

STRATEGY FOR RENEWABLE ENERGY DEVELOPMENT

# Renewable Energy Development in St. Lucia: Request for Proposals for 3 MW Solar PV System



**LUCELEC**  
ST. LUCIA ELECTRICITY SERVICES LIMITED  
The Power of Caring



**Project No.:** 10004396

**Issue:** D, **Status:** FINAL

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**Task and objective:** St. Lucia Electricity Services Ltd. (the "Owner"), through the Rocky Mountain Institute-Carbon War Room (RMI-CWR) has retained DNV KEMA Renewables, Inc. ("DNV GL"), to provide a request for proposals (RFP) to be provided to potential bidders.

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Reference to part of this report which may lead to misinterpretation is not permissible.

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## List of abbreviations

Abbreviation	Meaning
AC	Alternating Current
AHJ	Authority Having Jurisdiction
BoS	Balance of System
LUCELEC	St. Lucia Electricity Services Limited
CCI	Clinton Climate Initiative
COD	Commercial Operation Date
DAS	Data Acquisition System
DC	Direct Current
DCA	Development Control Authority
DHI	Diffuse Horizontal Irradiance
DNV GL	DNV GL Renewables Advisory (DNV KEMA Renewables, Inc.)
EPC	Engineering, Procurement, and Construction
GHI	Global Horizontal Irradiation
Hz	Hertz
IEC	International Electrotechnical Commission
IPP	Independent Power Producer
km	Kilometer
kV	Kilovolt
kW	Kilowatt
kWh	Kilowatt-hour
LCOE	Levelized Cost of Electricity

<b>Abbreviation</b>	<b>Meaning</b>
LID	Light-Induced Degradation
LNTP	Limited Notice to Proceed
LV	Low Voltage (under 600 V)
MCA	Mutual Confidentiality Agreement
MPP	Maximum Power Point
MPPT	Maximum Power Point Tracking
MV	Medium Voltage
MW	Megawatt
MWac	Megawatts alternating current
MWdc	Megawatts direct current
MWh	Megawatt-hour
NDA	Non-Disclosure Agreement
NEC	NFPA-70 National Fire Protection Agency (NFPA)-70 National Electric Code
NESC	National Electrical Safety Code
O&M	Operations and Maintenance
POI	Point of Interconnection
PPA	Power Purchase Agreement
PV	Photovoltaic
Q/A	Quality Assurance
RFP	Request for Proposal
RMI-CWR	Rocky Mountain Institute-Carbon War Room
SCADA	Supervisory Control and Data Acquisition System
STC	Standard Test Conditions
UL	Underwriters Laboratories

## 1 INTRODUCTION

St. Lucia Electricity Services Limited (LUCELEC) is issuing this Request for Proposals (RFP) for turn-key Engineering, Procurement, and Construction (EPC) services to be provided on the island of St. Lucia. The objective of this RFP is to solicit competitive proposals from qualified and experienced contractors (“Bidders”) to provide LUCELEC cost-effective solar photovoltaic (PV) systems comprising three 1 megawatt alternating current (MWac) systems, collectively the “Project”. The Project will be a phased implementation, with 1 MWac installed in 2016 (Phase 1), 1 MWac installed in 2017 (Phase 2), and 1 MWac installed in 2018 (Phase 3). The Project shall use fixed-tilt, ground mount-type PV, located within the same site that will be leased by LUCELEC.

**The desired outcome of this RFP is the successful negotiation and execution of an EPC Agreement for the scope of services described herein.**

Bidders are required to bid on all three phases. Alternate bids for installation of all 3MWac in 2016 (one mobilization) as well as 1MWac in 2016 and 2MWac (one mobilization) in 2018 are also requested. Separate proposal forms for each are included in Appendix C.

Note, only one successful bidder shall be awarded the work covering all three Phases through 2018.

### 1.1 Project background

Expanding renewable generation is one of the strategic objectives of LUCELEC and the Government of St. Lucia. LUCELEC’s goal for this RFP is to contract an EPC firm through an EPC Agreement that will design and build the systems on the LUCELEC site. LUCELEC will own and operate the Project.

The current LUCELEC generation capacity on the island consists of 87.48 MW of diesel generators with a peak load of approximately 59 MW. Like most islands in the Caribbean, St. Lucia relies heavily on foreign sources of petroleum to operate its power plants. LUCELEC and the Government of St. Lucia aim to supplement the diesel generators with renewable energy systems including PV in order to reduce the negative effects of burning fossil fuels, stabilize electricity rates, and reduce energy production costs.

LUCELEC will provide the infrastructure issued as an Exhibit to the EPC term sheet via addendum) and sites for these solar installations. These are the first utility scale renewable energy projects being developed on the island by LUCELEC. Additional solar projects may be considered in the future.

Clinton Climate Initiative and Rocky Mountain Institute-Carbon War Room (CCI & RMI-CWR) are neutral, third-party non-profit organizations working in partnership with the Government of St. Lucia and LUCELEC to create an open, competitive marketplace for renewables. The role of CCI & RMI-CWR is to actively coordinate political and technical aspects of the RFP preparation and evaluation process, as well as to provide ongoing project management services during bid evaluation. Through CCI & RMI-CWR, the role of DNV GL is provision of technical support throughout the RFP process and during construction implementation. DNV GL is the primary author of this RFP.

## 2 OVERVIEW AND GENERAL INFORMATION

### 2.1 Organization

LUCELEC was established to provide a supply of public electricity to the people of St. Lucia. LUCELEC's Cul De Sac Power Station (CDSPS) is the sole power plant on the island. In 1990, the CDSPS was commissioned with two MaK engines, each with a capacity of 6.3 MW. A third unit of capacity 7 MW was introduced in 1995. With these units came a significant improvement in fuel efficiency.

Prior to 1990, LUCELEC had two major generating stations, one at Union and the other at Vieux Fort, which fed independent distribution systems in the North and South. The Union and Vieux Fort power plants have since been closed down.

