

# REQUEST FOR PROPOSALS FOR SOLAR ARRAY PURCHASE AND INSTALLATION

**South Central Iowa Solid Waste Agency**

**1736 Highway T-17**

**Tracy, Iowa 50256**

**January 2020**



RFP adapted from National Renewable Energy Laboratory – Request for Proposal Template for Grid-Tied Solar Photovoltaic System for State, City, and Other Entities.

Kiatreungwattana, Kosol. 2018. *RFP Template for Grid-Tied Solar PV Systems for State/City*. Golden, CO: National Renewable Energy Laboratory. NREL/TP-7A40-71868.

<https://www.nrel.gov/docs/fy19osti/71868.pdf>.

## List of Acronyms

AC	alternate current
A/E	architect/engineer
ANSI	American National Standards Institute
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
CD	compact disc
CM	construction management
CSI	Construction Specifications Institute
DC	direct current
EPA	Environmental Protection Agency
ETL	Electrical Testing Laboratories
FM	Factory Manual
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
kW	kilowatt
kWh	kilowatt-hour
kV	kilovolts
LED	light-emitting diode
MDP	main distribution panel
MPPT	maximum power point tracking
NEC	National Electrical Code
NEM	Net Energy Metering
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NRCA	National Roofing Contractors Association
POA	plane of array
POI	point of interconnection
PPA	power purchase agreement

PV	photovoltaic
QCP	quality control plan
REC	renewable energy certificate
SB1	California Senate Bill 1
STC	standard test condition
TREC	tradable renewable energy certificate
UL	Underwriters Laboratories
V	volts

# Table of Contents

List of Acronyms.....	ii
Table of Contents.....	iv
Request for Proposal.....	1
1. PROJECT IDENTIFICATION .....	1
2. TENTATIVE SCHEDULE .....	1
3. BACKGROUND .....	2
3.1 Objective .....	2
3.2 Scope.....	2
3.3 Technical Requirements and Reference Materials.....	3
3.4 Roles and Responsibilities .....	4
4. PROPOSAL CONCEPT DRAWINGS AND SPECIFICATIONS SUBMISSION.....	5
4.1 Concept Drawings .....	5
4.2 Conceptual Design Information.....	5
5. DESIGN SERVICES.....	6
5.1 Timeline/Project Schedule .....	6
5.2 Post-award Conference.....	6
5.3 Specifications .....	6
5.4 Construction Drawings .....	6
5.5 Calculations .....	7
5.6 Registration Seals .....	8
6. DESIGN SUBMISSIONS .....	8
6.1 Design Reviews .....	8
6.2 Purpose .....	8
6.3 Resolution of Comments .....	8
7. Utility Interconnection Agreement .....	8
8. QUALITY AND CONTROL PLAN .....	9
8.1 Content.....	9
8.2 Submissions .....	9
8.3 Updating.....	9
9. SOLAR ELECTRIC MODULE ARRAY .....	10
9.1 Photovoltaic Modules.....	10
9.2 Inverter and Controls .....	10
9.3 Control Panel to Solar Electric Array Wire Runs.....	11
9.4 Photovoltaic Monitoring.....	11
9.5 Transformers .....	12
9.6 Structural Requirements .....	12
9.7 Attachment to Roof .....	13
9.8 Lightning Protection.....	13
9.9 Photovoltaic System Installation Warranty .....	13
10. QUALIFICATIONS FOR INCENTIVES .....	13
11. SHOP DRAWINGS/PRODUCT DATA .....	14
11.1 Submissions .....	14
11.2 Reviews .....	14
11.3 Products for Submission .....	14
12. INSPECTIONS AND TESTS .....	14
12.1 General .....	14
12.2 SCISWA Witness.....	14
12.3 Final Inspections and Tests .....	14
12.4 Documentation .....	14
13. PROJECT CLOSEOUT.....	15
13.1 Preparation for Final Inspections and Tests .....	15
13.2 Record Drawings .....	15
13.3 As-Built Drawings and Specifications .....	15
13.4 Warranties and Guarantees .....	15
13.5 Maintenance Manual.....	15
13.6 Spare Parts.....	15
13.7 Demonstration and Testing .....	15
14. OPERATIONS AND MAINTENANCE SERVICE.....	16
15. PROPOSAL EVALUATION .....	16

# Request for Proposal

South Central Iowa Solid Waste Agency (SCISWA) is soliciting proposals from a qualified contractor/vendor to design, fabricate, deliver, install, operate, and maintain a roof mounted, utility-interactive solar photovoltaic (PV) system under an Interconnection Agreement with Alliant Energy.

The contractor/vendor must demonstrate the ability to perform the work described in the scope of services set forth in this solicitation and have demonstrated experience successfully performing comparable work.

