

**PSE&G Solar 4 All Program Solicitation**

**Photovoltaic Generating Stations on Third Party Host Sites**

**EPC Contractor's Scope of Work**

**1. INTRODUCTION**

EPC Contractor's Scope of Work (the "SOW") is to develop, permit, engineer, design, procure, construct, interconnection to PSE&G-supplied transformer, commission, startup and test a turnkey photovoltaic facility which is built to a nameplate capacity of XXX MW (DC) and which performs to an agreed upon Performance Guarantee (the "Facility" or the "Project").

EPC Contractor will design, or have designed by consulting engineers, all aspects of the Facility, including the layout, civil, electrical and structural components. All final design drawings shall be issued by EPC Contractor for this Project.

EPC Contractor will obtain and comply with all EPC Contractor Permits.

EPC Contractor will procure, or have procured by Subcontractors, all Materials required to build and commission the Facility according to this SOW and the Project drawings and all applicable codes and standards, with the exception of equipment and materials which are required to be procured, installed or tested by PSE&G pursuant to the Interconnection Agreement.

Except as otherwise expressly provided in the EPC Contract, Owner is not responsible for providing any material, labor or services of any kind during EPC Contractor's execution of the Work. EPC Contractor is fully responsible for all development, permitting, engineering, procurement, construction, interconnection, startup and testing activities and will deliver a complete, operational and reliable turnkey photovoltaic Project to Owner.

**2. PROJECT DESIGN**

EPC Contractor shall design and build a free-field, photovoltaic solar energy generation facility. The Project will be designed and built to operate at a maximum DC voltage of 1000-volts (DC).

**2.1. Equipment**

2.1.1.Solar modules: EPC Contractor shall supply and install XXX modules.

2.1.2.Mounting system: EPC Contractor shall supply and install XXX racking as the mounting system for the solar modules. The system shall be composed of galvanized steel and aluminum. The racking manufacturer will supply a suitable warranty for the installed structure and the racking design will be certified by the solar module manufacturer. XXX inverters, which have a combined nameplate capacity of XXX kilowatts. For roof mounted systems, roof penetrations are to be minimized, and systems shall not void existing roof warranties, if any.

2.1.3.Transformers and inverters: EPC Contractor shall supply and install inverters (with their pads) and transformer pads and wiring/cabling to those pads in accordance with the Green Book. PSE&G will provide distribution step-up transformer connecting the system to the grid and will be responsible for connecting from the transformer to the grid.

- 2.1.4. Power Stations: EPC Contractor shall supply and install XXX power stations. A Power Station consists of an electrical enclosure capable of housing the following: inverters, step up transformers (as described in 2.1.3), AC switchgear and monitoring equipment.
- 2.1.5. Metering systems: EPC Contractor shall install or have installed appropriate equipment that allows for the metering of the energy delivered by the Facility to the local electric distribution system in order to meet the requirements of PJM. More detail about this requirement is included in section 10.5 of this Solicitation.
- 2.1.6. Electrical Interconnection: EPC Contractor shall assure that the Facility is properly interconnected at the point of delivery to the step-up transformer and shall provide all interconnection equipment and structures up to this point of delivery.
- 2.1.7. Control and Monitoring System: EPC Contractor shall supply and install monitoring hardware and software, including interconnection communications, as described in Segment 1B Solicitation – Additional Requirements, Section 9.5 and elsewhere. The monitoring system shall be configured for automatic reporting of generation statistics required by PJMGATS.
- 2.1.8. Any available drawings and data that describe the existing Site and the design and construction of the Project shall be provided by PSE&G.

## 2.2. Applicable Codes and Standards

The Project's engineering, design, construction, startup and testing shall follow the applicable codes, standards and publications that are in effect on the NTP Date and which are consistent with Industry Standards.

## 2.3. Interconnection

The design of the interconnection, as specified in the Interconnection Agreement, will be furnished by PSE&G. EPC Contractor has no design responsibilities regarding any equipment, specifications, calculations or settings relating to any equipment that is not or will not be owned or used by the Project or the Owner. Notwithstanding the above, EPC Contractor shall be responsible for all design, procurement, construction and startup of any and all equipment or services required to be provided under the EPC. EPC Contractor shall also be fully responsible for integrating and coordinating his design to properly interconnect to the Interconnection Provider's facilities.