At present, in addition to the three MaK units, there are seven larger Wärtsilä units including four 9.3 MW and three 10.2 MW units. Cul De Sac Power Station now has 87.4 MW installed generation and 86.2 MW of available generation capacity.

The Cul De Sac Power Station feeds seven (7) substations across the island, as follows:

- Cul de Sac substation
- Redit substation
- Union substation
- Castries substation
- Soufriere substation
- Vieux Fort substation
- Praslin substation

The PV systems will be interconnected to the Vieux Fort substation. The three systems will be connected to two separate feeders, off of which points of interconnection (POIs) will be provided by LUCELEC to the Project.

### 2.2 Execution of EPC Agreement

The scope of this RFP includes the turnkey EPC services for the implementation of the Project and will be executed through an EPC Agreement. The contractual structure of the parties under the EPC Agreement shall be as follows:

- LUCELEC = EPC buyer; property lessee; project owner; project operator; grid study authority
- EPC contractor = EPC seller; implementer of the EPC agreement scope of services

Summary: LUCELEC will execute an EPC Agreement with the successful Bidder for a negotiated dollar amount (USD). An EPC Agreement term sheet is included as Appendix A (to be provided to bidders via Addendum). LUCELEC will own and operate the Project. The winning bidder will be considered an EPC Contractor, and LUCELEC will be the purchaser, owner, and operator of the constructed system.



## 2.3 Project schedule

Bidders are to provide a high-level construction schedule as part of the bid package to support the milestones. The major milestones are listed below. Details on the RFP response schedule are provided in Section 2.4.3.

**Table 2-1 Proposed Project schedule**

Milestone	Date
Limited Notice to Proceed ("LNTP")	TBD (target 10 June 2016)
Full Notice to Proceed ("FNTP")	TBD (target 8 July 2016)
Guaranteed Construction Start Date ("GCS")	TBD (target 22 August 2016)
Phase 1 Final Completion Date	31 December 2016
Phase 2 Final Completion Date	31 December 2017
Phase 3 Final Completion Date	31 December 2018

## 2.4 Proposal instructions

### 2.4.1 Guidelines

Bidder shall provide a comprehensive proposal for the full scope of services in accordance with the instructions and submittal requirements specified herein.

### 2.4.2 Submission of proposals

Proposals shall be delivered electronically via box.com to [smushegan@clintonfoundation.org](mailto:smushegan@clintonfoundation.org) and must be received by the proposal deadline as described below. Box.com instructions are included as Appendix F. Proposals received after this deadline will not be considered. Proposals shall meet the requirements for submittals described in Section 5. All files shall be filed under a folder called "LUCELEC Solar PV Proposal\_*Bidder Name*," where "*Bidder Name*" is the name of the firm submitting the proposal.

### 2.4.3 RFP schedule

**Table 2-2 RFP schedule**

Date	Event
24 February 2016	Receipt confirmation and notice of site visit deadline
14 March 2016 (week of)	<b>Mandatory</b> site visit conducted
25 March 2016	Request for clarification submission deadline
1 April 2016	Final responses to request for clarification issued
<b>22 April 2016</b>	<b>Bid submission deadline</b>
6 May 2016	Shortlist finalized
20 May 2016	Award approval and contract negotiations initiated
TBD (target 10 June 2016)	Contract execution and Limited Notice to Proceed (LNTP) granted

#### 2.4.4 Binding offer

Proposals submitted in response to this RFP shall constitute binding offers and must be signed by a duly authorized representative of the Bidder.

#### 2.4.5 Proposal validity period

Proposals submitted in response to this solicitation shall state that the proposal is valid for a minimum period of **120 days** beyond the proposal deadline.

#### 2.4.6 EPC Agreement

Proposals shall include a redline markup to the proposed EPC Agreement Term Sheet for the Project.

*The EPC Agreement Term Sheet and all associated Exhibits will be provided to Bidders under an Addendum to this RFP.*

#### 2.4.7 Bidder expenses

Bidders are solely responsible for their own expenses in preparing a response and for subsequent negotiations with LUCELEC, if any. LUCELEC, DNV GL, and CCI & RMI-CWR will not be liable to any Bidder for any claims, whether for costs or damages incurred by the Bidder in preparing the response, loss of anticipated profit in connection with any final contract, or any other matter whatsoever.

#### 2.4.8 Acceptance of responses

This RFP is not an agreement to purchase goods or services. LUCELEC is not bound to enter into a contract with any qualified Bidder. Responses will be assessed in light of the proposal review criteria and other factors. LUCELEC will be under no obligation to receive further information, whether written or oral, from any Bidder.

#### 2.4.9 Modification of terms

LUCELEC reserves the right to modify the terms of this RFP at any time at its sole discretion. LUCELEC also reserves the right to cancel this RFP at any time.

#### 2.4.10 Ownership of responses

All proposals and other documents submitted to LUCELEC become the property of LUCELEC. Responses will be treated with confidentiality. Responses may be shared with CCI & RMI-CWR and DNV GL for the purposes of assistance evaluating proposals, managing a question and answer (Q&A) log, communicating with Bidders and similar activities related to the RFP process.

#### 2.4.11 Confidentiality agreement

Bidders shall enter into a multi-party Mutual Confidentiality Agreement (MCA) with LUCELEC, DNV GL, and CCI & RMI-CWR. The MCA is included in Appendix B, and Bidders agree that this RFP and any response and discussion related thereto, are subject to the MCA. This RFP constitutes "Confidential Information" under such MCA.

#### 2.4.12 Receipt confirmation and notice of site visit

Bidders are requested to acknowledge receipt of this solicitation by responding via email to [smushegan@clintonfoundation.org](mailto:smushegan@clintonfoundation.org) by the deadline for receipt confirmation and notice of site visit. This response should include (i) primary and secondary (if applicable) points of contact for all future RFP-related communication, (ii) confirmation that the Bidder is planning to attend the site visit, described below, and, (iii) the names and contact information of the personnel planning to attend. Please include "LUCELEC RFP RSVP" in the subject line. All subsequent information regarding this RFP, including changes made to this document, addenda, responses to questions, and any notifications will be directed only to Bidders who acknowledge receipt of this RFP.