## 1. PROJECT IDENTIFICATION

1.1. Project: Roof-Mounted Grid-Tied PV System

1.2. Location: Poweshiek Transfer Station  
1163 Highway 6  
Malcom, IA 50157

## 2. TENTATIVE SCHEDULES

RFP released/issued.....January 29, 2020  
Facility site visits.....as scheduled with Agency Director  
Proposals due.....February 28, 2020  
Proposals evaluated.....March 2 – 11, 2020  
Selection notification.....March 12, 2020  
Contract development.....March 18, 2020  
Design and construction.....within 180 days of Award  
Commercial operation date.....no later than September 30, 2020

### RFP Submission Guidelines

Electronic or hard copy will be accepted for submission. If mailed, provide two (2) copies of proposal and any supporting documents. The proposal shall be received no later than 1:00 p.m. Central Time, February 28, 2020

### All inquiries should be directed to:

Rick Hurt – Director  
South Central Iowa Solid Waste Agency (SCISWA)  
1736 Highway T-17  
Tracy, IA 50256  
Email: rhurt@sciswa.org

### 3. BACKGROUND

**3.1. Objective.** Contractor shall provide a total “turnkey” project including all necessary equipment, materials, design, manufacturing, and installation services for the installation of a Roof-Mounted Grid-Tied PV System utility-interactive PV system that shall produce a minimum of twenty-two thousand (22,000) kilowatt-hour (kWh) alternate current (AC)/year at the point of interconnection (POI), approximately seventeen and two tenths (17.2) kilowatt (kW) direct current (DC) capacity. SCISWA will review the proposed system to be directly owned by SCISWA and an Interconnection Agreement with Alliant Energy. The contractor should prepare a system summary detailing each location, applicable equipment/size, and predicted system energy production (kWh). With regard to any building-mounted system, the contractor shall evaluate roof conditions and may remove the existing roof system and replace it with either an integrated roof/PV system or a new roof with a PV system installed. See roofing specification for these requirements. The project shall meet all requirements of this statement of work and other specifications included that apply.

**3.2. Scope.** The contractor shall perform all professional services as necessary to provide SCISWA with a complete design package, including the requirements outlined in this statement of work. The contractor shall install the project such that it is operational and compliant with all applicable standards, building codes, Alliant Energy interconnection requirements, and Iowa requirements. The contractor shall include specifications, calculations, and drawings in the design package and submit it to SCISWA for review and approval. After approval by SCISWA of the final design package, the contractor shall provide all necessary construction services to successfully complete the PV system installation. The awarded contractor shall apply for and manage incentives and rebate funding and renewable energy certificates (RECs) paperwork. RECs will be the property of the SCISWA unless otherwise noted.

**3.2.1. Interconnection Agreement.** A cost proposal is to be submitted that includes the Interconnection Agreement with Alliant Energy.

**3.2.2. Design Guidelines for Rooftop PV.** Contractor shall develop a design for a new PV system at 1163 Highway 6 Malcom, IA 50157. See attached drawings indicating available areas for installation and existing roof structure plans. These drawings are meant for informational purposes only and must be field-verified by the contractor.

- The mounting system shall minimize roof penetrations and may include building-integrated roof PV or fully ballasted. The mounting system design needs to meet applicable local building code requirements with respect to snow, wind, and earthquake factors.
- Conduit penetrations shall be minimized.
- If the system is not building-integrated or membrane-sealed, the system shall be fixed-tilt (minimum 5-degree tilt for flat roof or flush mounted for sloped roof) with an orientation that maximizes annual energy production.
- All roof access points shall be securely locked at the end of each day.
- The system layout shall meet local fire department, code, and ordinance requirements for roof access.

**Performance Criteria.** The following performance criteria shall be met for all arrays:

- The power provided shall be single-phase compatible with the on-site distribution system. Winning bidder will be required to submit design drawings stamped (by a licensed professional engineer) specifying connection voltage and location.

- The proposal shall provide an estimated energy delivery for each array, for each month of the year, and for the total for the year at the delivered voltage (208 V, 480 V, or 13.8 kV). The estimated annual energy delivery for all arrays shall be a minimum of 22,000 kWh AC/year at the POI.
- The standard test condition (STC)-rated power value, slope, and orientation will be entered into PVWatts (<http://pvwatts.nrel.gov/>) using the nearest weather file to determine estimated energy delivery in kWh AC. A default value for the system losses of 14% shall be used.
- The PV array shall mean one or more PV modules having the same orientation and on the same maximum power point tracking (MPPT) system. Every array with differing orientation shall have a separate MPPT system.
- All proposed/implemented PV array locations shall be shade-free from 9 a.m. to 3 p.m. (solar time). The contractor shall provide documentation of shading calculations for exterior extents for each proposed array. These calculations may be modified for shading obstructions that will be removed and mitigated as part of the project. Suggested documentation would include sun path diagrams for exterior array locations or SunEye measurements.
- All PV hardware components shall be either stainless steel or aluminum. PV structural components shall be corrosion-resistant (e.g., galvanized steel, stainless steel, composites, or aluminum).
- The project, including supports and power conductors, shall not interfere with roof drains, water drainage, expansion joints, air intakes, existing electrical and mechanical equipment, existing antennas, and planned areas for future installation of equipment shown on drawings.

