Solar Quality Initiative

Provider Credentialing Protocol

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The process outlined below describes an credential approach to ensure that solar aggregators have the internal systems in place, and meet the necessary requirements to deliver solar systems that meet or exceed the requirements set forth in the Solar Installation Best Practices (www.solarquality.org).

Companies may demonstrate compliance through providing necessary supporting documentation, which will be reviewed and approved by a third party, as having met the terms set forth in this document.

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Provider Credential

1. Quality Management Manual

The Service Provider shall have a Quality Management Manual that details its Quality Management System (QMS). Per ISO 9001, a Quality Management System is a way of defining how an organization can meet the requirements of its customers and other stakeholders affected by its work.

The QAP should be distributed to all company employees and contain documented statements of a quality policy and quality objectives. (Signed documentation of manual acceptance shall be retained.)

All documentation required by the Quality Management Manual (per project) shall be stored by the finance company while each project's financing is active. All documentation required by the Quality Management Manual shall be stored by the warranty provider (which may be different than the finance provider) shall be kept for the duration of the warranty.

Verification:	Quality Management Manual should be reviewed by a third-party representative and is preferred to be certified by an independent ISO Auditor. Reviewers shall have access to verify that practices defined within QMS are being followed.
Documentation:	Quality Management Manual including minimum documentation of the Quality Management System with regard to: ● Customer Service Policy ● Employee Training Policy ● Management Interaction Policy ● System Installation Quality Assurance Policy ○ On site record of "as built" system status. ■ Design vs. installed ■ Installation method ■ Photo evidence/documentation. ○ Review of on site record, resulting in action for issues found not in compliance with relevant codes or requirements.

2. Design and Production Estimates

The Service Provider is responsible for ensuring accurate solar PV system production estimates and estimated utility bill savings based on existing customer utility rate structure.

- Full year of customer utility bills when available. (Min requirement- 3 months)
- Utility Rate Structure: using national database such as Genability or Clean Power Research or the Utilities current published tariff rate.
- Shade Estimate: using Solmetric Suneye, Solar Pathfinder or industry accepted alternative.
- Solar PV production Estimates: using PV Watts, SAM, PVsyst, or Clean Power Research

Service Providers that use software or datasets listed above in combination with internal, actual performance data shall document and disclose rationale of additional data changes.

Verification:	Review a stratified, random sample of ten percent (10%) of completed projects to verify shade analysis and estimated production were estimated per industry standards. Reviewer shall provide documentation of each system in review with approval.
Documentation	Data tape of reviewed systems.

3. Equipment Underwriting

Service Providers shall maintain a list of approved equipment to be financed. The approved equipment list shall include the following major components of a PV system:

- Solar Photovoltaic Modules
- Inverters
- Mounting Systems
- Monitoring Systems
- Balance of System (BOS) Components

Underwriting requirements of major components shall be defined and documented in the Quality Management Manual. Underwriting criteria shall, at a minimum, meet requirements of the SAPC Best Practices in PV System Installation.

Solar Photovoltaic Modules

- UL1703 Flat-Plate Photovoltaic Modules and Panels
- IEC 61215 or UL 61215 Crystalline Silicon Terrestrial PV Modules
- IEC 61646 or UL 61646 Thin-Film Terrestrial PV Modules
- ASTM E2481-06
- Manufactured using an ISO-9001 quality management system

Inverters- additional oversight

- IEEE 1547 Standard for Interconnecting Distributed Resources with Electric Power Systems
- IEEE 1547.1 Standard for Conformance Test Procedures for Equipment Interconnecting Distributed Resources with Electric Power Systems
- Inverter installation requirements are governed by the National Electric Code Articles 690 and 705. Article 705, Part II lists requirements of Utility Interactive Inverters, including circuit sizing and overcurrent protection
- NEC 690.10 lists requirements for standalone system inverters
- NEC 690.14 provides additional requirements including location of inverters in not readily-accessible locations
- NEC 705.12(D) lists requirements for Utility Interactive Inverters
- NEC 705.40 lists requirements of inverters for loss of primary source of power.