#### 2.4.13 Mandatory site visit

**Mandatory** site visits will be held during the week **15 March 2016**. Details regarding the site visit are to be determined. Updated site visit information will be emailed only to Bidders who complete the receipt confirmation and notice of site visit described above.

#### 2.4.14 Experience requirements

To qualify, Bidder must demonstrate experience on two successfully completed solar PV projects in the last five years of similar size or larger as well as solar PV experience in the Caribbean (smaller projects are acceptable for Caribbean experience).

#### 2.4.15 Proposal review

All proposals will be reviewed by DNV GL, CCI & RMI-CWR and the LUCELEC proposal review committee. The LUCELEC review committee will be solely responsible for the final EPC selection and EPC Agreement contract award.

#### 2.4.16 Q&A log

The CCI & RMI-CWR will be managing a Q&A log for the benefit of Bidders. Please submit questions to [smushegan@clintonfoundation.org](mailto:smushegan@clintonfoundation.org) and include "LUCELEC Solar PV RFP Q&A" in the subject line. Responses to questions will be sent periodically to all Bidders who have confirmed receipt of the RFP as described above.

#### 2.4.17 Language

All proposal deliverables, confirmations, requests for clarification, and other communications associated with this RFP shall be in the English language.

#### 2.4.18 Fees

The RFP fee structure is intended to reflect the cost of services provided by RMI-CWR, an independent non-profit organization. The applicable fees are as follows:



### **Response Submission Fee**

Each Bidder must pay a one-time non-refundable "Response Submission Fee" equal to \$1,000 USD due at the time of bidding.

### **Contract Award Fee**

Upon signing the EPC Agreement, the selected EPC Contractor must pay a non-refundable "Contract Award Fee" as follows:

- Contract Award Fee = Total Price (all Phases combined per Schedule of Pricing) \* 0.5%

### **Project Completion Fee**

The EPC Contractor selected must pay a non-refundable "Project Completion Fee". This fee reflects expected costs of services provided by RMI-CWR from the EPC Agreement award date to commercial operation date ("COD"). The Project Completion Fee is calculated and paid as follows:

- Project Completion Fee = Total Price (all Phases combined per Schedule of Pricing) \* 1.5%

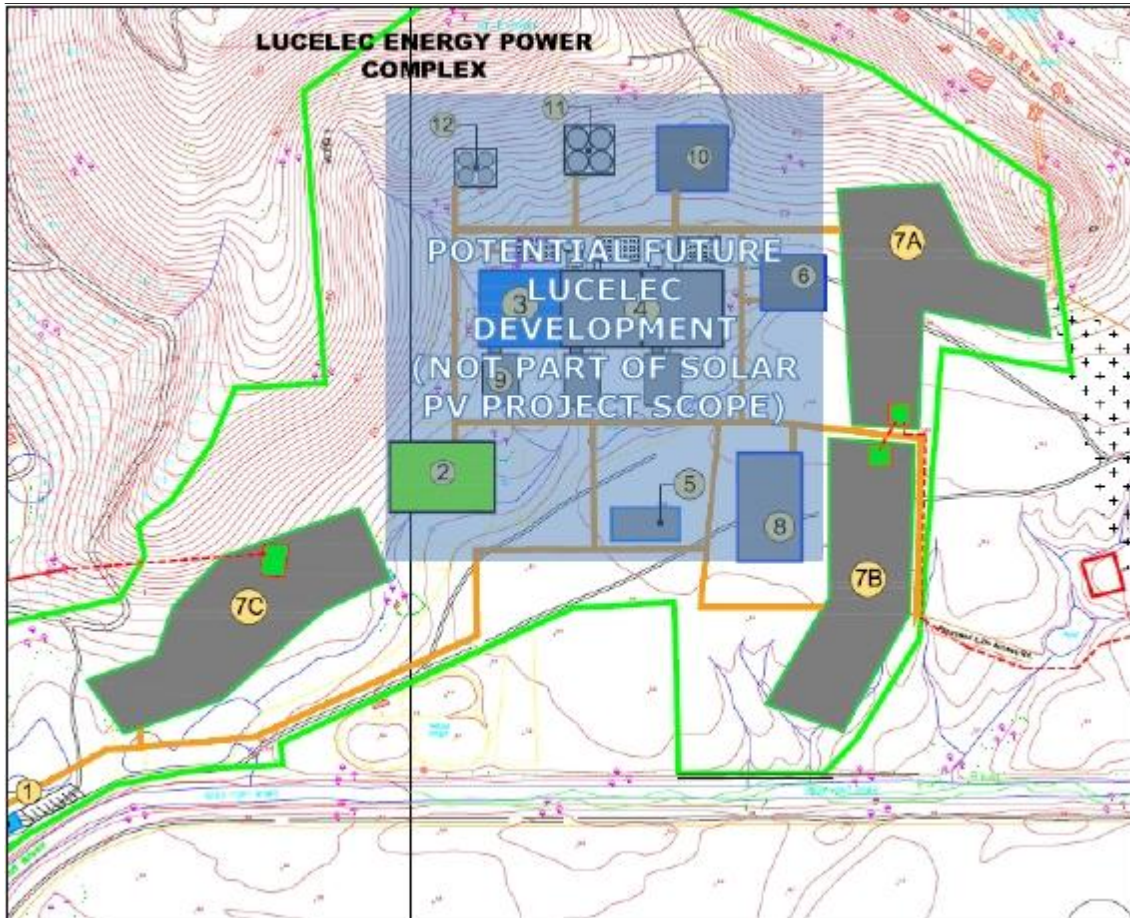
All fees paid are to be in the form of certified check, bank draft, or money order payable to:

*Rocky Mountain Institute - Carbon War Room  
820 Folsom Street  
Boulder, Colorado 80302  
Attn: Ed McCullough*

## 3 SITE DESCRIPTION AND PREVIOUS STUDIES

### 3.1 General

The proposed Project sites are located just north of the Hewanorra International Airport in Vieux Fort, St. Lucia. See Figure 3-1.