**Production Metering.** The project shall have at least one production meter at POI of the building.

**3.2.3. Construction.** Perform all construction services necessary for the successful installation of the system based upon the design generated from 3.2.2.

### **3.3. Technical Requirements and Reference Materials**

**3.3.1. Code Compliance.** The installation and equipment shall comply with applicable building, mechanical, fire, seismic, structural, and electrical codes. Only products that are listed, tested, identified, or labeled by Underwriters Laboratories (UL), Factory Manual (FM), Electrical Testing Laboratories (ETL), or another nationally recognized testing laboratory shall be used as components in the project. Non-listed products are only permitted for use as project components when a comparable useable listed component does not exist. Non-listed products proposed for use as components must be identified as such in all submittals.

The contractor shall use project components that are or made of materials that are recyclable, that contain recycled materials, and that are or ENERGY STAR<sup>®</sup> rated if they are available on the market.

The publications listed below form a part of this document and are hereby incorporated by reference:

- National Electrical Code (NEC)
- UL 1703 Flat – Plate PV Modules and Panels

- UL 1741 – Standard for Static Inverters and Charge Controllers for Use in PV Power Systems
- FM Approved – Fire Protection Tests for Solar Component Products
- International Electrotechnical Commission (IEC) 62446 Grid-Connected PV Systems – Minimum Requirements for System Documentation, Commissioning Tests, and Inspections

Other technical codes that shall apply include:

- American Society of Mechanical Engineers (ASME) Performance Test Codes (PTC) 50 (solar PV performance)
- American National Standards Institute (ANSI) Z21.83 (solar PV performance and safety)
- National Fire Protection Association (NFPA) 853 (solar PV systems near buildings)
- Institute of Electrical and Electronics Engineers (IEEE) 1547 (interconnections)
- American Society of Civil Engineers/Structural Engineering Institute (ASCE/SEI)- 7 – ASCE – “Minimum Design Loads for Buildings and Other Structures”
- National Roofing Contractors Association (NRCA)

### **3.4. Roles and Responsibilities**

**3.4.1. Contractor.** The contractor is required to provide:

- Conceptual Design Drawings
- Construction documents and engineering calculations that are signed and sealed by a licensed architect or professional engineer in the appropriate discipline of the subject design drawings (e.g. architectural, geotechnical, electrical, structural)
- Submittals for materials and products
- Construction materials, equipment, and labor
- Design and construction supervision/contract management
- A quality control plan (QCP)
- A safety plan
- Inspections and tests (per QCP)
- Manuals (e.g., design calculations, operation/maintenance, a shop drawing, etc.)
- Commissioning of the project
- Mentoring and training of building operating staff for operation and maintenance
- Operation and maintenance during the first year and an optional service plan after the first year
- A web-based monitoring system for 20 years

**3.4.2. SCISWA will:**

- Provide information and facility site visits per the contractor’s request
- Review for approval design submittals and QCP
- Witness inspections to verify attainment of performance requirements
- Make progress payments for design/construction as agreed



## 4. PROPOSAL CONCEPT DRAWINGS AND SPECIFICATIONS SUBMISSIONS

**4.1. Concept Drawings.** The contractor shall provide SCISWA with conceptual design drawings with the proposal. The conceptual design drawings must indicate the proposed location of the PV array(s) and access points along with a one-line electrical diagram showing inverters, transformers, meters, and interconnection locations. All drawings shall be submitted with dimensions shown in English units.

**4.2. Conceptual Design Information.** The proposal shall include major equipment information, proposed installation/interconnection information, applicable incentive information, and performance characteristics of the system. The proposal shall identify an appropriate location for the solar PV inverter equipment and its related components and environmental control systems that will meet the following criteria:

- Ease of maintenance and monitoring
- Efficient operation
- Low operating losses
- Secured location and hardware
- Compatibility with existing facilities
- Avoidance of flood-prone areas

All products shall comply with the technical requirements shown under section 8, “Solar Electric Module Array.” At a minimum, the proposed concept information shall include:

### Equipment Information

- System description
- Layout of installation
- Selection of key equipment and layout of equipment
- Performance of equipment components and subsystems
- Specifications for equipment procurement and installation
- All engineering associated with structural and mounting details
- Controls, monitors, and instrumentation
- Operation and maintenance service plan

### Installation Interconnection Information

- Solar electric array orientation (degrees)
- Solar electric module tilt (degrees)
- Electrical grid interconnection requirements
- Integration of solar PV system with other power sources
- System type and mode of operation (utility interactive)

### Performance Characteristics

- Shading calculation documentation
- Total system output (kWh/year)
- Estimated kWh/month per array (shown over a 12-month period)
- Warranties and guarantees

### Applicable Incentives

- Identify all applicable incentives

### Interconnection Agreement

- Provide confirmation that the PV systems will be designed to comply with applicable Alliant Energy interconnection requirements

### Cost

- The total bid price of the project (to include costs expressed in \$/Watt) including operation and maintenance for the first year and an optional service plan after the first year
- Interconnection Agreement price and terms.