Verification:	Service Providers shall have their own underwriting standards for equipment. Verification includes that the equipment included in a Service Provider approved equipment list meets the underwriting requirements defined by the Service Provider. Review all equipment financed meets Service Provider

	documented underwriting requirements. Exhibit A and Exhibit B are examples of documented underwriting criteria for modules and inverters.
Documentation:	Underwriting criteria documentation and specific approval forms for all approved equipment for: ● Solar Photovoltaic Modules ● Inverters ● Racking Systems ● Monitoring Systems

4. System Documentation

Providers should store basic homeowner and system information for the term of the initial customer agreement. Data naming methodology should follow the SunSpec Data Dictionary.

Customer Information:

Design/ Permitting

- System Design Drawings (layout and 1-line drawing)
    - To include any structural drawings needed for documenting structural integrity or required work on structure to be brought up to code.
- Copy of approved permit
- Date of permit approval
- Estimated monthly and annual production
- Estimated system degradation rate
- Utility bill (copy)

System Information

- Module manufacturer and model
- Module count
- Inverter manufacturer and model
- Inverter count
- Mounting manufacturer
- Date of PTO

Completed System Photos

Service Provider shall maintain a time stamped photo inventory of all active systems. Photos may be captured through the installation Contractor, third-party inspector, or in-house personnel. Mandatory photos include at least one (1) onsite photo of the following system components.

- Roof (showing condition)
- Photo(s) showing array as installed including all modules
- Junction Box Locations
- Wire Management (module to module at array and home runs)
- DC Disconnect location and interior disconnect locations.
- Inverter Location
- Inverter Nameplate
- AC Disconnect location and interior disconnect locations.
- Main service panel (cover removed)
- Main service panel (cover closed)

• Connection to premises grounding system • Production meter • Monitoring system • Net meter • Point of Interconnection (If other than main service panel.) • System Overcurrent Protection (DC string fuses and AC)	
Verification:	Review a stratified, random sample of the lesser of either one percent (1%) or 25 of completed projects to verify system documentation is accurate. Reviewer shall provide documentation of each system in review with approval.
Documentation:	Data tape of reviewed systems with third-party signoff.

5. Contract Management Systems

Providers shall have systems in place to document and verify installer experience based on these criteria:

EXPERIENCE: The installation Contractor shall have a work performance experience that demonstrates its ability to install safe and reliable solar PV systems. The Contractor must provide the number of systems and total kWdc installed (mandatory) for each year of experience to demonstrate transparency regarding work experience. The Contractor can demonstrate this experience through one of the following: 1. 3 years of company work experience installing residential solar PV systems, OR 2. One individual with 5 years of work experience installing residential solar PV, OR 3. At least 5 independent on-site field inspections performed on previously installed systems (random sampling) with an at least 70% passing score for all five systems, with zero catastrophic/safety issues. (Scoring metrics shall be developed by the Service Provider), OR 4. North American Board of Certified Energy Practitioners (NABCEP) PV Installation Company Accreditation

Verification:	Finance company application form with the contractor providing company and personal experience (or copies of inspection reports). Application should be self-certified by the contractor as accurate with signature.
Documentation:	Completed application form.

FINANCIAL TRANSPARENCY: Contractors shall provide documentation that communicates the financial solvency of the installer.	
Verification:	Check at least 2 contractors in a random sample for proper documentation.
Documentation:	Previous two years financial statements and current balance sheet.

HEALTH AND SAFETY: A Contractor should create and maintain a health and safety manual which establishes appropriate rules and procedures concerning workplace safety, including rules related to: the reporting of health and safety problems, injuries, and unsafe conditions; risk assessment; and first aid and emergency response. Some examples of typical rules and procedures follow below.