**Figure 3-1 Project site locations**

- The project will be split into separate sites and phased as follows:
  - East Site:
    - North tract (7A): 1 MWac system; Phase 1
    - South tract (7B): 1 MWac system; Phase 2
  - West Site (7C): 1 MWac system; Phase 3

The West Site is located among existing trees and brush that will need to be cleared for the installation of the site by the EPC Contractor. There is a hill to the north of the West Site from which the 11 kV line will be routed. The site has a slight slope down from north to south.

The East Site is located near the existing cemetery and runs along the wall that spans the east side of the site. There is a slight slope down from north to south, and there is a ditch on the south end of the East Site that will need to be avoided because of excessive slopes.

LUCELEC has surveyed the sites. There are no known property requirements or constraints.

A topographical survey of the entire island was conducted in 2009 via aerial orthophotography and has the following reported resolution:

- Horizontal accuracy: 0.60 meters root mean square error (RMSE) or better
- Vertical accuracy: 0.8 meters RMSE or better


Compliance with the accuracy standard was ensured by the placement of GPS ground control. A site constraints map showing the elevation contours is included in Appendix D. A digital copy of the topographic map (.gbd or .shp format) will be made available to Bidders, upon request. A .kmz file of the sites is included in Appendix D.

A preliminary geotechnical investigation and associated report was previously completed for the site; however, this investigation was performed for a former proposed development on the site and is not specifically for this solar PV project. Relevant information from this previous study, however, may be used to inform the Bid. In summary, six borings and three test pits were completed; and laboratory testing of soil samples consisting of moisture content, plasticity indices, grain size, shear strength, and chemical composition were performed. According to the report, the general subsoil stratigraphy consists of topsoil overlying silty sand which overlies highly weathered basalt bedrock. At some locations, a clayey silt layer lies beneath the silty sand and overlies the bedrock. The sub-soils were found to be highly corrosive to buried steel. A copy of the report shall be included as an Exhibit to the EPC Agreement (to be provided to bidders via addendum).

Similarly, an environmental impact assessment (EIA) was previously completed for the site for the formerly proposed development. LUCELEC has recently updated the EIA to include the solar PV project; however, there will be ongoing discussions with the Development Control Authority (DCA) physical planners for acceptance and LUCELEC may further update the EIA as required by additional Terms of Reference provided by DCA. Further details on the mitigation actions in the current EIA are noted in Section 4.2 Permitting and Fee Requirements. *Documentation on the EIA will be provided to Bidders under an Addendum.*

### 3.2 Grid interconnection

An 11 kV overhead line will be routed to each of the two site locations. The East Site tracts shall be connected with an underground 11 kV line to a common, medium-voltage, switchgear. The 11 kV overhead lines will be provided by and at the cost of LUCELEC. The dead-end pole for each of the two 11 kV lines will be considered the point of interconnection (POI). The exact location of the POI shall be coordinated with LUCELEC before construction commences. The EPC Contractor will be required to provide all electrical equipment to the POI.



DNV GL completed an interconnection analysis on the Pierrot and Vieux-Fort distribution feeders owned and operated by LUCELEC. A copy of the report is included in Appendix G. The objective of the analysis was to identify the technical limitations to installation of the proposed 3 MW of PV generators on the two feeders at the Vieux-Fort substation, including 2 MW PV on the Pierrot feeder and 1 MW PV on the Vieux-Fort feeder. The analysis was carried out using Synergi Electric, and the post-processing was done using the automated Cluster Results Tool developed by DNV GL.

In the report, feeders' locations, loading and existing PV generation are presented, along with the maximum daytime peak and minimum daytime load profiles. The analysis is split into 4 cases representing the existing PV generation status of the network at 0% and the planned PV capacity of 3 MW total for the feeders for daytime peak and minimum loading conditions, in order to identify the potential steady state violations of the PV deployment.

The results show that voltage and loading limits were not violated on either feeder with the addition of the 3 MW PV generation. There were no instances of back feed on the feeders at any loading scenario. The Pierrot feeder demonstrates minimal negative load flow at sections closer to the feeder head that happen to be in the close vicinity of the 2 MW PV site. The negative load flow is due to the low concentration of load in comparison to the large amount of generation and is not an issue for the feeder and the transformer substation.

## 4 SCOPE OF SERVICES

### 4.1 General

The EPC Contractor shall be responsible for all aspects of the detailed engineering investigations, design, manufacture, permitting, procurement, supply shipping and importation, delivery, storage, construction, labor, supervision, proper staffing, all costs related and applicable for general conditions, erection, installation, commissioning and testing of the complete Project. EPC Contractor shall also be responsible for the establishment of appropriate operations and maintenance procedures, quality management system documentation and warranties for the Project. EPC Contractor shall be responsible to ensure all employees comply with safety and quality assurance requirements. The scope of services shall be more specifically described as Exhibit A to the EPC Term Sheet (to be provided to bidders via addendum). Exhibit A shall take precedence if there are any discrepancies between this RFP and Exhibit A.

The EPC scope of work shall include the St. Lucia Government's mandate to include local engineering review and stamping of the permit drawings. Though a Project Labor Agreement will not be enforced, the bidder shall provide a local labor plan showing percentage of local and EPC Project labor forces (see Section 5.8). Proposal selection will take this percentage into consideration as a key evaluation criteria when short listing and for final bidder selection. While a minimum percentage requirement of onsite man-hours from local labor force has not been established, LUCELEC considers around 80% as optimal.

### 4.2 Permitting and fee requirements

The EPC Contractor will provide the full engineering plans, designs and documents such that LUCELEC may obtain the following permits:

- a) EIA approval
- b) Building permits issued through the DCA
- c) Electrical permits right-of-way encroachment/access permits
- d) Temporary construction power, fire, and sanitation permits

Note, LUCELEC shall bear any cost/fees associated with obtaining the above-identified approvals and permits.