## **5. DESIGN SERVICES**

The solar PV system shall be designed and engineered to maximize the solar energy resources, taking into consideration the customer's electrical demand and load patterns, proposed installation site, available solar resources, existing site conditions, proposed future site improvements, and other relevant factors. Design services for this project shall require a schematic design submission, a design development submission, a check set submission, and a construction document submission. A final set of as-built drawings shall also be provided to SCISWA. These submissions shall be delivered to SCISWA based on the project schedule submitted and approved by SCISWA. The design package shall include the following details (5.1–5.6):

- 5.1. Timeline/Project Schedule.** The contractor shall provide an estimate of the project timeline and schedule.
- 5.2. Post-award Conference.** The contractor shall hold a post-award conference within 21 calendar days after receipt of the contract award. The meeting will be attended by SCISWA team members and the contractor's personnel. At a minimum, the prime contractor's project manager and foreman, the primary designer, and a representative of any subcontractor performing over 25% of the work shall attend. The meeting shall include a site walk of the project location. The purpose of the meeting will be to discuss the contractor's plan for completing the design and construction, including a construction schedule.
- 5.3. Specifications.** A full set of specifications shall not be required for this project. However, specifications that express all information and demonstrate sufficient detail so as to direct the construction work outlined in this statement of work shall be required. The specifications package shall be coherent enough that any contractor not familiar with the project would be able to construct the project design. The specifications shall include all equipment information, proposed installation and interconnection information, and performance characteristics of the system.
  - 5.3.1.** All drawings, estimates, calculations, and specifications shall be in English units.
  - 5.3.2.** The contract shall take into account a construction plan producing a minimum disruption of day-to-day activities, utilities, services, etc.
- 5.4. Construction Drawings**
  - 5.4.1.** Provide drawings for each discipline required (architectural, structural, electrical, etc.), with separate plans for new work and demolition as well as special types of drawings where

necessary, such as enlarged plans, equipment curbing and flashing details, roof penetration details, etc. Drawings shall clearly distinguish between new and existing work.

**5.4.2.** Each drawing shall indicate project title, project number, array identification and location, architect/engineer (A/E) firm, A/E's address and/or phone number, contract number, drawing title, drawing type, drawing number, and key plan. A cover sheet shall be provided and shall include a list of the drawings, legend, vicinity map, and location map in addition to all items required for each drawing. Each A/E submission shall be clearly dated and labeled (e.g. 75% Design Development Submission, 100% Check Set Submission, Construction Document Submission, As-Built Drawings, etc.). Each drawing sheet submitted shall include a graphic scale in the lower right-hand portion of the sheet. The final set shall be stamped by a licensed engineer for the state in which the building/carport is located. At a minimum, the following drawings are required:

- Site plan including utility locations and connections – showing staging and phasing requirements
- Electrical plans – including single line diagram and utility interconnection
- Electrical details
- Roof plan and/or carport plan – showing the full layout of the system and detailing any obstacles that must be permanently or temporarily removed or relocated
- Array support and mounting details
- Any drawings that may be required to install a complete project
- Waterproofing details

**5.4.3.** The contract documents shall sufficiently define the statement of work and shall stand on their own.

**5.4.4.** Specifically address the means to keep the existing building accessible and operational by means of relocation and/or phasing.

**5.5. Calculations.** The contractor will provide the following calculations:

**5.5.1.** System Electrical Calculations. Provide with design development and again with 100% check set.

- PVWatts calculation
- System energy production calculation showing estimated monthly and yearly energy output for each array
- Energy value and project cash flow

**5.5.2.** Energy performance calculated by a detailed PV analysis program such as System Advisor Model (SAM) (<https://sam.nrel.gov/>) or other industry-recognized PV design software tools using proposed specific PV modules and inverters.

**5.5.3.** Include roof structural loading calculations. These calculations shall specifically address roof loading from the PV array and confirmation that the loading does not exceed existing roof framing capacity as determined by the analysis. The documents included in this contract include a preliminary *Roof Structural Analysis*. This document provides some preliminary indications on the existing roof's capability to carry additional loading and is intended to assist during the proposal process in developing the concept design. It is not

intended to alleviate the need to do array-specific structural calculations during the subsequent design phases.

**5.6. Registration Seals.** Each final working drawing and each submitted specification and calculation document shall be signed by, bear the seal of, and show the state certificate number of the architect and/or engineer who prepared the document and/or is responsible for its preparation.

## **6. DESIGN SUBMISSIONS**

The awarded contractor will secure from governing agencies and the utility company all required rights, permits, approvals, and interconnection agreements at no additional cost to SCISWA. The awarded contractor will complete and submit in a timely manner all documentation required to qualify for available rebates and incentives.