- Contractor Site Supervisor shall complete a minimum of Occupational Safety and Health Administration (OSHA) 30-hour Construction Industry training, and all site personnel complete a minimum of OSHA 10-hour Construction Industry training.
- Additional training should be supplemented to provide sufficient knowledge for installers to identify hazards, provide corrective actions, and prevent reoccurrence specific to solar PV systems.
- All site personnel must be equipped with, and trained in the use of, complete personal protective equipment (PPE) and trained on any specific hazards associated with their jobs.
- Contractor Site Supervisor shall complete a Job Hazard Analysis (JHA).
    - Site shall meet all applicable code required NEC, NFPA 70E, OSHA and local AHJ mandated safety and labeling requirements.
- Contractor Site Supervisor shall complete a jobsite orientation with all workers on site.
- Written safety program with verbiage to competent person on site
    - Area PM will complete a minimum of one (1) random safety check per week on projects being installed in that area.
    - PM will complete a minimum of one(1) safety inspection per installation crew per month.
    - Jobsite shall be inspected for compliance with NFPA, OSHA and local AHJ safety requirements.
    - All Safety Inspections to be documented on Jobsite Safety Inspection form and retained in file for Contractor.

The Contractor must maintain an OSHA total case incident rate (TCIR) of 5.00 or less or a similar rate based on a substantially equivalent, accepted measure used to report workplace injuries.

Verification:	1. Check at least 2 contractors in a random sample for proper documentation (OSHA 300 logs). 2. Verify complete Health and Safety Manual.
Documentation:	- Last two years OSHA 300 logs - Site Safety Inspection document

INSURANCE: Contractor must maintain current and appropriate business insurances, including liability insurance, workers' compensation insurance, and commercial vehicle insurance. Coverage should include:

- General liability - $1,000,000 per occurrence, $2,000,000 aggregate, and
- Workers' compensation - $1,000,000 each accident, each employee, with proper classification, policy limit
- Insurance policies should name the Service Provider and any intermediaries as additional insured(s) and certificate holder(s).

Verification:	Check at least 2 contractors in a random sample for proper documentation (Certificate of Insurance).
Documentation:	Copy of current Certificate of Insurance showing applicable insurance coverage.

TRADE / BUSINESS LICENSES: The Contractor should have all professional and trade licenses required by the state and local AHJ. Required solar PV licenses can be found through the Interstate Renewable Energy Council's (IREC) Solar Licensing Database.

Contractor has required business licenses to operate in all jurisdictions where installations have occurred.

Verification:	Verify all applicable business licenses.
Documentation:	Copy of all applicable business licenses.

PERSONNEL QUALIFICATIONS: The Contractor Site Supervisor, Project Manager, or designated responsible party should have one of the following professional certifications:

- North American Board of Certified Energy Practitioners (NABCEP) Certified PV Installation Professional.
- Licensed electrician (master or journeyman).
- Underwriters Laboratories (UL) Certified PV System Installer

All workers shall have entry level or minimal installation training. Some Contractors or Finance Companies may have proprietary training and education programs that are more specific to the job duties performed by their personnel, which may meet or exceed training and experience requirements for the some certifications. In these instances, the internal training can be used as a substitute for the certifications listed below.

Additional certifications that installation personnel may hold to ensure a high level of quality workmanship and safety include: ● North American Board of Certified Energy Practitioners (NABCEP) PV Entry Level Certification ● Roof Integrated Solar Energy (RISE) Certified Solar Roofing Professional ● Proprietary technology training offered by an original equipment manufacturer	
Verification:	
Documentation:	Copy of all personnel certifications.

6. Third-party Inspection and Verification

Finance Companies shall verify and measure installed asset quality through a continuous process of field installation verification of the Service Provider's completed systems. For purposes of this document, an independent third-party inspector shall be any technically qualified entity that was not directly involved in the installation or system design process. Where required, the independent third-party inspector cannot be part of the installation company (e.g., part of the O&M division), and must be from an entirely separate entity. The field installation verification process includes onsite inspections and documentation of completed system installations to verify the systems have been installed to equipment manufacturer specifications, relevant codes, and installation best practices.