An EIA dated January 2016 describes the various impacts the solar PV project is expected to have on the natural environment. A summary of mitigation actions is listed below; additional EIA documentation will be provided to bidders under addendum. LUCELEC expects to remain responsible for the mitigation plans, with input from the EPC Contractor as required:

- A soil conservation plan, including dust suppression, sediment screens, and planning construction concurrent with dry and non-windy seasons, to minimize erosion
- Habitat and biodiversity loss mitigation plan, including engaging a botanist, flagging endangered plants in the construction zone, replanting of grassy vegetation between PV rows, and construction of sedimentation ponds to reduce sediment load in stormwater
- Surface water mitigation actions, including development of a drainage plan, use of silt curtains to prevent sediment transfer to the Vieux Fort River, and management of a vegetation buffer



St. Lucia's DCA manages development of land on St. Lucia. LUCELEC has already leased the land and DCA has currently given Approval in Principle for Land Use for the Project. Full approval for construction requires at least 90 days of review by DCA after project plans and drawings are submitted. In order to facilitate the timeline of construction of 1 MW by the end of 2016, LUCELEC will begin the preliminary civil and electrical engineering design in parallel with the RFP bidding and evaluation process. This will accelerate the process of obtaining Full Approval by DCA. The EPC Contractor will be responsible for working with LUCELEC's civil and electrical engineers to update these drawings for construction (remaining within the DCA guidelines).

The EPC Contractor, at its expense, shall obtain and file on a timely basis all documents required to obtain applicable permits and approvals, including:

- a) Import permits and licenses
  - b) Work permits
  - c) Transportation with appropriate trucking companies
  - d) Port fees and duties
- Import duties are waived for specific items including RE materials, however the supplier will be responsible for paying value added tax of 15%, service charge of 5% on any imported materials.

Local support in obtaining these permits will be facilitated by local support through the St. Lucia Ministry of Sustainable Development, Energy, Science and Technology.

In addition, because of the project's proximity to the Hewanorra International Airport, the DCA approached the Saint Lucia Air and Sea Ports Authority (SLASPA) for its requirements, and SLASPA requested the following studies from LUCELEC, which have been completed:

- a) Aeronautical Study
- b) Glint and Glare Study

A preliminary Glint and Glare Study has been completed and is included in Appendix H. DNV GL assumed industry standard design and technology parameters, but recognizes that the EPC Contractor's design may differ. In the Aeronautical Study completed by LUCELEC and SLASPA, general findings for the solar PV Project were that the Glint and Glare study referenced above assumed an arrival path of 100° and 280° rather than the final approach course and a glide path angle of 3°, and do not take into account the possible impact of helicopters arriving at a 90° angle.

The study recommends that a more representative Glint and Glare study be conducted to include these possibilities, as noted above. The EPC Contractor shall design and select PV system components to minimize glint and glare. The EPC Contractor will need to re-run the study using the Sandia National Laboratories *Solar Glare Hazard Analysis Tool* (SGHAT), including any design parameters that differ in order to ensure the Project does not cause any additional glint and glare hazards to pilots and aircrafts at the airport.

## 4.3 Required system attributes

### 4.3.1 PV system design criteria

The systems shall be designed and constructed for a minimum functional life of 25 years.

The systems shall be designed and constructed with a primary objective of maximizing energy generation within the lands available with a maximum output at the POI of 3 MWac, installed in three phases (1 MWac Phase 1 in 2016; 1 MWac Phase 2 in 2017; and 1MWac Phase 3 in 2018).

The systems shall be designed and constructed in a manner to minimize losses due to PV module shading, soiling, wire losses, inverter losses, and switchgear and transformer losses.

The systems shall be designed and constructed in a manner to meet LUCELEC's power quality requirements as defined in the EPC Agreement and associated Exhibits.

The systems, facilities, and components shall be designed and constructed to withstand, without damage, all applicable environmental conditions as defined by the local building codes appropriate for the sites, including but not limited to wind, corrosion, precipitation, flooding, and temperature and humidity extremes.

The generating facilities shall utilize solar PV modules as the means of renewable power generation. The type and technology of the modules, mounting systems and inverters shall be specified by the EPC Contractor within compliance with Exhibit A. The EPC Contractor shall provide a plan that meets all the objectives of this RFP.

The system shall comply with the requirements of IEC and National Electrical Safety Code (NESC), with IEC taking precedence if conflicting code requirements exist.

The system shall be designed and installed in compliance with component manufacturer instructions.

The complete system and facility shall be surrounded by fencing adequate for site security and public safety.

#### 4.3.2 Civil requirements

The EPC Contractor shall provide a plan to address all necessary civil engineering concerns of the Project. The plan should provide sufficient detail to demonstrate EPC capabilities and Project-specific awareness. The selected Bidder shall be required to provide civil details in engineering drawings stamped by a local licensed civil engineer as part of the design and permitting process. Civil details required for permit submittal include but are not limited to:

- a) Environmental impact assessment
- b) Site topographical evaluation
- c) Geotechnical analysis and subsurface investigation
- d) Hydrology and hydraulic study
- e) Site grading
- f) Site drainage and stormwater containment
- g) Wetlands management and erosion control
- h) Vegetation management
- i) Vehicle access, parking, paving, and walkways
- j) Underground trenches and utilities
- k) Pads and foundations
- l) Spill prevention and containment plan

#### 4.3.3 Structural requirements

All structures must be designed in accordance with applicable local codes.

The complete generating system, support structure, and ancillary structures shall comply with Category IV hurricane (150 mile per hour basic design wind speed, Risk Category I per ASCE 7-10) or greater requirements of the local building code requirements. The EPC Contractor shall confirm all wind load requirements with DCA and LUCELEC prior to initiating design activities.

The structure must resist both static and dynamic wind loading without damage due to resonance or fatigue. The structures must be designed to withstand gravitational loads and combined loads as required by applicable codes. The structures must take into account expected thermal expansion and contraction and thermal cycling.