**6.1. Design Reviews.** For each design/drawing submission, SCISWA reserves the right to make comments and request changes after the receipt of the submission. Reviews will be made by SCISWA staff. As part of its review, SCISWA may offer submission reviews to local code officials. SCISWA shall provide review comments within 14 calendar days of receipt of the 75% Design Development Submission and the 100% Check Set Submission.

**6.2. Purpose.** SCISWA will review the contractor design submissions to verify adherence to contract requirements. Design reviews by SCISWA are not to be interpreted as resulting in an approval of the contractor's apparent progress toward meeting contract requirements but are intended to discover any information that can be brought to the contractor's attention that might prevent errors, misdirection, or rework later in the project. The contractor shall remain completely responsible for designing, constructing, operating, and maintaining the project in accordance with this request for proposal, and the contract requirements

**6.3. Resolution of Comments.** The contractor shall respond to all design review comments in writing, indicating one of the following: (1) adoption and action taken, (2) adoption with modifications and action taken, (3) alternative resolution and action taken, or (4) rejection. In cases other than unqualified adoption, the contractor shall provide a statement as to why the reviewer's comment is inappropriate. If the contractor believes that any SCISWA design comments or requested changes will result in a change in the contract cost, it shall notify SCISWA within seven calendar days of receiving the comment(s) and provide a detailed cost estimate of anticipated contract modifications. Rejection items shall not go forward to the construction phase until adequate resolution of the rejected item has been approved by SCISWA. Design review comments shall not relieve the contractor from compliance with terms and conditions of this contract. The contractor's comment resolution shall be transmitted to SCISWA within seven calendar days of comment receipt and shall incorporate discussions from the scheduled design comment review meetings.

## **7. UTILITY INTERCONNECTION AGREEMENT**

**7.1.** The contractor shall coordinate with Alliant Energy to ensure that the project satisfies all Alliant Energy criteria for interconnection of the project to the Alliant Energy electric distribution system. This includes coordinating all negotiations, meeting with Alliant Energy, conducting design reviews, and participating in any needed interaction between Alliant Energy and SCISWA.

**7.2.** The contractor is responsible for preparing required submissions for obtaining the Net Energy Metering (NEM) (if applicable) and interconnection agreement from the utility. SCISWA, not

the contractor, will sign the NEM and interconnection agreements. For a PPA, the Net Energy Metering (NEM) and interconnection agreement is between the system owner and the utility.

- 7.3.** The contractor shall manage the interconnection and start-up of the project in coordination with the site and Alliant Energy. The contractor shall at its own expense pay any interconnection, processing, and other fees and expenses as may be required by Alliant Energy for interconnection and operation of the project.

## **8. QUALITY AND CONTROL PLAN**

- 8.1. Content.** For each performance and installation requirement, the QCP shall identify: item/system to be tested, exact test(s) to be performed, measured parameters, inspection/testing organization, and the stage of construction development when tests are to be performed. Each inspection/test shall be included in the overall construction schedule. The contractor is not relieved from required performance tests should these not be included in the plan.

The QCP is intended to document those inspections and tests necessary to assure SCISWA that product delivery, quality, and performance are as required. It also serves as an inspection coordination tool between the contractor and SCISWA. An example of these inspections/tests is the final test/inspection for overall performance compliance of the system. Results from tests and inspections shall be submitted within 24 hours of performing the tests and inspections. At a minimum, the QCP should conform to “IEC 62446 Grid-Connected PV Systems – Minimum Requirements for System Documentation, Commissioning Tests, and Inspections (Version xxxx).”

Performance tests will be conducted at the final commissioning/acceptance testing and 1 year after the acceptance date. Performance tests will include electrical current – voltage (I-V) curve traces for all PV strings. For project acceptance, measured performance at MPPT must be at least 90% of expected performance, which will be adjusted for concurrently measured cell temperature and plane of array (POA) irradiance. This can be accomplished using a current industry standard I-V curve tracer with capability to compare measured PV string I-V curves with nameplate performance of PV string compensated for concurrent cell temperature and POA irradiance measurements. If performance is less than 90% at the 1-year performance tests (measured using the same method as for project acceptance), the contractor shall promptly troubleshoot and correct any malfunction or issues as necessary to return the project to 90% measured performance or better. The contractor shall supply SCISWA with detailed documentation of malfunction or errors and all corrective actions taken.

- 8.2. Submissions.** The QCP shall be prepared and submitted within 21 calendar days of the post-award conference meeting and prior to any construction on-site. The QCP may be rejected as incomplete and returned for resubmission if there is any performance, condition, or operating test that is not covered therein.
- 8.3. Updating.** During construction, the contractor shall update the QCP if any changes are necessary because of any changes or schedule constraints. SCISWA shall be notified immediately of any schedule and/or procedural changes.