- **Internal Review Requirements -** 100% oversight of projects at either internal, or third party desktop review, or other that meets requirements of internal QA process guidelines.
    - System Installation Quality Assurance Policy
        - On site record of "as built" system status including:
            - Design vs. installed
            - Installation quality
            - Photo evidence
        - Review of on site record, resulting in action for issues found not in compliance with relevant codes.
        - Retention of data or findings.

- **Independent Third-Party Inspection Requirements -** Additional 10% of projects to be FIELD inspected by an independent third-party inspection company.
    - System Installation Quality Assurance Policy
        - On site record of "as built" system status including:
            - Design vs. installed
            - Installation quality
            - Photo evidence
        - Review of on site record, resulting in action for issues found not in compliance with relevant codes.
        - Retention of inspection reports and/or data.

Verification:	- Review and verify inspection program and a minimum of (10) completed desktop review / project completion reports conducted by desktop review team. - Review and verify inspection program and a minimum of

	ten (10) completed onsite inspection reports conducted by a third party.
Documentation:	- Internal review checklist forms for the 10 samples. - Third party inspection forms for the 10 samples.

7. Operations and Maintenance

If different than the installation Contractor, the O&M contractor shall have a work performance experience that demonstrates its ability to operate and maintain safe and reliable solar PV systems. The Contractor must provide the number of systems and total kW installed (mandatory) for each year of experience to demonstrate transparency regarding work experience. The Contractor can demonstrate this experience through one of the following: 1. 3 years of company work experience installing residential solar PV systems or 2. 5 years of personnel work experience installing residential solar PV systems or 3. At least five (5) third-party inspections performed on previously installed system (random sampling) with a passing score and no critical hazards or safety violations.	
Verification:	Check experience through list of installed systems over the past 3 or 5 years.
Documentation:	● *If 1: report from reviewer on experience including number of projects, kW, ???* ● *If 2: list of qualifying personnel with their experience and type of verification used* ● *If option 3 is selected, copy of five (5) inspection reports conducted by a third party.*

Warranty: To be filled in by Chris Doyle.	
Verification:	
Documentation:	

Exhibit A - Equipment Approval Form - Inverters

Manufacturer	
Website	
Manufacturing Location(s)	
Approved Model Number(s)	
Type (string / micro / hybrid)	
Rated Power (kWac)	
Inverter Efficiency (%)	
CEC Inverter Efficiency (%)	
Number of MPPT inputs	
AC Output Voltages (V)	
Grounded or Ungrounded DC Architecture	
NEMA Rating of Enclosure	
Country of Origin	
Product Warranty Length	

3rd party QA verifications (check all that apply):

___ Listed on CEC List
___ Listed on NYSERDA Certified Interconnection Equipment

If not approved by a qualified 3rd party (check all that apply):

___ UL1741 Listed
___ IEEE 1547 compliant
___ FCC Part 15 A&B compliant
___ 10+ year warranty

Exhibit B Equipment Approval Form - Modules

Manufacturer	
Website	
Manufacturing Location(s)	
Tracking Serial Numbers (minimum of one per job)	
Approved Model Number(s)	
Rated Power (Wstc)	
Module Efficiency	
Power Tolerance	
Output Connector Type	
Fire Classification	
Product Warranty Length	
Power Warranty Length	

3rd party QA verifications (one approval is sufficient):
___ On CEC List + IEC 61215
___ PV+ Test result of “Good” or “Very Good”
___ VDE Quality Tested
___ TUV Thresher Tested
___ Atlas 25+ Tested
___ Fraunhofer PVDI result of 4 or 5
___ Listed on NYSERDA Certified Interconnection Equipment

If not approved by a qualified 3rd party: Would be required to meet ALL of the below if not listed by 3rd party orgs listed above.

___ UL1703/2703 Listed
___ IS 9001 / 14001 compliant
___ IEC 61215 / 61730 compliant
___ 10+ year workmanship and 20+ year performance warranties