The selected Bidder will be required to provide structural details in engineering drawings stamped by a local licensed structural engineer as part of the design and permitting process. Structural details include but are not limited to the PV module mounting fasteners, support structures, material specifications, grades and finishes, foundations, inverter pads, fences, LUCELEC and EPC Contractor metering sections, monitoring and disconnect facilities, and array layout drawing.

#### 4.3.4 Mechanical requirements

All generating facility components, support structures, hardware, conduits, wire management, enclosures, shade structures and the like shall be protected from corrosion due to known or expected atmospheric conditions local to the Project site. Consideration shall be given to humidity, salinity, acidity, condensation, air particulates, or other conditions likely to cause or accelerate corrosion of materials.

Contact of dissimilar metals and finishes shall be avoided or intentionally managed to prevent premature galvanic corrosion.

Aluminum shall not be in direct contact with concrete or copper.

Areas of exposed ferrous metals (i.e., cuts, field welds, butt ends, and similar) shall be aggressively treated with multiple applications of an appropriate corrosion protection coating.

Support structure components in contact with soil shall be protected from detrimental subsurface corrosion for the design life of the Project. Particular site-specific evaluations including local soil conditions shall be conducted to assure long-term structural integrity of all support structures.

Fastener quantity, diameter, material grade, and finish shall be selected appropriate to each joint to assure sufficient initial clamping preload, prevention of loss of preload, and maintainability of the joint for the design life of the Project.

Mechanical wire and cable management shall be provided to prevent all opportunities for strain, abrasion, disconnection, accidental grounding, and similar avoidable hazards. Mechanical wire management components shall be rated for long-term sunlight exposure.

#### 4.3.5 General electrical requirements

Voltage insulation levels, grounding, equipment interrupting and continuous current capacities, circuit protection, and mechanical strengths shall be selected and coordinated in accordance with calculations and the recommendations of the NESC, IEC, or other applicable codes and standards as noted (with IEC taking precedence if conflicting code requirements). Any variation from code shall be noted. The maximum dc voltage shall be 1000 Vdc.

Per LUCELEC standards, no aluminum wire shall be used within the generation plant.

Conductor color codes shall be in compliance with the existing St. Lucia regulations based on IEEE BS7671 – British Standard.

Direct current (dc) and alternating current (ac) conductors shall be labeled to match wiring diagrams at all combiner boxes, pull boxes, vaults, electrical enclosures, inverters, and transformer terminals.

#### 4.3.6 PV modules

Modules installed shall conform to the manufacturer's published data sheet(s).

Manufacturer shall provide test data that quantify initial light-induced degradation (LID).

The average of the power ratings of all modules shipped, based on the manufacturer's flash test data, shall be greater than or equal to the nominal rating of the module as specified in the published data sheet.

Modules shall be listed to Underwriters Laboratories (UL) 1703 and/or IEC and individually marked as such.

Modules shall be independently certified to qualification standard IEC 61216 (crystalline silicon flatplate modules) or to IEC 61646 (thin film flatplate modules), as appropriate.

Module string configuration must be compatible with the proposed inverter (provide name of inverter or list of possible inverters in an Exhibit to be provided by EPC Contractor).

PV module connectors must be designed for environmental exposure, be polarized, not interchangeable, and have an ampacity rating not less than the maximum series fuse rating of the module.

Minimum PV module warranty shall be 25 years.

#### 4.3.7 Module interconnection cables

Conductor size is to be determined in accordance with the IEC, including conditions of use with particular consideration of temperature rise due to solar exposure, terminal ratings, and consideration of over-current protection and all possible current sources.

Module interconnect wiring should be identified and marked for "Sunlight Resistant" when exposed, "Cable Tray" when in cable tray, and "Direct Burial" when directly buried.

Solid wire that could break when modules are serviced or moved should be avoided.

#### 4.3.8 Combiner boxes (if applicable)

Combiner boxes must be listed to the appropriate UL and/or IEC standard.

Materials, finish, and corrosion protection of combiner boxes shall be selected for strength, toughness, and durability for the design life of the Project.

#### 4.3.9 Disconnects

Disconnects must be listed to the appropriate UL and/or IEC standard for the application.

Disconnects must be provided at locations required by the IEC.

### 4.3.10 Inverters

PV inverter systems shall be commercial grade, pure sign wave, and specifically designed for PV installations.

Minimum inverter warranty shall be 10 years.

Inverter systems shall be designed for the expected environmental conditions at the site, including temperature, humidity, elevation, and corrosion.

The PV inverter system shall be designed and materials shall be furnished in accordance with the latest revisions of applicable sections of UL, IEC, and IEEE. See Exhibit A for inverter requirements.

Inverter voltage, current, and frequency capability are to be selected in accordance with the PV technology used and conditions local to the generating facility.

### 4.3.11 Weather monitoring

See Exhibit A of Appendix A (to be provided via addendum) for the weather monitoring requirements.

### 4.3.12 Performance monitoring / metering / data acquisition system

See Exhibit A of Appendix A for the Performance monitoring / metering / data acquisition system requirements.

## 4.4 Warranties and guarantees

The EPC Contractor shall prepare and submit to LUCELEC a plan for a comprehensive Project warranty including but not limited to the following:

- a) PV module materials, workmanship, and long-term performance
- b) Inverter materials, workmanship, and long-term performance
- c) Balance of System (BoS) materials, workmanship, and long-term performance
- d) Energy performance guarantee at POI

This plan, once approved will become an Exhibit to the EPC Agreement.

## 4.5 Subcontractors

The EPC Contractor may engage subcontractors to perform the work and supply the labor, material, equipment, and supervision required to be supplied by the EPC Contractor on this Project, and the selection of such subcontractors shall be at the discretion of the EPC Contractor with exception to subcontractors with a contract value exceeding 5% of the contract price, which shall require LUCELEC approval.

