

# **ENERGY MANAGEMENT & EFFICIENCY PROGRAMME**

## **TERMS OF REFERENCE**

### **Consultancy Services - To Conduct Structural Integrity Assessments (SIAs) of 27 Government Facilities**

#### **1.0 Background**

Jamaica is the third largest island in the Caribbean region with an area of 11,000 square kilometers (km<sup>2</sup>) and a population of 2.72 million people. Imports of petroleum products are a substantial portion of Jamaica's GDP, representing 13.5% and costing the economy US\$1.9 billion (in 2014). The Government of Jamaica (GOJ) pays an annual electricity bill of approximately US\$102 million, with health, education and public agencies facilities contributing approximately 23% of that annual bill. After decades of trying to stabilize the high debt-to-GDP levels (at 125% in 2015) and given some progress with an IMF stabilization program, the current focus of GOJ is on strict fiscal policy measures and growth-promoting programs. Therefore, a more efficient use of energy resources would free public funds through lower government bills and reduced oil imports, helping the GOJ to further reduce debt and invest more in growth-promoting programs.

While Jamaica has no control over oil price movements, it can save in the long-term by diversifying its energy mix and improving the efficiency of energy consumption to reduce fuel imports, thereby limiting the impact of price shocks. The GOJ is keen to decrease the amount of fiscal resources spent on its own electricity bill and also to demonstrate the value and the public sector's commitment to Energy Efficiency (EE) and Energy Conservation (EC); the vision of the energy sector as articulated by the National Energy Policy (NEP) 2009-2030. As a sub-set to the NEP, the National Energy Conservation and Efficiency Policy, 2010-2030 seeks to prioritize EE interventions as follows: (i) continued adoption by households and businesses of energy conservation and efficiency practices towards reducing Jamaica's carbon footprint; (ii) creating an enabling legislative and regulatory environment; (iii) government institutions leading, and (iv) modernization of the energy sector.

The GOJ being the driver of the energy sector transformation, and with the assistance of the Inter-American Development Bank (IDB) have packaged a programme dubbed "Energy Management and Efficiency Programme (EMEP)". The Programme has received loan financing from the Inter-American Development Bank and Japan International Cooperation Agency (JICA) and will be provided with grant support from the European Union Caribbean Investment Fund (EU-CIF). The general objective of this Programme is to promote energy efficiency in government facilities and fuel conservation in road transportation by contributing to the avoidance of fuel imports. The specific objectives and expected results of this programme are: (i) reduced electricity consumption within health, education and public agency government facilities, which translates into lower Carbon Dioxide (CO<sub>2</sub>) emissions; (ii) reduced travel times and avoided fuel consumption through improved traffic control management, which translates

to lower CO<sub>2</sub> emissions; and (iii) increased capacity within the Ministry of Science, Energy and Technology (MSET) to enable it to update its Integrated Resource Plan (IRP) for Jamaica.

The MSET has the mandate to increase the percentage of electricity generation from renewable sources, thereby reducing dependence on imported fuels and increasing Jamaica's energy security. Consequently, MSET will execute the Programme on behalf of the GOJ.

## 2.0 Objective

The objective of this consultancy will be to conduct Structural Integrity Assessments (SIAs) of selected buildings at 27 government facilities across the island. The assessments will focus on identifying and determining the capability of the buildings (rooftops) to accommodate solar photovoltaic (PV) panels.

## 3.0 Scope of Services

The professional services of an experienced and qualified consultant (with relevant expertise conducting SIAs) is required to execute and prepare reports with recommendations for twenty-seven (27) government owned and operated facilities across Jamaica. Locations of the facilities are provided in Annex A. The consultancy services shall include, but not be limited to:

- a. **Visual Inspections:** Visit all twenty-seven (27) facilities to verify the existing conditions of the related buildings at each facility.
- b. **Roof Identification and Integrity Assessment:** The Consultant shall identify and assess the current condition of the roof/s relative to normal or anticipated deterioration. This includes but not limited to the following:
  - Existing conditions, such as roof decking, slab, excessive movements, bowing, deflections, and differential settlements, including any evidence of distress and material deterioration, roof leakage, cracks, etc.
  - Determination of the service life of the roof/s components in light of proposed loading characteristics.
  - Determination of the seismic load using international building code (IBC) and the Jamaica Spectral Seismic Hazard Maps<sup>1</sup> for the buildings/location.
  - Determination of the thickness of the concrete slab and adequacy for drilling for installing solar photovoltaic panels.
  - Determination of the thickness, type and current state of any roofing membrane, and its appropriateness for the proposed installations/project.
  - An assessment of the structural loading capacity (*dead* and *live*) for each roof structure.
- c. **Structural Integrity Assessment Reports and Recommendations:**

