, civil society and policy makers including financiers. It is also designed to encourage the participation to disadvantaged groups such as women and youths. There would be several employment opportunities emanating during and after the implementation of the project. These job creation opportunities will positively impact those marginalised groups

and would assist in the reduction of the incidence of poverty that they experience. The mater of safety for the individual will be enforced during the implementation of the hardware phase.

Briefly describe in the space below how the Project is likely to improve gender equality and women's empowerment

The project is envisaged to provide several benefits. Among them are job opportunities for both men and women. At the inception of the training programmes equal opportunities would be offered to both gender to participate. Particular effort will be made to inform women's group which will ensure that their constituents are mobilised to attend and participate. The training programmes will pay special attention to weaknesses that are common women so as to ensure that they are minimised and managed so that they are not at any disadvantage and that they (women) can take full advantage of all opportunities. Following the training programmes, a database will be developed

Briefly describe in the space below how the Project mainstreams environmental sustainability

At the design stage of the project, itsmajor outputs and activities were aligned to a number of national policies aimed at mainstreaming environmental sustainability. Notwithstanding the fact that the project is focusing on climate mitigation, adoption is also critical to the environmental sustainability of Jamaica. The project is addressing the issues of establishing new guidelines for a modernised National Building Code particularly through new buildings standards that will strengthen the resistance of buildings to withstand hurricanes and other natural events across the island.

The project is primarily promoting mitigation measures in renewable energy technologies such as solar photovoltaic,solar thermal energy and energy efficiency measures to reduce the high cost of electricity and lesson the demand for fossil fuel based energy. These measures of course, support a number of policy initiatives and national projects including Jamaica Energy Policy 2009-2030 and the Draft Carbon Trading Emission Trading policy, *The development and implementation of renewable energy projects, The implementation of an island wide Compact Fluorescent Bulb (CFL) Replacement Project and* Public Education and Awareness.

Part B. Identifying and Managing Social and Environmental Risks

QUESTION 2: What are the Potential Social and Environmental Risks? *Note: Describe briefly potential social and environmental risks identified in Attachment 1 – Risk Screening Checklist (based on any "Yes" responses). If no risks have been identified in Attachment 1 then note "No Risks Identified" and skip to Question 4 and Select "Low Risk". Questions 5 and 6 not required for Low Risk Projects.*	**QUESTION 3: What is the level of significance of the potential social and environmental risks?** *Note: Respond to Questions 4 and 5 below before proceeding to Question 6*			**QUESTION 6: What social and environmental assessment and management measures have been conducted and/or are required to address potential risks (for Risks with Moderate and High Significance)?**
Risk Description ***No identifiable risks***	***Impact and Probability (1-5)***	***Significance (Low, Moderate, High)***	***Comments***	***Description of assessment and management measures as reflected in the Project design. If ESIA or SESA is required note that the assessment should consider all potential impacts and risks.***
Risk 1: ….	I = P =		**Not applicable**	
Risk 2 ….	I = P =			
Risk 3: ….	I = P =			
Risk 4: ….	I = P =			
[add additional rows as needed]				

QUESTION 4: What is the overall Project risk categorization?		
Select one (see SESP for guidance)		**Comments**
Low Risk	√☐	**The project does not pose any perceived social and environmental risk.**
Moderate Risk	☐	
High Risk	☐	

	QUESTION 5: Based on the identified risks and risk categorization, what requirements of the SES are relevant?		
	Check all that apply		**Comments**
	Principle 1: Human Rights	☐	None of the proceeding categories is applicable
	Principle 2: Gender Equality and Women's Empowerment	☐	
	1. Biodiversity Conservation and Natural Resource Management	☐	
	2. Climate Change Mitigation and Adaptation	☐	
	3. Community Health, Safety and Working Conditions	☐	
	4. Cultural Heritage	☐	
	5. Displacement and Resettlement	☐	
	6. Indigenous Peoples	☐	
	7. Pollution Prevention and Resource Efficiency	☐	

Final Sign Off

Signature	***Date***	***Description***
QA Assessor		UNDP staff member responsible for the Project, typically a UNDP Programme Officer. Final signature confirms they have "checked" to ensure that the SESP is adequately conducted.
QA Approver		UNDP senior manager, typically the UNDP Deputy Country Director (DCD), Country Director (CD), Deputy Resident Representative (DRR), or Resident Representative (RR). The QA Approver cannot also be the QA Assessor. Final signature confirms they have "cleared" the SESP prior to submittal to the PAC.
PAC Chair		UNDP chair of the PAC. In some cases PAC Chair may also be the QA Approver. Final signature confirms that the SESP was considered as part of the project appraisal and considered in recommendations of the PAC.

