**Solar Electric Technician (Level 2)**

**Module 4: Site selection for solar PV systems**

**E3: Assignment - Solar PV system wiring diagram and Single Line Diagram (SLD)**

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| **E3: ASSIGNMENT MEMO** | |
| **Date** | …. |
| **To** | Participants |
| **From** | Trainers |
| **Subject:** | Comprehend solar PV module wiring and SLD. |
| **What** | Review and verify the wiring diagram and single line diagram of a solar PV system. |
| **Why** | The objective of the assignment is to equip trainees with the skills to assess and verify the wiring of a solar PV array, string etc. with respect to the drawing provided or as per the site conditions. |
| **How** | 1. Work in group of 2 or 4. 2. Gather the required tools and equipment. 3. Read and carefully follow the given instructions for each task. 4. Study and review the wiring diagram, connection at the site, single line diagram and verify 5. Answer the questions and discuss the results. |
| **Time** | 60’ for each technology (at least two) |

**Comprehend the solar PV array wiring diagram and SLD**

**Required tools/equipment:**

* Solar PV array wiring diagram/Single line diagram
* Compass and angle meter
* Measuring tape
* Camera (smartphone) for documentation

| **Specific tasks/instructions** | **Findings/Observations** |
| --- | --- |
| **Task 1: Review of the Single-Line Diagram (SLD) to:** | |
| 1. Identify the following components by looking at the representation/ symbols of each component  * PV array * Inverter(s) * AC disconnects * Main distribution panel * Grid connection or battery storage system (if applicable |  |
| 1. **Identify the flow of electricity:**  * Start from the solar PV array noting how electricity flows to the inverter, which converts DC to AC, and then to the AC system leading to the main distribution panel. |  |
| 1. **Identify the protection devices in the SLD:**  * **Look** for symbols representing fuses, circuit breakers, and surge protection devices (SPDs). * **Also** try to understand the role of each device and how they protect the system from overcurrent or electrical faults. |  |
| 1. **Trace cable connection and grounding:**  * **Trace** the paths of cables and sizes from the PV array to the inverter and from the inverter to the distribution panel, noting any junctions or connections. * **Grounding** and Bonding: Identify grounding points from PV array (typically at the panel frame), inverter (often on the chassis or mounting brackets) and distribution panel (connected to grounding rods). * **Understand** how grounding is essential for safety, protecting both people and equipment. |  |
| 1. **Verify DC and AC wiring:**  * Distinguish between the DC side and the AC side. * **DC side**: From the PV array to the inverter, typically includes solar cables rated for DC voltage. * **AC side**: From the inverter output t to the main distribution panel, generally uses standard AC wiring. |  |
| 1. Note **the transition point from DC to AC:**  * Confirm the inverter wirings, ensuring it connects DC side from the PV array and AC side to the distribution panel. |  |
| 1. **Compare wiring diagram to site conditions:**  * **Wiring layout**: Check if the wiring layout in the diagram matches the actual site layout. * **Wire length and routing:** Ensure that wire lengths, routing, and electrical components on-site match what is represented in the diagram. |  |
| 1. **Discuss the system configuration:**  * **Overall design:** As a group, discuss the overall system design. Discuss and confirm if the system is grid-tied (connected to grid/utility), off-grid(self-sufficient), or hybrid (combines both) and ensure the diagrams reflect this setup. * **Additional components:** Note any additional equipment in the SLD, such as battery storage or backup generators, and how they are integrated into the system. |  |
| 1. **Identify potential issues:**  * **Discrepancies:** Discuss and note any discrepancies or potential issues found between the diagrams and the actual system setup. * **Wiring design improvements:** Identify and note any areas where the wiring design could be improved or requires adjustment. |  |
| 1. **Optimization** of wiring setup and system setup:  * Collaborate on how the wiring and system setup could be optimized or adjusted for safety and efficiency*.* |  |
| **Task 2: Documentation of findings: Based on the findings, list out following things** | |
| **Tools required for installation** |  |
| **Areas of concern**   * Document any discrepancies or potential issues noted during the review. |  |
| **Measurement and observations**   * Record wire length, distances between the components, and grounding |  |
| **Adjustment needed**   * List adjustments required to bring the installation in line with the best practices and safety standards. |  |