## 9. SOLAR ELECTRIC MODULE ARRAY

### 9.1. Photovoltaic Modules

- PV modules shall be a premium tier commercial, off-the-shelf product, UL-listed, and on the California Senate Bill 1 (SB1) Lists of Eligible SB1 Guidelines Compliant PV Modules<sup>1</sup> to be eligible for Construction Specifications Institute (CSI) and shall be properly installed according to manufacturer's instructions, the NEC, and as specified herein.

**9.1.1.** The solar electric system shall produce the minimum annual AC energy output. If the system is proposed to produce more than the minimum required energy output to reduce the cost per delivered kWh, then the system shall produce the "proposed" energy. The output will be adjusted if the actual yearly solar insolation received is less than that indicated by PVWatts. A normalizing calculation will be made to correct the output, so a contractor is not penalized for an extremely cloudy year.

**9.1.2.** System wiring shall be installed in accordance with the provisions of the NEC.

**9.1.3.** All modules installed in a series string shall be installed in the same plane/orientation.

**9.1.4.** Panel installation design shall allow for the best ventilation possible of panels to avoid adverse performance impacts.

**9.1.5.** Provide SCISWA with 1% extra PV panels.

**9.1.6.** Provide a panel manufacturer's warranty as a minimum: No module will generate less than 90% of its specified minimum power when purchased. PV modules shall have a 25-year limited warranty guaranteeing a minimum performance of at least 80% of the original power for at least 25 years. Measurement made under actual installation and temperature will be normalized to standard test conditions using the temperature and coefficients published in the module specifications. PV modules that do not satisfy this warranty condition shall be replaced.

Note: For a PPA, a warranty is included in the PPA price and covered by the contractor.

### 9.2. Inverter and Controls

**9.2.1.** Each inverter and associated controls shall be properly installed according to the manufacturer's instructions.

**9.2.2.** Inverters shall be a micro-inverter type commercial off-the-shelf product, listed to UL 1741 and IEEE 1547, and on the SB1 Compliant Lists of Eligible Inverters per SB1 guidelines: <http://www.gosolarcalifornia.org/equipment/inverters.php> or on local guidelines.

The inverter shall have at a minimum the following features:

- UL/ETL listed
- Peak efficiency of 96% or higher

---

<sup>1</sup> <http://www.gosolarcalifornia.ca.gov/equipment/index.php>

- Operational indicators of performance and built-in data acquisition and remote monitoring
- Capable of parallel operation with the existing AC power and the ability to automatically synchronize its output waveform with that of the utility upon restoration of utility power

**9.2.3.** Warning labels shall be posted on the control panels and junction boxes indicating that the circuits are energized by an alternate power source independent of utility-provided power.

**9.2.4.** Operating instructions shall be posted on or near the system and on file with facilities operation and maintenance documents.

**9.2.5.** Provide detailed lock-out/tag-out instructions for all equipment.

**9.2.6.** Power provided shall be compatible with on-site electric distribution systems.

- Install inverters and control panels in most optimum locations with appropriate environmental protection. Roofs may be used if structurally sufficient. If inverters are mounted outside they shall be shaded from direct sun from 10 a.m. to 6 p.m. in the months of June–August and be able to be secured.

**9.2.7.** The inverter and system shall utilize an astronomical timer or other means to shut down the inverter during nighttime to avoid energy usage at night.

**9.2.8.** A minimum 10-year manufacturer’s warranty shall be provided.

### **9.3. Control Panel to Solar Electric Array Wire Runs**

**9.3.1.** Areas where wiring passes through ceilings, walls, or other areas of the building shall be properly restored, booted, sealed, and returned to their original condition.

**9.3.2.** All wiring between carports and the POI shall be underground and meet applicable codes.

**9.3.3.** Thermal insulation in areas where wiring is installed shall be replaced to “as found or better condition.” Access doors to these areas shall be properly sealed and gasketed.

**9.3.4.** All field electrical devices shall have the capability to be locked as appropriate.

### **9.4. Photovoltaic Monitoring**

**9.4.1.** The PV systems installed shall include a monitoring system for use by the SCISWA on a vendor-provided website. The public site is intended for education and outreach regarding renewable energy production and information on avoided greenhouse gas production. The public site shall be maintained for 10 years.

**9.4.2.** Monitor by an Internet Protocol (IP)-addressable device and display graphically in a user-friendly manner the following parameters:

- AC energy
- Solar irradiance
- status of all equipment
- electrical one-line diagram showing operation and performance of all equipment

Data shall be available both in real time and in archived 15-minute averages. All monitoring hardware and monitoring equipment shall be provided by the contractor. The system shall also include metering for remote data collection and display on the vendor-provided web site of system performance. System performance shall allow display during different monitoring periods from 1 hour to 1 year.

- 9.4.3.** Provide networking equipment, engineering, programming, wiring, and software to allow remote connection by SCISWA to the local area network.
- 9.4.4.** Meters used for the project shall be listed on the California Energy Commission (CEC) Lists of Eligible System Performance Meters per SB1 Guidelines, be UL-listed, and comply with Alliant Energy net energy metering requirements.
- 9.4.5.** Meters shall be installed in the main distribution panel (MDP) when possible. Meters shall not be mounted to the transformer housing without prior approval when there is no other reasonable place to mount it.