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<sup>1</sup> Jamaica Spectral Seismic Hazard Maps - UWI, Mona | URL: [https://www.mona.uwi.edu/cardin/virtual\\_library/docs/1164/1164.pdf](https://www.mona.uwi.edu/cardin/virtual_library/docs/1164/1164.pdf) | Retrieved February 6, 2018

The Consultant shall prepare a report of his/her findings to describe and address the following:

- Type of roof.
  - Thickness of the concrete roof.
  - Thickness of the Membrane material (if any).
  - The type and current state of existing roofing membrane.
  - Load bearing capacity (*dead* and *imposed*) for each roof structure to include but not be limited to:
    - Distributed loads
    - Point loads
  - Anticipated roof structural performance, in accordance with the relevant international and local building codes including standards, under the following load combination conditions:
    - Wind uplift forces on solar PV panels at an angle of tilt of 5, 10 and 15 degrees to the horizontal (taking into account wind velocity [up to 157 mph - Category 5 Hurricane force wind], topographic features, roof height, dead weight of the roof structure, etc.).
    - Added weight of the solar PV panels (existing roof dead load plus solar PV panels' dead load). The range of system weights per unit area for currently available solar PV panels with metal mounting frames shall be researched and considered in the analysis.
    - Existing Roof Dead Load plus Solar PV panel added Dead Load plus Wind Force acting Downwards.
    - Existing Roof Dead Load plus Solar PV panel added Dead Load plus 75% Wind Force Downwards.
    - Existing Roof Dead Load plus Solar PV panel added Dead Load and wind velocity up to 157 mph - Category 5 Hurricane force wind.
- d. ***Structural Integrity Assessment Report Format*** - The SIA report should be presented in the format outlined below:
1. ***Executive Summary***
    - Brief background and summary of scope.
    - Summary of findings.
  2. ***Background Information***
    - Contact information for stakeholder.
    - Description of site and buildings.
    - Structural assessment methodology.
    - Orientation of buildings.
  3. ***Findings and Supporting Information***
    - Analysis of findings (seismic load, roof load, etc.).
    - Site and roof plans.

- Thickness of the concrete roof.
- Thickness of existing Membrane material (*if any*).
- Type of roof.
- The type and state of existing roofing membrane.
- A general plans/layouts of the targeted buildings/sites with dimensions included.
- Additional information or specifications.

4. **Conclusion and Recommendations**

These should include a high level summary of the finding, the general and specific recommendations to facilitate the implementation of the grid-tied solar PV systems.

#### 4.0 Reporting & Deliverables

The consultant shall submit a first draft report (in word document electronic format) to the Ministry of Science, Energy and Technology (MSET) through EMEP, and present the contents of the report with the MSET and its representatives. The MSET, through EMEP will provide comments and feedback. The consultant shall address all the concerns as outlined by MSET to facilitate the completion of the final report. Three (3) hard copies and an electronic copy of the final report should be submitted thereafter to MSET.

Table 1 describes the key deliverables to be achieved and provided by the consultant.

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No.	Description of Deliverables	Duration	Reporting <sup>2</sup>
1	Work Plan - detailing methodology, schedule of activities and timeline for the presentation of all deliverables.  One (1) week after the signing of contract.	5 days	Electronic copy.
2	MSET's review and comments.	2 days	N/A
3	Submit draft Reports - for all activities as per scope of services.	32 days	

<sup>2</sup> All reports must be prepared in English and delivered in MS Word; figures and tables in case to apply in MS Excel with free access for edits

	Reports must be submitted by 39 days after contract signing.		3 copies & electronic copy.
4	MSET's review and comments.	5 days	N/A
5	Submit draft Final Reports - for all activities as per scope of services.  Draft Final Reports must be submitted by 54 days after contract signing.	10 days	3 copies & electronic copy.
6	MSET's review and comments.	3 days	N/A
7	Submit Final Reports with all comments.  These Final must be submitted by 60 days after contract signing.	3 days	3 copies & electronic copy.

Table 1.