## 3. PERMITS

All Permits required to execute the Work are the responsibility of the EPC Contractor. EPC contractor shall identify known Permit requirements. The cost of preparing, filing and obtaining the Permits shall be included in the EPC Contract Price. EPC Contractor shall provide Owner copies of all approved Permits and applications for Permits still in process on the effective date of this Contract.

## 4. PROJECT MANAGEMENT

EPC Contractor shall have project management responsibilities for the duration of the Work. EPC Contractor shall appoint a single representative as its Project Manager. The primary project management deliverables are described here:

- 4.1. Monthly progress reports shall be provided by EPC Contractor by the second Wednesday of every month covering the prior month's activities and progress. The report shall cover each of the major areas of responsibility as follows: Engineering, Permitting / Environmental, Procurement, Safety, Construction Startup and Testing. For each major area of responsibility (i.e. engineering, permitting / environmental, procurement, safety, construction, startup and testing) and for the completion status of the Project in general, EPC Contractor shall provide a progress versus planned report. The reports shall outline areas of concern and plans for corrective action to maintain the project schedule. The reports shall include the total field person-hours worked for the month and from construction start so that OSHA recordable incident rates can be calculated and reported.
- 4.2. Monthly progress reports will commence on the second Wednesday of the month following the month in which NTP is granted.
- 4.3. A weekly status meeting or conference call will be held with Owner and EPC Contractor to discuss current and planned activities or significant issues. Contractor shall issue an Agenda and a Weekly Report / Action Items List at least one day prior to the weekly status meeting or conference call.

## 5. ENGINEERING

- 5.1. EPC Contractor is responsible for all engineering and design. Where required by applicable Law or Permits, drawings and documentation shall be signed and sealed by a professional engineer registered in the state of New Jersey.
- 5.2. EPC Contractor will submit to Owner design drawings, data and documents for review and comment. The drawings, data and documents will be submitted to Owner when they are deemed 90% complete by EPC Contractor. Owner will have at least (5) business days to review and comment.
- 5.3. EPC Contractor shall provide copies of the following studies and reports as they are completed and issued in final form.
  - Geotechnical Report and Test Ramming Report (for ground mounted systems only)
  - Evaluation and confirmation of roof structural capacity to support proposed system
  - Solar Production Studies
  - Shading Studies

### 5.4. Detailed Site Layout and Design

5.4.1. It is the responsibility of EPC Contractor to generate a site layout that specifies a Project with a nameplate AC capacity of XXX MW, which means the sum of the nameplate AC capacities of the inverters shall be XXX MW. The DC portion of the Facility, which is defined as the sum of the nameplate capacities of the solar modules under Standard Test Conditions, shall not be less than 500 kW (DC).

5.4.2. The site layout shall include the location of photovoltaic arrays, inverters, transformers, switchgear, fencing, laydown / staging areas, site access roads and any other permanent features of the Project such as landscaping and storm water management provisions, if applicable. The site layout shall include dimensions of key site features to existing landmarks or survey monuments. Once the site layout drawings are approved by Owner, EPC Contractor shall not make changes to the

site layout drawings without Owner's prior review and written approval. The site layout shall include pictorial indications of key equipment features (e.g. access doors for power stations, control enclosures and switchgear) so that the detailed designers and construction subcontractors can determine how the equipment and foundations are to be oriented on site.

5.4.3.EPC Contractor shall generate a site plan, which indicates the civil, structural and electrical Work that is required for the successful completion of the Project and for permitting.

#### 5.5. Structural Engineering

5.5.1.Structural analysis and design of the photovoltaic arrays, mounting systems, concrete foundations, piers and storm water management provisions (if applicable) are the responsibility of EPC Contractor. The design shall be based upon the requirements of the applicable codes, standards and Permits as well as the data supplied by the module, inverter, transformer, switchgear and racking suppliers.

5.5.2.EPC contractor shall provide a sealed Professional Engineer's report describing and confirming the structural integrity, remaining useful life and load bearing capacity of the roof.

#### 5.6. Civil Engineering

5.6.1.All civil engineering and design requirements will be completed by EPC Contractor.