SESP Attachment 1. Social and Environmental Risk Screening Checklist

Checklist Potential Social and Environmental Risks		
Principles 1: Human Rights		**Answer (Yes/No)**
1.	Could the Project lead to adverse impacts on enjoyment of the human rights (civil, political, economic, social or cultural) of the affected population and particularly of marginalized groups?	No
2.	Is there a likelihood that the Project would have inequitable or discriminatory adverse impacts on affected populations, particularly people living in poverty or marginalized or excluded individuals or groups? 42	No
3.	Could the Project potentially restrict availability, quality of and access to resources or basic services, in particular to marginalized individuals or groups?	No
4.	Is there a likelihood that the Project would exclude any potentially affected stakeholders, in particular marginalized groups, from fully participating in decisions that may affect them?	No
5.	Is there a risk that duty-bearers do not have the capacity to meet their obligations in the Project?	No
6.	Is there a risk that rights-holders do not have the capacity to claim their rights?	No
7.	Have local communities or individuals, given the opportunity, raised human rights concerns regarding the Project during the stakeholder engagement process?	No
8.	Is there a risk that the Project would exacerbate conflicts among and/or the risk of violence to project-affected communities and individuals?	No
Principle 2: Gender Equality and Women's Empowerment		
1.	Is there a likelihood that the proposed Project would have adverse impacts on gender equality and/or the situation of women and girls?	No
2.	Would the Project potentially reproduce discriminations against women based on gender, especially regarding participation in design and implementation or access to opportunities and benefits?	No

42 Prohibited grounds of discrimination include race, ethnicity, gender, age, language, disability, sexual orientation, religion, political or other opinion, national or social or geographical origin, property, birth or other status including as an indigenous person or as a member of a minority. References to "women and men" or similar is understood to include women and men, boys and girls, and other groups discriminated against based on their gender identities, such as transgender people and transsexuals.

3.	Have women's groups/leaders raised gender equality concerns regarding the Project during the stakeholder engagement process and has this been included in the overall Project proposal and in the risk assessment?	No
4.	Would the Project potentially limit women's ability to use, develop and protect natural resources, taking into account different roles and positions of women and men in accessing environmental goods and services? *For example, activities that could lead to natural resources degradation or depletion in communities who depend on these resources for their livelihoods and well being*	No
Principle 3: Environmental Sustainability: Screening questions regarding environmental risks are encompassed by the specific Standard-related questions below		
Standard 1: Biodiversity Conservation and Sustainable Natural Resource Management		
1.1	Would the Project potentially cause adverse impacts to habitats (e.g. modified, natural, and critical habitats) and/or ecosystems and ecosystem services? *For example, through habitat loss, conversion or degradation, fragmentation, hydrological changes*	No
1.2	Are any Project activities proposed within or adjacent to critical habitats and/or environmentally sensitive areas, including legally protected areas (e.g. nature reserve, national park), areas proposed for protection, or recognized as such by authoritative sources and/or indigenous peoples or local communities?	No
1.3	Does the Project involve changes to the use of lands and resources that may have adverse impacts on habitats, ecosystems, and/or livelihoods? (Note: if restrictions and/or limitations of access to lands would apply, refer to Standard 5)	No
1.4	Would Project activities pose risks to endangered species?	No
1.5	Would the Project pose a risk of introducing invasive alien species?	No
1.6	Does the Project involve harvesting of natural forests, plantation development, or reforestation?	No
1.7	Does the Project involve the production and/or harvesting of fish populations or other aquatic species?	No
1.8	Does the Project involve significant extraction, diversion or containment of surface or ground water? *For example, construction of dams, reservoirs, river basin developments, groundwater extraction*	No
1.9	Does the Project involve utilization of genetic resources? (e.g. collection and/or harvesting, commercial development)	No
1.10	Would the Project generate potential adverse trans boundary or global environmental concerns?	No

1.11	Would the Project result in secondary or consequential development activities which could lead to adverse social and environmental effects, or would it generate cumulative impacts with other known existing or planned activities in the area? *For example, a new road through forested lands will generate direct environmental and social impacts (e.g. felling of trees, earthworks, potential relocation of inhabitants). The new road may also facilitate encroachment on lands by illegal settlers or generate unplanned commercial development along the route, potentially in sensitive areas. These are indirect, secondary, or induced impacts that need to be considered. Also, if similar developments in the same forested area are planned, then cumulative impacts of multiple activities (even if not part of the same Project) need to be considered.*	No
Standard 2: Climate Change Mitigation and Adaptation		
2.1	Will the proposed Project result in significant[43] greenhouse gas emissions or may exacerbate climate change?	No
2.2	Would the potential outcomes of the Project be sensitive or vulnerable to potential impacts of climate change?	No
2.3	Is the proposed Project likely to directly or indirectly increase social and environmental vulnerability to climate change now or in the future (also known as maladaptive practices)? *For example, changes to land use planning may encourage further development of floodplains, potentially increasing the population's vulnerability to climate change, specifically flooding*	No
Standard 3: Community Health, Safety and Working Conditions		
3.1	Would elements of Project construction, operation, or decommissioning pose potential safety risks to local communities?	No
3.2	Would the Project pose potential risks to community health and safety due to the transport, storage, and use and/or disposal of hazardous or dangerous materials (e.g. explosives, fuel and other chemicals during construction and operation)?	No
3.3	Does the Project involve large-scale infrastructure development (e.g. dams, roads, buildings)?	No
3.4	Would failure of structural elements of the Project pose risks to communities? (e.g. collapse of buildings or infrastructure)	No
3.5	Would the proposed Project be susceptible to or lead to increased vulnerability to earthquakes, subsidence, landslides, erosion, flooding or extreme climatic conditions?	No

[43] In regards to CO_2, 'significant emissions' corresponds generally to more than 25,000 tons per year (from both direct and indirect sources). [The Guidance Note on Climate Change Mitigation and Adaptation provides additional information on GHG emissions.]