## **9.5. Transformers**

- 9.5.1.** Stand-alone boost-up transformers not incorporated into the inverters shall be National Electrical Manufacturers Association (NEMA) premium efficiency. Exterior transformers shall be housed in a NEMA 3R<sup>2</sup> enclosure and pad-mounted. They shall be located next to switchgear housings where indicated on drawings.

## **9.6. Structural Requirements**

- 9.6.1.** All structures, including array structures, shall be designed in accordance with all applicable state and local codes and standards.
- 9.6.2.** The contractor shall provide structural calculations stamped by a licensed professional structural engineer in the appropriate state.
- 9.6.3.** All structural components shall be noncorrosive (galvanized steel, stainless steel, or aluminum). All hardware shall be stainless steel or aluminum. All components shall be designed to obtain a minimum 40-year design life.

---

<sup>2</sup> Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against access to hazardous parts; to provide a degree of protection of the equipment inside the enclosure against ingress of solid foreign objects (falling dirt); to provide a degree of protection with respect to harmful effects on the equipment due to the ingress of water (rain, sleet, snow); and that will be undamaged by the external formation of ice on the enclosure.



**9.6.4.** All roof penetrations shall be designed and constructed in collaboration with the roofing professional or manufacturer responsible for the roof and roofing material warranty for the specific site. The number and size of the penetrations necessary to extend the power and control cable into the building must be kept to a minimum and grouped in a single location when practicable. All roof installations and weather proofing of penetrations shall not compromise the roof warranty, or if the roof has no warranty, accepted best practices. The roof penetrations and roof connections shall be warranted for weather tightness for 10 years from the installer, including parts and labor.

**9.6.5.** Rooftop installations where there is no parapet, or the parapet is less than 42 in., a 6-ft safety zone from the roof edge to the PV system shall be maintained. A 3-ft clear path of travel shall be maintained to and around all rooftop equipment. Design shall address access for maintenance and replacement of the equipment. Appropriate fall protection or temporary platforms shall be incorporated into the design to allow for this maintenance and replacement work. If the inverters are mounted on the roof, this equipment shall have permanent access walkways installed to facilitate monitoring and maintenance.

## **9.7. Attachment to Roof**

**9.7.1.** The system shall be mounted using the best means practicable, such as direct attachment or a fully ballasted system. All penetrations and structural connections associated with supports and conduit shall be kept to a minimum and shall be waterproof.

**9.8. Lightning Protection.** Provide surge protection on all electrical systems.

**9.9. Photovoltaic System Installation Warranty.** The PV systems shall carry a 5-year workmanship warranty by the installer, including parts and labor.

## **10. QUALIFICATIONS FOR INCENTIVES**

**10.1.** Incentives and Benefits: The contractor shall determine and select all incentives and benefits available to the project, except that it shall select from among any mutually exclusive incentives for which the project might qualify in a way reasonably expected to maximize net present value to SCISWA of all incentives and benefits, RECs, and energy cost savings that might be realized in relation to the project.

The contractor shall complete the application and pay all deposits and fees for the selected incentives and ensure that SCISWA receives all benefits of the incentives to the extent reasonably within the contractor's control.

The project shall be designed and constructed to comply with requirements of all other benefits programs for which it might qualify, such as accreditation for RECs, green tags, and tradable renewable energy certificates (TRECs). Certification shall be accomplished through Green-e Energy ([http://www.green-e.org/getcert\\_re.shtml](http://www.green-e.org/getcert_re.shtml)) and overseen through a REC tracking system, where available.

The contractor shall complete all documentation and application processes associated with Green-e certification on behalf of SCISWA and shall, if SCISWA does not yet have an account with a REC tracking system, complete all application processes to establish an account for SCISWA, and, after the account has been established, register the project in the account such that SCISWA will receive RECs for the operation of the project. Contractor shall, at its expense,

pay all deposits and fees for completing the applications and certifications with Green-e and the REC tracking system.

## 11. SHOP DRAWINGS/PRODUCT DATA

**11.1. Submissions.** The contractor shall submit shop drawings and product data/submittals, catalog cuts, etc., as stipulated herein. Shop drawing/product data submissions to SCISWA shall be made after review and approval by the contractor. All approved product data and shop drawings shall be delivered to SCISWA in one submission electronically.

The contractor shall combine all product data submission material into hard copy manuals for reference during all phases of construction. Shop drawings shall be bound with product data.

**11.2. Reviews.** Reviews of shop drawings and product data by SCISWA are not to be interpreted as an approval of the contractor's product selections. The contractor shall remain completely responsible for constructing the PV system in accordance with all contract performance requirements.

**11.3. Products for Submission.** The contractor shall provide shop drawings and product data for all systems, equipment, and materials.