5.6.2.EPC Contractor shall design and install all systems for the containment of storm water, as required by codes, standards and permits.

#### 5.7. Electrical Engineering

5.7.1.Electrical engineering and design shall be based upon meeting Industry Standards, the National Electric Code, IEEE 1547-2003 "IEEE Standard for Interconnecting Distributed Resources with Electric Power Systems." and other applicable codes and standards.

5.7.2.The engineering and design shall include the appropriate sizing of all cabling (above and below ground) that will connect the modules, arrays, inverters, transformer and switchgear to the point of interconnection.

5.7.3. All underground wiring and cables shall be installed with a minimum of 3 feet of cover.

5.7.4.All protection equipment throughout the system shall be sized and specified to reduce damage on all components and the interconnection point in case of electrical failure.

5.7.5.The above ground portion of the electrical systems shall be neatly routed to facilitate access, troubleshooting, maintenance, lawn mowing, etc.

5.7.6.The electrical design shall include the design of equipment grounding, and lightning / surge protection for the entire site.

5.7.7.All monitoring and communication equipment and cabling shall be designed and specified.

5.7.8.The design of the interconnection is described in the Interconnection Agreement. EPC Contractor shall design, procure and install all the equipment which is listed as EPC Contractor-furnished in the Interconnection Agreement.

- 5.7.9. EPC Contractor shall design and specify all communications hardware and software required for system protection and remote monitoring.
- 5.7.10. EPC Contractor shall design, procure and install any necessary power, communications and internet facilities required for solar system operation, control remote monitoring, and the plant security system. This shall include all initial service provider's initial setup and installation charges, as well as all usage charges through the Substantial Completion Date. Usage charges shall pass to Company after the Substantial Completion Date.
- 5.7.11. The security system for all ground mounted equipment, to be provided by EPC Contractor, shall include the following:
- Fencing: 7' high chain link fence with 1' high top guard with 3 strands of 9 gage barbed wire.
  - Locked Gates
  - Locked Combiner Boxes
  - Locked Power Stations
  - The following signage to be provided along the perimeter fence (Details of the signage to be determined during project execution):
    - PSE&G Property
    - Danger High Voltage
    - No Trespassing
    - Security / Surveillance
- Battery powered spot/flood lights triggered by motion sensors shall be installed as follows: one at each Power Station and two at each gate.

All as-built drawings shall be provided by EPC Contractor upon Final Acceptance

## 6. PROCUREMENT

- 6.1. Procurement and expediting tasks for all equipment and Materials are the responsibility of EPC Contractor. Such equipment includes the items listed in Section 2.1, and the Materials include such items as wire, cable, conduit, imported fill, rip-rap, concrete, imported rock, fencing and gates.
- 6.2. The equipment and Materials shall be purchased by EPC Contractor, and it is understood that the cost of this equipment and Materials, including the risk of any escalation in the price of such equipment and Materials, is included in the Contract Price.
- 6.3. PSE&G does not have a preferred vendor for the communications and diagnostic equipment, but PSE&G will review the list of subcontractors and suppliers that bidders intend to use.
- 6.4. EPC Contractor shall submit to Owner the key vendor drawings and documents for information, review and comment. Owner will have no more than five (5) business days to review and comment on such drawings. Vendor drawings that shall be submitted to Owner when received by EPC Contractor include, but are not limited to:
- 6.4.1. Solar Panels
  - 6.4.2. Racking and Mounting System
  - 6.4.3. Power Stations

- 6.4.4. Inverters
- 6.4.5. Switchgear
- 6.4.6. Metering and Communications System
- 6.4.7. Control and Monitoring System
- 6.4.8. Security System

## 7. CONSTRUCTION

It is the responsibility of EPC Contractor or its Subcontractors to build all aspects of the Project as depicted in the Project drawings and documents. This includes the electrical system from the modules through the point of delivery to PSE&G. EPC Contractor shall also provide all temporary equipment, materials or facilities required to construct the Project and place it into operation.