The engagement of subcontractors shall not relieve the EPC Contractor from any liability or its obligations, and the EPC Contractor shall be fully responsible for the performance of its subcontractors and for the negligent acts, errors and omissions of its subcontractors. All Subcontractors performing Work shall be properly licensed and insured and be in compliance with all local laws, rules and regulations applicable to the Project, and as required by applicable law.

## 5 PROPOSAL DELIVERABLES

### 5.1 Proposal checklist

The Bidder shall provide a completed checklist of the proposal deliverables. The checklist is provided in Appendix E.

### 5.2 Cover letter

Bidder shall include a cover letter signed by a duly authorized representative of their respective company. The letter must clearly identify the EPC Contractor and its contact persons for future communications regarding its proposal.

### 5.3 Confidential information

During the term of this RFP, Bidder may receive or have access to data and information that is confidential and proprietary to DNV GL, LUCELEC, CCI & RMI-CWR, and/or the Government of St. Lucia (the "Parties"). All such data and information ("Confidential Information") made available to, disclosed to, or otherwise made known to Bidder in connection with this RFP shall be considered the sole property of the Parties. Confidential Information may be used by Bidder only for the purposes of performing the obligations of the Bidder hereunder. Bidder shall not disclose Confidential Information to any third party without the prior written consent of the Parties. Bidder shall not use or duplicate any proprietary information belonging to or supplied by the Parties, except as authorized by the Parties. These obligations of confidentiality and non-disclosure shall remain in effect for a period of five years following the expiration or earlier termination of this RFP. Further, Bidder shall enter into Mutual Confidentiality Agreement in the form attached hereto as Appendix B. The Bidder agrees that this RFP and any response and discussion related thereto shall be considered Confidential Information.

### 5.4 Statement of qualifications

Bidder shall provide a statement of qualifications ("SoQ") which includes the following information, at minimum:

- a) Company overview/description
- b) 2013/2014 revenues (whole company and renewables)
- c) Number of projects/MW installed – Caribbean (Caribbean experience is required to bid)
- d) Number of projects/MW installed – Outside Caribbean
- e) Number of projects/MW currently in construction
- f) Project references
- g) Years in operation – Caribbean (whole company and renewables)
- h) Years in operation – Outside Caribbean (whole company and renewables)
- i) Size of solar/renewables team
- j) Safety plan/safety record
- k) Quality plan/quality record

- l) Sample Project organization chart
- m) Description of EPC capabilities, including whether firm typically self-performs Engineering, Procurement, and Construction, or subcontracts one or more of these functions for solar projects
- n) Any legal issues or ongoing litigation

To qualify, Bidder must demonstrate experience on two successfully completed solar PV projects in the last five years of similar size or larger as well as solar PV experience in the Caribbean (smaller projects are acceptable for Caribbean experience).

## 5.5 Technical information

The following shall be provided for the Project:

- a) Nameplate power capacity (MWac), as measured at the POI (where the system ties into the LUCELEC electrical system and where the meter is located)
- b) Key equipment datasheets and their associated warranties
- c) Module testing for the Project
- d) Estimated capacity factor (%), and first year annual production (MWh). Energy estimates are to be performed using PVsyst software (version 6) and be based on 3Tier or SolarGIS at a fine spatial resolution of <3 km to determine solar resources at the potential sites. The methodology used to calculate the first-year energy production should be summarized based on a PVsyst simulation, and an itemized list of the following loss factors given as a percentage of annual energy shall be provided. Bidders are to provide the PVsyst report, 8760 data files, and Project files using the following list of loss factors:
  - Reflection
  - Low irradiance losses
  - PV thermal losses
  - PV mismatch losses
  - dc wiring losses
  - ac wiring losses
  - Transformer fixed core (eddy) losses (if applicable)
  - Transformer variable winding losses (if applicable)
  - Array soiling losses
  - PV module Initial light-induced degradation losses
  - PV module rating short of nameplate losses
  - Inverter efficiency losses
  - System availability losses
  - Auxiliary load losses
  - Night consumption losses
  - Other losses, if any (provide list)

## 5.6 Project execution summary

Bidder shall prepare and provide a Project Summary Execution Plan for the full scope of services to be performed, including but not limited to the items listed below. See Contractor Deliverables Table Exhibit for references to Technical Specifications for additional requirements (note, all items listed below shall be included as specific Exhibits to the EPC Agreement).

- a) Organizational chart with roles and responsibilities. This chart shall show lines of authority and responsibility. Number of personnel to be utilized on the job shall be indicated in appropriate organizational elements. If significant changes in the organization are expected to occur during the life of the Project or phases of construction, these shall be described.
- b) Key personnel.
- c) Major subcontractors.
- d) Construction workforce, number of crew, vehicles, and equipment.
- e) Basic construction sequence description.
- f) Overall Project schedule with key design/engineering, procurement, construction and commissioning milestones.
- g) Typical start-up plans.
- h) Conceptual site layout. The conceptual site layout should include consideration for Project requirements per the EPC Agreement Exhibits and the usable area files included as Appendix D.
- i) Conceptual single-line diagram.
- j) Specification sheets for major equipment.
- k) Equipment warranties.
- l) Security plan.
- m) Safety plan.
- n) Environmental compliance plan.
- o) Quality control and assurance plan.
- p) Project management plan.

## 5.7 Schedule of pricing

An itemized Schedule of Pricing shall be submitted as part of the proposal and shall include sufficient detail to allow the owner to fully evaluate the Bidder's proposal in comparison to other Bidders. In addition to such format as the Bidder wishes to use, cost information shall be provided in accordance with the Schedule of Pricing Form provided as Appendix C. Appendix C contains forms and instructions for providing Bidder's proposed pricing.

Bidder shall provide separate Schedule of Pricing forms for:

- Phase 1: 1 MWac installed in 2016
- Phase 2: 1 MWac installed in 2017
- Phase 3: 1 MWac installed in 2018
- Alternate: 3 MWac installed in 2016 under one mobilization
- Alternate: 1 MWac installed in 2016, 2 MWac installed in 2018 under a separate mobilization

Bidder shall provide a draft of payment schedules to accompany the Schedule of Pricing forms. This will be included as an Exhibit to the EPC Agreement.