## 12. INSPECTIONS AND TESTS

**12.1. General.** The contractor shall perform inspections and tests throughout the construction process, including: existing conditions/needs assessments, construction installation placement/qualification measurements, and final inspections/tests performance certification. Periodic "quality" inspections shall also be conducted to support progress payments as identified in the contractor's QCP.

**12.2. SCISWA Witness.** All inspections and tests to verify documented contract assumptions, establish work accomplishment, or certify performance attainment shall be witnessed by SCISWA and/or its construction management (CM) representative and coordinated through the QCP.

**12.3. Final Inspections and Tests.** To ensure compliance with provisions of the NEC, an inspection by a licensed electrical inspector is mandatory after construction is complete. Unless otherwise identified, manufacturer recommendations shall be followed for all inspection and test procedures. The NEC inspection shall be conducted by an independent third-party electrical inspector familiar with PV systems. Provide qualifications of the proposed third-party inspector for review and approval prior to conducting the NEC inspections.

Tests shall include a commissioning of the array. Commissioning tests shall conform with the requirements in Section 7 (QCP). Commissioning shall be performed for the entire PV system. This data shall be used to confirm proper performance of the PV system.

**12.4. Documentation.** Inspections/tests required in the QCP shall result in a written record of data/observations. The contractor shall provide two copies of documents containing all test reports/findings. Test results shall typically include: item/system tested, location, date of test, test parameters/measured data, state of construction completion, operating mode, contractor inspector/SCISWA witness, test equipment description, and measurement technique.

## 13. PROJECT CLOSEOUT

- 13.1. Preparation for Final Inspection and Tests.** The below steps shall be taken to ensure the project is in a condition to receive inspections and tests.

Finalize record drawings and manuals, indicating all as-built conditions.

- 13.2. Record Drawings.** The contractor shall maintain on-site the working record drawings of all changes/deviations from the original design. Notations on record drawings shall be made in erasable red pencil or another color to correspond to different changes or categories of work. Marked-up drawings shall always be maintained at the contractor's on-site construction office, available for SCISWA and/or CM to review. Record drawings shall note related change order designations on affected work. When shop drawings indicate significant variations over design drawings, shop drawings may be incorporated as part of record drawings. A review of record drawings may be required before monthly payments can be processed.

- 13.3. As-Built Drawings and Specifications.** The contractor shall provide as-built drawings and documents based upon actual site installation. Should SCISWA determine that variations exist between finished construction and the as-built drawings, the contractor shall correct drawings to the satisfaction of SCISWA.

The contractor shall submit six hard copies and two compact discs (CDs) containing the as-built drawings and specifications as CAD and PDF files.

- 13.4. Warranties and Guarantees.** Submit specific warranties and guarantees, final certifications, and similar documents to SCISWA upon substantial completion and prior to final payment. Include copies with the operation and maintenance manual. All warranties shall be signed by a principal of the contractor's firm and sealed if a corporation.

- 13.5. Maintenance Manual.** Provide a detailed operation and maintenance manual including a diagram of system components; a description of normal operation; a description of operational indicators and the normal status of each; a table of modes of operation, safety considerations, preventive maintenance requirements, troubleshooting, and corrective actions; sources of spare parts; and cut sheets for all components. The contractor shall prepare six hard copies and two CDs containing the detailed maintenance manual. Submit to SCISWA.

- 13.6. Spare Parts.** The contractor shall provide a recommend list of spare parts. At the minimum, a set of combiner box fuses for each array shall be provided along with the required spare panels noted in Section 8.

- 13.7. Demonstration and Training.** Provide SCISWA with approved training for designated personnel in the operation of the entire PV energy system, including the operation and maintenance of inverter(s), transfer switches, the panel board, disconnects, and other features as requested by SCISWA. Instruct the designated SCISWA personnel in removal and installation of panels, including wiring and all connections. Provide SCISWA with written instructions and procedures for shutdown and start-up activities for all components of the system. SCISWA shall be permitted to videotape this training for official use.

**14. OPERATION AND MAINTENANCE SERVICE**

- 14.1.** Provide operation and maintenance of the solar array systems for 1 year. Work shall include all manufacturer recommended maintenance as well as a 12-month performance commissioning as outlined in Section 7.1 (QCP). SCISWA shall be invited to witness all performance commissionings. A maintenance log shall be maintained to note dates, equipment, and issues being resolved. The contractor should be available within 48 hours to respond to natural disasters (e.g., extreme storm, hail, wind events, etc.) to inspect the array for damage.

Note: For a PPA, operation and maintenance is included in the PPA price and covered by the contractor.

**15. PROPOSAL EVALUATION**

The proposals will be reviewed by the review committee. The following qualitative merit criteria will be used to determine the technical value of the offer in meeting the objectives of the solicitation.

Proposal Cost Effectiveness	30 points
Technical Approach/ Implementation	30 points
Company Qualifications/Project Experience	20 points
Project team, team and experience	20 points