



Design Checklist for Solar PV Projects

The following checklist provides a list of information that must be incorporated into your team's 525 – Pre-Implementation Report for a Solar Photovoltaic (PV) project. Each item listed must be clearly documented in the 525 report. For a more complete description of each item, please refer to the Recommendations for Solar PV projects (which is also available on the EWB-USA website under MyEWBUSA/Project Resources/EWB-USA Guidelines). It is intended that this document be used with the current 525 – Pre-Implementation Report Instructions to cover all requirements for your design.

Part 1, Project Design

A. Preliminary Steps

- ☐ Project team has performed and documented alternatives analysis of potential energy sources and explained how an energy source is most appropriate for the community

B. Electrical Distribution Load Calculations & Analysis

- ☐ Loads determined, including timing, duration and starting surge requirements
- ☐ Peak power requirements calculated (to be used in the AC inverter size determination)
- ☐ Distribution system voltage drops calculated
- ☐ Size of conductors, circuit protection devices (fuses, circuit breakers, etc.) determined, as based on operating voltage and current
- ☐ Rating of conductors determined for site conditions, such as temperature and conduit fill
- ☐ Drawing(s)/Diagram(s) of the Electrical Distribution subsystem prepared in sufficient detail to depict a complete picture of the subsystem design

C. Inverter Sizing Calculations & Analysis

- ☐ Inverter size determined using the calculated peak power requirements
- ☐ Visual display of battery state of charge to be monitored by system operators designed and documented (Strongly recommended, not a requirement)
- ☐ Chapter has defined and documented the following data:
 - Programming and data monitoring for controller and inverter
 - Maximum Inverter input current at the lowest operating voltage for sizing
 - Disconnect sizing and circuit location
 - Overcurrent Protective Device (OCPD) sizing, circuit location, and Ampere Interrupting Capacity (AIC)
- ☐ Drawing(s)/Diagram(s) of the Inverter subsystem prepared in sufficient detail to depict a complete picture of the subsystem design

D. Charge Controller Sizing Calculations & Analysis

- ☐ Daily energy input into batteries calculated
- ☐ Daily energy taken out of the batteries calculated
- ☐ A data plan to track the electrical energy put into and taken out of the fielded batteries each day is defined and documented (Strongly recommended, not a requirement)
- ☐ Drawing(s)/Diagram(s) of the Controller subsystem prepared in sufficient detail to depict a complete picture of the subsystem design

E. Battery Sizing Calculations and Analysis

- ☐ The energy needed to be supplied to the electrical distribution system has been calculated and used to size the



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battery bank

- ☐ An analysis to the prevailing weather conditions, in order to determine the worst case energy input situation, has been made and documented
- ☐ Drawing(s)/Diagram(s) of the Battery subsystem prepared in sufficient detail to depict a complete picture of the subsystem design

F. Solar Panel Power and Energy Calculations

- ☐ Solar Panels power output calculations are documented and they show adequate energy output to meeting the needs of the electrical distribution system and to account for site specific considerations, to include:
 - Irradiance at location to determine minimum sun hours per day
 - Cold temperature maximum voltage for PV array
 - Hot temperature minimum voltage for PV array
 - Ampacity for conductor sizing, fuse sizing, and disconnect sizing (including 1.25% continuous duty factor as well as irradiance factor, as applicable)
 - Disconnect and Overcurrent Protective Device (OCPD) sizes and locations
- ☐ If multiple panel types are used, the differences in operating parameters have been analyzed and documented
- ☐ Drawing(s)/Diagram(s) of the Solar Panel subsystem prepared in sufficient detail to depict a complete picture of the subsystem design

G. Additional required Design Documentation:

- ☐ A 3-wire schematic drawn to show the circuit grounding, both DC and AC single-phase systems
- ☐ Sketch showing equipment grounding and earth ground
- ☐ Physical sketch of size and location of all equipment used, including NEC layout requirements
- ☐ Table of conductors to be used and explanation of why each conductor was chosen.
- ☐ A short summary stating which portions of the National Electrical Code (NEC) NFPA 70 – 2008 or 2011 or later were used in the design and why these portions were selected
- ☐ A materials list showing all items needed to implement the project. Include confirmation that all of the components of the system are available locally.

H. Mounting details for the array mechanical design

- ☐ Document mechanical design calculations for the array mounting structure
- ☐ Describe how the panel structure is to be protected from wind and debris damage
- ☐ Describe how the Solar PV installation is to be protected from theft and vandalism

I. Structural Engineering

- ☐ Document Civil/structural calculations including evaluation of existing associated structures, wind loading, and other factors, as determined by a structural engineer
- ☐ Document the materials of construction and explain their suitability for the intended use and local conditions



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Part 2, Construction Plan

A. Installation

- ☐ A construction plan that includes:
 - The logic of the installation steps and why this logic was selected
 - Tools needed for installation
 - Estimation of the duration of the installation and the human resources required (skills and quantity)
 - Plan to document on-site activities, minutes, photographs, videos, etc.
 - Note: Installation safety and Personal Protective Equipment (PPE) must be carefully considered, and documented in the Health and Safety Plan (HASP)

B. Start-up and Testing

- ☐ A site start-up and test plan has been written and includes:
 - A site wiring diagram is drawn and shows suitable test points and expected values
 - A template devised to show test data to be taken and compared to the expected values; a comments section that allows for a discussion of why any measured values do not agree with expected values
 - A test agenda showing period of monitoring and testing while on-site, with an appropriate data logging methods defined
 - Discuss a technology hand-over plan to local technicians and operators, highlighting duties and responsibilities

Part 3, Operation and Maintenance

A. Documentation of Operation and Maintenance Plans

- ☐ The Installation and Operation and Maintenance (IOM) package should be in a language that is common for the support personnel expected to provide ongoing, in-country technical support. The package is to include:
 - A draft IOM manual
 - Vendor technical and safety information
 - Wiring diagrams showing suitable test points and expected values
 - A complete list of Recommended Spare Parts and their source of procurement
 - A draft of a Field Log to be used by the local community partners to help them document all recommended maintenance activities and any setting changes, repairs, or modification