Bidder shall propose liquidated damages applicable to delayed schedule milestones for each bid variant. Agreed-upon liquidated damages provisions will be included in the final EPC Agreement.

Bidder shall provide the contractor labor time and materials cost schedule. This will be included as an Exhibit to the EPC Agreement.

## 5.8 Employment practices

Bidder shall provide a comprehensive description of the employment practices of its business and how it plans to comply with applicable laws pertaining employment. Bidder shall also provide a detailed summary of the local labor that will be used for engineering, management, and construction.

## 5.9 EPC Agreement / Terms and Conditions

An EPC Agreement Term Sheet is attached in Appendix A (to be provided via addendum). A full EPC Agreement is currently under preparation by LUCELEC and will be provided to shortlisted Bidders via addendum.

Bidder shall provide a red-line to the EPC Agreement Term Sheet and to any EPC exhibits which the Bidder wishes to modify, attached hereto as Appendix A (to be provided via addendum). Bidder is encouraged to provide a brief term sheet summarizing any changes made to the EPC Agreement and/or exhibits.

Bids shall be priced to include, and will be expected to comply with, the requirements in all of the Project contracts, agreements, and documentation attached hereto in the Appendices and exhibits. This includes but is not limited to: permits, product manuals, and any un-modified terms to the EPC Agreement and associated exhibits, and the Q&A log.

## 5.10 Credit worthiness

In order to evaluate credit worthiness, the Bidder shall provide audited annual financial statements for the past three fiscal years and current unaudited quarterly financial statements.

## 5.11 Bid Security

Bid Security shall be furnished to LUCELEC in the amount of ten percent (10%) of the bidder's proposed price for all three phases (combined) as security against the failure of the Bidder to comply with all requirements within the time frames established subsequent to notification of award. The proposed form of Bid Security (Bid Guarantee) is included in Appendix I.

If the Bidder fails to (1) execute the Contract, (2) furnish Performance Security (per Section 5.12 below), or (3) furnish certificates of insurance within TEN (10) calendar days of the written notification of intent to award a Contract, then LUCELEC may collect under the Bid Security. LUCELEC may retain the Bid Security of the three remaining lowest, responsible, responsive Bidders, until the earlier of either the seventh day after the effective date of the new agreement or the one-hundred-twenty-first day after the bid opening, whereupon Bid Securities furnished by such Bidders will be returned.

## 5.12 Performance Security

The successful bidder will be required to furnish performance security in the total amount (100%) of the awarded contract for all three phases (combined), executed in favor of LUCELEC, to insure faithful performance and payment of the contract. Failure to furnish the security within TEN (10) calendar days may result in bid rejection, forfeiture of bid security, and award of the contract to another bidder.

The apparent low bidder must provide all required proof of security within 10 days of notification of award. Failure to present the required documents within 10 calendar days may be grounds for award disqualification.

The proposed form of Performance Security (Performance Guarantee) is included in Appendix J.

## 5.13 Conflicts of interest

The Bidder shall disclose any conflicts of interest or potential conflicts of interest.

## 5.14 Key project risks

The Bidder shall identify key risks that may impact the Project and propose measures to mitigate said risks.

## 6 EVALUATION CRITERIA AND SELECTION PROCESS

### 6.1 Proposal selection process

All proposals will be reviewed to determine whether they are responsive or non-responsive to the requirements of this RFP. Proposals that are determined to be non-responsive will be rejected. The remaining proposals will be evaluated and rated based on the evaluation criteria prescribed below. LUCELEC reserves the right to conduct site visits and/or interviews and/or to request that Bidders make presentations and/or demonstrations, as appropriate.

### 6.2 Bid clarification and contract negotiation meetings

In the process of evaluating the responses, bid clarification meetings will be required of selected Bidders. Following detailed evaluations, LUCELEC will make a "short list" decision and request further bid clarification and initial negotiation meetings with the short listed Bidders, followed by final contract negotiation meetings with the selected finalist Bidder. Scheduling of any such meetings will be performed at the discretion of LUCELEC. A minimum notice of ten (10) calendar days will be given.

### 6.3 Notice of award

Upon conclusion of the evaluation process and any subsequent negotiations, all Bidders will be notified of the outcome.

### 6.4 Evaluation criteria

Proposals will be evaluated based on the criteria noted below:

a) Company


1. Relevant experience & references (Caribbean experience is required to bid)
2. Accreditations
3. Financial stability & credit worthiness
4. Organizational effectiveness
5. Familiarity with relevant permitting and regulatory processes

b) Project Team

1. Depth and breadth of team experience
2. Key staff qualifications
3. Technical expertise
4. Evidence of successful project management

c) Project Proposal

1. Bid quality and completeness
2. Energy generation and quality of energy estimate
3. Acceptance/red-line of form EPC Agreement and exhibits

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4. Project Execution Plan
  5. Local Labor Plan
  6. Demonstration of understanding of scope based on submitted documents
  7. Level of detail provided
  8. Equipment selection
  9. Bid price (Schedule of Pricing)
  10. Overall Project capital cost
  11. Levelized cost of energy/Project returns
  12. Cost risk assessment and contingency planning
  13. Bidder's workmanship guarantee
  14. Bidder's warranties
  15. Post-commissioning maintenance and monitoring practices

d) Employment Practices

1. Local labor plan
2. Equal opportunity practices
3. Positive labor relationship



## **About DNV GL**

Driven by our purpose of safeguarding life, property and the environment, DNV GL enables organizations to advance the safety and sustainability of their business. We provide classification and technical assurance along with software and independent expert advisory services to the maritime, oil and gas, and energy industries. We also provide certification services to customers across a wide range of industries. Operating in more than 100 countries, our 16,000 professionals are dedicated to helping our customers make the world safer, smarter, and greener.

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