## 5.0 Characteristics of Consultancy

**Type:** Individual

**Duration of the Assignment:** 3 months

**Type of Contract & Modality:** Lump-Sum

**Requirements:** Consultant must be a citizen of one of the IDB's 48 member countries and or EU eligible countries.

## 6.0 Qualification and Experience

To successfully execute the services required under this Terms of Reference, the Consultant should have the following qualification(s) and experiences:

## 1. Experience and Academic Training

- Bachelor Degree in Structural or Civil Engineering.
- Minimum 5 years post qualification experience in Structural or Civil Engineering assessments.
- Minimum 3 years post qualification experience in Structural and Civil designs would be an asset.
- Registered Engineer with the Professional Engineers Registration Board (PERB) or equivalent organization (either Structural Engineer/Civil Engineer).
- Proficiency in English both written and oral.
- Computer literate.

Additional experience in projects of similar scope of services and nature as described in this Terms of Reference is advantageous.

## 7.0 Payment Schedule & Consultancy Condition

This consultancy is expected to last for a period of three (3) months after commencement of services. The contract amount will be paid in accordance with the following schedule:

Description	Percentage Payment
Submission of Work Plan	20% of Contract Sum upon acceptance by MSET
Submission of Draft Report of SIA	40% of Contract Sum upon acceptance by MSET
Submission of Final Report	40% of Contract Sum upon acceptance by MSET

**Annex A**

**Location of Facilities**

	<b>HEPA Facilities</b>	<b>Geographic Location</b>	<b>Parish</b>	<b>Distant from MSET (km)</b>
1	Electoral Office	17°58'8.84"N, 76°47'27.41"W	Kingston	6.2
2	Ministry Agriculture - Hope Complex	18° 1'8.55"N, 76°44'57.90"W	St. Andrew	5.2
3	Ministry of Finance and The Public Service	17°58'59.30"N, 76°47'11.11"W	Kingston	4.2
4	KSAC	17°58'0.77"N, 76°47'31.02"W	Kingston	6.4
5	Half Way Tree Transport Centre	18° 0'43.95"N, 76°47'53.49"W	St. Andrew	1.3
6	Bureau of Standards Jamaica	18° 0'40.12"N, 76°47'34.48"W	St. Andrew	0.8
7	Ministry of Labour & Social Security	17°58'53.77"N, 76°47'12.73"W	Kingston	5.3
8	Linstead Hospital	18° 7'59.45"N, 77° 1'54.04"W	St. Catherine	38.5
9	PCJ 36 Trafalgar Road	18° 0'40.76"N, 76°47'18.86"W	St Andrew	-
10	Jamaica Library Service Headquarters	17°59'45.20"N, 76°46'55.90"W	St Andrew	2.6
11	Anchovy High School	18°24'50.26"N, 77°56'4.33"W	St. James	185.0
12	Lacovia High School	18° 4'46.85"N, 77°45'38.09"W	St. Elizabeth	133.0
13	Maggotty High School	18° 9'50.67"N, 77°45'45.82"W	St. Elizabeth	133.0
14	St. Mary High School	18°16'0.73"N, 76°53'11.08"W	St. Mary	52.2
15	Ferncourt High School	18°19'51.46"N, 77°10'11.09"W	St. Ann	72.0
16	Camperdown High School	17°58'24.76"N, 76°46'16.07"W	Kingston	7.1
17	St. Thomas Technical High School	17°55'31.00"N, 76°16'8.04"W	St. Thomas	76.1
18	Marcus Garvey High School	18°26'15.55"N, 77°12'30.73"W	St. Ann	86.6
19	Ebony Park Academy	17°57'1.91"N, 77°21'10.19"W	Clarendon	69.0
20	Cornwall Regional Hospital	18°28'11.93"N, 77°54'35.87"W	St. James	176.0
21	University Hospital of the West Indies	18° 0'40.94"N, 76°44'40.05"W	St. Andrew	7.6
22	Bustamante Children Hospital	18° 0'0.82"N, 76°46'38.38"W	St. Andrew	2.2

23	St. Ann's Bay Hospital	18°26'10.86"N, 77°12'38.44"W	St. Ann	86.8
24	Spanish Town Hospital	17°59'29.53"N, 76°56'50.60"W	St. Catherine	20.0
25	Annotto Bay Hospital	18°16'23.55"N, 76°45'43.08"W	St. Mary	48.7
26	Port Antonio Hospital	18°10'34.86"N, 76°27'22.25"W	Portland	92.3
27	Port Maria Hospital	18°21'29.99"N, 76°53'42.65"W	St. Mary	65.0