### 7.1. Construction Management and Quality Control

- 7.1.1. Construction management shall be provided by EPC Contractor with an on-site construction management team.
- 7.1.2. EPC Contractor shall implement its standard Quality Assurance / Quality Control plan for construction activities on the Project Site. At least 15 days prior to the planned commencement of construction, EPC Contractor shall submit a copy of the Quality Assurance / Quality Control plan for review, comment and approval by Owner.
- 7.1.3. Quality control shall include inspection of the electrical collection trench system, electrical cabling placement, module placement, racking layout and assembly, foundation excavation, concrete forms (including dimensional checks and embedment placement) concrete strength and slump testing and appropriate soil compaction testing. Inspections and testing shall be in accordance with EPC Contractor's QA/QC procedures and applicable code requirements.
- 7.1.4. EPC Contractor shall develop, present and implement a complete Health and Safety Plan (HASP) in accordance with the requirements of 29 CFR 1910 *et. seq.* for sites that are known or suspected of having hazardous substances in soil and/or ground water, **and** 29 CFR 1926 *et. seq.* for construction activities on the Project Site. EPC Contractor shall submit a copy of the site specific HASP for review, comment and acceptance of Owner at least 30 days prior to the planned commencement of construction. EPC Contractor shall provide a qualified Health and Safety representative who shall be present on site whenever construction activities are taking place.
- 7.1.5. EPC Contractor shall supply all labor, tools, machinery, equipment and equipment transportation for all Work.
- 7.1.6. EPC Contractor shall supply all temporary office space, temporary power, sanitary facilities, communications, and drinking water for EPC Contractor's personnel on the Site. EPC Contractor shall provide two desks in a separate office trailer for use by Owner. Owner's site representative shall be provided with electrical power, HVAC, one telephone, one bookcase, one file cabinet and access to sanitary facilities in a manner similar to EPC Contractor's office trailers.

- 7.1.7. EPC Contractor shall keep the Site clean and orderly throughout the duration of construction. All trash and rubbish shall be disposed of off-site by licensed waste disposal companies and in accordance with applicable Law.
- 7.1.8. EPC Contractor shall maintain a copy of all drawings, specifications, permits and vendor installation manuals at the Site.
- 7.1.9. EPC Contractor shall be responsible for storage and maintenance of all installed equipment. Copies of all installed equipment maintenance records shall be kept at the Site and included in the turnover packages. EPC Contractor shall be responsible for obtaining any required off-Site warehouse space, temporary parking, staging or laydown areas.
- 7.1.10. EPC Contractor shall provide permanent equipment marking, labeling and signage for the Project. Warning signs shall be placed at key areas near equipment, at Project entrances, along the perimeter fence, and where required by PSE&G.
- 7.1.11. EPC Contractor, during Project development, shall identify any environmentally sensitive areas on or adjacent to the Site. EPC Contractor shall erect temporary construction fences and silt barriers to protect these environmentally sensitive areas prior to performing any other construction Work. The fences and silt barriers shall be inspected and maintained throughout the duration of construction to prevent any unauthorized discharge to the environmentally sensitive areas.
- 7.1.12. EPC Contractor shall recognize and respect any properties adjacent to the Site and shall use reasonable efforts to minimize disruption to those neighbors (e.g., sediment control, dust control, traffic control, trash control, noise control, etc.)
- 7.1.13. EPC Contractor shall fully comply with all applicable notification, safety and Work rules when working on or near the facilities of PSE&G.
- 7.1.14. It is intended that EPC Contractor re-use all excavated soils in other areas of the site via re-grading and incorporation into final site grading. Should any excess soils be unsuitable for re-use on site, that soil shall be stockpiled, sampled, and covered in accordance with applicable Law. Once characterized, the excess soils shall be disposed of off-site by licensed disposal companies and in accordance with applicable Law.
- 7.1.15. EPC Contractor shall route all field routed electrical collection system in a neat and orderly fashion and in accordance with all applicable code requirements. All cable terminations, excluding module-to-module and module-to-cable harness connections, shall be permanently labeled.
- 7.1.16. EPC Contractor shall provide all temporary road and warning signs, flagmen or equipment as required to safely execute the Work. Street sweeping services shall also be provided as required to keep any dirt, soil, mud, etc. off of roads.

