

## SOLAR PV SYSTEM SPECIFICATIONS AND REQUIREMENTS

### **General**

- All power generation and transmission equipment must be UL listed for its designed use
- Construction must comply with current adopted State Building Code, which encompasses:
  - 2012 International Building Code
  - 2011 National Electric Code (NEC)
  - State Fire Marshall
- Minimum 10-year warranty for all materials and workmanship
- System integrator is responsible for conducting all required building, utility, and rebate inspections, and must complete all construction and documentation in a manner necessary to pass such inspections, and in accordance with industry standard best practices
- System integrator must possess current state electric and solar contractors license from State's Contractors Licensing Board to perform work being proposed

### **Modules**

- System modules shall be UL1703 listed, and CEC-listed
- 10-year warranty on minimum of 90% nameplate energy production and 25-year warranty on minimum of 80% nameplate energy production
- All warranties must be documented, in advance and be fully transferable to Client

### **Inverters**

- Inverters shall be UL1741 listed and must be CEC-listed with an efficiency of 95% or higher
- Inverters must carry minimum 10-year warranty (direct purchase price must include 20-year warranty)
- All warranties must be documented, in advance and be fully transferable to Client

### **Balance of System**

- Each proposed PV system shall include, at a minimum, one fused DC disconnect and one fused AC disconnect for safety and maintenance concerns.
- String combiner boxes must include properly-sized fusing, and all metal equipment and components must be bonded and grounded as required by NEC.
- All system wiring and conduit must comply with NEC stipulations, and all indoor and outdoor wiring, outdoor-rated or otherwise, must be enclosed in EMT or RIGID conduit or covered raceway, except adjacent panel connections and under-array home run wiring.
- Wall penetrations must be sealed in compliance with NEC and NFPA regulations.
- All wiring materials and methods must adhere to industry-standard best practices, and all inter-module connections must require the use of a specialized tool for disconnecting.
- Material requirements:
  - Fasteners and hardware throughout system shall be stainless steel or material of equivalent corrosion resistance
  - Racking components shall be anodized aluminum, hot-dipped galvanized steel, or material of equivalent corrosion resistance
  - Unprotected steel not to be used in any components

### **Interconnection**

- System interconnection must comply with NEC and Utility regulations, and must be approved by the local Utility and the Authority Having Jurisdiction (AHJ)'s Building Department before any PV system construction is begun.
- Interconnection points will be at facility main switchgear locations
- Emergency back-up generation may exist on-site and must be factored into proposed PV system electrical plans.
- All placards required by Client, the AHJ, the Utility, and/or State Solar Initiative program must be provided and installed according to Client and NEC guidelines.

### **Monitoring and Reporting**

- System monitoring and reporting must comply with State solar program requirements, and must be provided at no additional cost for a minimum of five years.
- Monitoring shall include revenue-grade metering of PV system production and building consumption; pyranometer; and ambient air temperature sensor.
- Proposals must include Internet hosting of monitoring with on-line access for Client personnel and touchscreen kiosk or video monitor for public display of data.
- System integrator must work with the Client to determine best location and technique for monitoring communications interconnection.
- System integrator will be responsible for providing all required monitoring communications and power wiring and conduit, with Client guidance on approved locations.

### **System Design and Permitting**

- For each site, within 90 days of contract being signed, bidder shall create a construction plan set which includes at a minimum:
  - Site overview
  - Detailed array layout with stringing configuration
  - Mounting and racking details
  - Details of electrical transmission showing conduit routing and location of electrical enclosures, conduit support details, and enclosure mounting details
  - Electrical single-line diagram
  - Electrical three-line diagram
  - Monitoring plan
  - Construction project plan with timeline
- All proposed system designs and construction techniques must be approved by the AHJ's Building Department.
- A building permit is required for each system, and must be obtained through normal permitting processes by bidder.
- Bidder shall obtain structural PE stamp verifying the integrity of the existing facility to handle additional weight load of proposed PV system
- Bidder shall obtain electrical PE stamp verifying the integrity and code compliance of proposed PV system and interconnection with facility.
- Roof-mounted array layouts shall be designed to provide minimum of 3 feet of walking access around the perimeter of the roof and convenient access to existing roof-mounted HVAC equipment.
- Ground-penetrating array layouts shall adhere to all soil and geographical requirements and concerns in terms of ground penetration and trenching.
- Final array layouts shall be designed to avoid shading from 9am to 3pm annually. If this shading requirement cannot be strictly met, bidder shall specify the predicted solar access and performance losses.

- Wire loss in DC circuits to be < 1.5%
- Wire loss in AC circuits to be < 1.5%

### **Installation**

- Integrator shall prepare, maintain, and abide by Site Safety Plan to include, at a minimum, all applicable OSHA workplace safety and Personal Protective Equipment (PPE) requirements
- Construction work shall be designed to minimize impact to facility operations. Integrator shall develop a construction plan for site access, staging, and equipment storage and obtain approval from the Client prior to beginning construction.
- All asphalt, concrete, landscaping, and other areas that are disturbed during construction shall be remediated and returned to original condition, or equivalent condition as approved by the Client.
- After completion of work, site shall be left clean and free of any dirt or debris that may have accumulated during construction. All construction equipment, spoils, and other construction byproducts shall be removed from the site.
- All electrical enclosures and equipment shall be installed to be readily accessible to qualified personnel only. Fences or other protection may be required per Client specifications.
- All visible conduits and electrical equipment shall be painted or aesthetically dressed per Client specifications.
- Location of existing underground utilities must be marked by USA/Dig Alert and equivalent private service prior to any underground work.

### **PV System Documentation and Process Control**

In addition to construction requirements listed above, system integrator will be required to:

- Apply for and receive interconnection approval from the local Utility for proposed PV systems.
- Obtain Solar Initiative rebates and/or Renewable Energy Credits (if applicable)
- Provide Operations & Maintenance training to Client staff, and must prepare press releases and a ribbon-cutting ceremony at Client request.
- Provide twenty years of system maintenance (at Client's sole discretion; priced separately), with annual reports of system performance and consistent oversight of system monitoring.
  - Bidder shall be required to respond to system downtime within 24 hours of first occurrence of incidence. If corrective action is not immediately feasible, bidder shall notify client of action plan and timeline for execution.
  - Bidder shall be required to respond to warranty related issues not affecting production within 72 hours of notification.
- Provide As-Built drawings of PV system, which must include finalized module layout and stringing chart.