3.6	Would the Project result in potential increased health risks (e.g. from water-borne or other vector-borne diseases or communicable infections such as HIV/AIDS)?	No
3.7	Does the Project pose potential risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during Project construction, operation, or decommissioning?	No
3.8	Does the Project involve support for employment or livelihoods that may fail to comply with national and international labor standards (i.e. principles and standards of ILO fundamental conventions)?	No
3.9	Does the Project engage security personnel that may pose a potential risk to health and safety of communities and/or individuals (e.g. due to a lack of adequate training or accountability)?	No
Standard 4: Cultural Heritage		
4.1	Will the proposed Project result in interventions that would potentially adversely impact sites, structures, or objects with historical, cultural, artistic, traditional or religious values or intangible forms of culture (e.g. knowledge, innovations, practices)? (Note: Projects intended to protect and conserve Cultural Heritage may also have inadvertent adverse impacts)	No
4.2	Does the Project propose utilizing tangible and/or intangible forms of cultural heritage for commercial or other purposes?	No
Standard 5: Displacement and Resettlement		
5.1	Would the Project potentially involve temporary or permanent and full or partial physical displacement?	No
5.2	Would the Project possibly result in economic displacement (e.g. loss of assets or access to resources due to land acquisition or access restrictions – even in the absence of physical relocation)?	No
5.3	Is there a risk that the Project would lead to forced evictions?[44]	No
5.4	Would the proposed Project possibly affect land tenure arrangements and/or community based property rights/customary rights to land, territories and/or resources?	No
Standard 6: Indigenous Peoples		

44 Forced evictions include acts and/or omissions involving the coerced or involuntary displacement of individuals, groups, or communities from homes and/or lands and common property resources that were occupied or depended upon, thus eliminating the ability of an individual, group, or community to reside or work in a particular dwelling, residence, or location without the provision of, and access to, appropriate forms of legal or other protections.

6.1	Are indigenous peoples present in the Project area (including Project area of influence)?	No
6.2	Is it likely that the Project or portions of the Project will be located on lands and territories claimed by indigenous peoples?	No
6.3	Would the proposed Project potentially affect the human rights, lands, natural resources, territories, and traditional livelihoods of indigenous peoples (regardless of whether indigenous peoples possess the legal titles to such areas, whether the Project is located within or outside of the lands and territories inhabited by the affected peoples, or whether the indigenous peoples are recognized as indigenous peoples by the country in question)? *If the answer to the screening question 6.3 is "yes" the potential risk impacts are considered potentially severe and/or critical and the Project would be categorized as either Moderate or High Risk.*	No
6.4	Has there been an absence of culturally appropriate consultations carried out with the objective of achieving FPIC on matters that may affect the rights and interests, lands, resources, territories and traditional livelihoods of the indigenous peoples concerned?	No
6.5	Does the proposed Project involve the utilization and/or commercial development of natural resources on lands and territories claimed by indigenous peoples?	No
6.6	Is there a potential for forced eviction or the whole or partial physical or economic displacement of indigenous peoples, including through access restrictions to lands, territories, and resources?	No
6.7	Would the Project adversely affect the development priorities of indigenous peoples as defined by them?	No
6.8	Would the Project potentially affect the physical and cultural survival of indigenous peoples?	No
6.9	Would the Project potentially affect the Cultural Heritage of indigenous peoples, including through the commercialization or use of their traditional knowledge and practices?	No
Standard 7: Pollution Prevention and Resource Efficiency		
7.1	Would the Project potentially result in the release of pollutants to the environment due to routine or non-routine circumstances with the potential for adverse local, regional, and/or trans boundary impacts?	No
7.2	Would the proposed Project potentially result in the generation of waste (both hazardous and non-hazardous)?	No
7.3	Will the proposed Project potentially involve the manufacture, trade, release, and/or use of hazardous chemicals and/or materials? Does the Project propose use of chemicals or materials subject to international bans or phase-outs? *For example, DDT, PCBs and other chemicals listed in international conventions such as the Stockholm Conventions on Persistent Organic Pollutants or the Montreal Protocol*	No

7.4	Will the proposed Project involve the application of pesticides that may have a negative effect on the environment or human health?	No
7.5	Does the Project include activities that require significant consumption of raw materials, energy, and/or water?	No