## 7.2. Project Site

- 7.2.1. All roads, photovoltaic arrays, ancillary structures, storage yard, and fencing shall be built in the locations and orientations set forth in the site plan and site layout drawings and in accordance with the design specifications.
- 7.2.2. EPC Contractor shall clear, grub and otherwise prepare the Site, as necessary, to install the Work.
- 7.2.3. Excavated material and/or imported fill material shall be used on site, as needed, to complete the Work.
- 7.2.4. Continuous monitoring and maintenance of erosion control measures shall be performed during all construction activities as per the environmental permits, best management practices and Project documents.
- 7.2.5. Dust control shall be performed as needed during construction.
- 7.2.6. Mowing of the site shall be completed on an as-needed basis.
- 7.2.7. All roads, storage areas, and other project civil design features shall meet all County, State and local grading requirements and environmental documents.
- 7.2.8. All road features shall be designed and constructed to allow delivery, access and egress of all Project components and construction equipment to their respective design and working locations.
- 7.2.9. Control, monitoring, communications, security systems and equipment (fencing for ground mounted equipment, security cameras etc) shall be installed according to the engineering and design documents.
- 7.2.10. Coordination with property owner/occupier

### 7.3. Solar Installation

- 7.3.1. Structural solar array works shall be performed in accordance with technical specifications and drawings, which includes installation of the primary post, header, binder, crossbeam, and cable tray.
- 7.3.2. Electrical solar array works shall be performed in accordance with technical specifications and drawings, which include installation of modules, wire harness, termination boxes, array feeders, ground grid, power stations and all electrical connections.
- 7.3.3. All contracted installation work will be subject to the provisions of the New Jersey Prevailing wage laws, or the equivalent of the prevailing wage for the county where the work is performed.

## **8. PERFORMANCE TESTING**

- 8.1. The Acceptance Test shall be performed by EPC Contractor.
- 8.2. EPC Contractor shall give Owner at least 30 days' notice of the planned Acceptance Test date.

- 8.3. After the Acceptance Test has been completed, EPC Contractor shall provide a copy of the Acceptance Test report for Owner's review. Owner shall notify EPC Contractor of any material deficiencies within five (5) business days of receipt. Once all comments have been addressed, EPC Contractor shall provide three (3) hard copies of the final report and one (1) electronic copy.
- 8.4. EPC Contractor shall provide all test instrument calibration records prior to the start of the Acceptance test. The instruments must be calibrated within six (6) months of the Acceptance Test.
- 8.5. The estimated annual generation of the Project is set forth in Appendix XXX.

## **9. COMMISSIONING**

All commissioning procedures will be carried out according to the Interconnection Agreement and EPC Contractor's standard protocol. For any aspect of commissioning for which the Interconnection Agreement does not specify a procedure, EPC Contractor shall develop and carry out the procedure in accordance with Industry Standards.

## **10. SUBSTANTIAL COMPLETION**

EPC Contractor shall develop, permit, construct and commission the Project such that it achieves Substantial Completion and performs at or above the agreed upon Performance Guarantee.

## **11. FINAL COMPLETION**

- 11.1. EPC Contractor shall arrange for and facilitate final construction inspections and certifications by the local authorities having jurisdiction. Copies of all final approvals and certifications shall be provided to Owner.
- 11.2. EPC Contractor shall complete any Punch List items, clean up the construction site and remove any temporary structures, equipment or services, and construction debris. EPC Contractor shall finish landscaping the Site according to the project specifications, and submit record drawings to Owner.
- 11.3. EPC Contractor shall provide six (6) hard copy sets of the final Project as-built documentation including:
  - 11.3.1. All as-built engineering drawings and specifications
  - 11.3.2. Vendor Drawings and Data
  - 11.3.3. Instruction Manuals
  - 11.3.4. Installation, Operation and Maintenance Manuals
  - 11.3.5. All Permits with copies of close-out records as required
  - 11.3.6. Control system software.
  - 11.3.7. Spare Parts Lists
- 11.4. EPC Contractor shall provide one (1) CD of the electronic as-built documentation, including executable CADD files and ".pdf" versions of all design drawings.
- 11.5. EPC Contractor shall provide six (6) copies of an as-built site survey documenting the Solar Project as-built conditions in relation to the Site, easement areas and right of way areas.

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- 11.6. Final Acceptance will be declared once all of the above Work and Punch List items have been completed. A Certificate of Final Acceptance will be issued by EPC Contractor to Owner at that time in accordance with the EPC Contract.