

PV Installation Course Outline

Session 1

Photovoltaics (PV) Overview
 Development
 Opportunities
 Advantages
 Disadvantages
 Issues
Photovoltaic Principles
Components
System Types
Terminology
Electrical Circuits
Power Sources
Electric Loads
Basic Safety

Session 2

Series and Parallel Circuits
Wiring Exercises
Measure the direct output of a PV panel
for troubleshooting purposes
 Hazards
 Equipment
 Site Safety
 Testing High Voltage
Photovoltaic Modules
Module Characteristics
Factors of Performance
Inverters
 Operation
 Types
 Features
 Sizing

Session 3

The Solar Resource
Solar Radiation
Gathering Site Data
Completing the Solar Site Analysis
Electric Load Analysis
Using Energy Efficiently
Electrical Load Requirements

 Considerations
 Calculating Loads
Matching Appliances to the System

Session 4

System Installation
 Site Evaluation
 .PV Array Installation
Installation Safety
PV System Wiring
 Intro
 Wire Size
 Over-current Protection
 Disconnects
 Grounding
 Surge Suppression

Session 5

PV Array Configuration
 *Series configurations
 *Parallel configurations
 *Series/Parallel configurations
* Select proper cabling for a given PV
array installation
 *Proper ampacity for a given
distance and current level
 *Proper insulation type for a
given installation environment
 *Properly ground a PV array
installation
* Electrically configure PV arrays to
achieve necessary voltage/current/power
requirements for a given load
* Configure a PV array to supply a given
AC load using a non grid-tie inverter
 *Select and install a non grid
inverter that can operate with a
given AC load and PV panel
supply

Session 6

Mounting

System Types

Building Integrated PV

- * Construct/order/assemble a commercially available PV array mounting system for a given installation
 - *Roof mounting systems
 - *Top and Side Pole mounting systems
 - *Ground mounting systems
- * Mount multiple PV panels to create a solar array
 - *Horizontal arrays
 - *Vertical arrays
 - *Horizontal/vertical arrays

Session 7

Grid-Tied Systems

- Types and Advantages
- Sizing and Economics
- Interconnection Agreements
- Net Metering
- * Connect PV arrays to common protective/control/monitoring devices
 - *Meters
 - *AC and DC Disconnects
 - *Fuses and Breakers
- * Prepare a PV array to be connected to the commercial AC power system through a grid-tie inverter to augment/replace AC current from a commercial power utility

*Install PV array wiring up to the AC disconnect

- * Calculate Net Metering capabilities of a given grid-tied PV array
- * Use a multi-meter to troubleshoot connectivity problems

Session 8

Battery Installation

- * Create the correct battery configuration option for a given load requirement
 - *Series configurations
 - *Parallel configurations
 - *Series/Parallel configurations
- * Connect a given PV array to a storage battery system
 - *Use proper battery and PV panel connectivity to meet the current and voltage requirements of a given load
 - * Document battery charge/discharge rates for a given PV installation
 - * Implement excess capacity management to drive auxiliary loads
- Controller and Inverter Installation
- System Wiring
 - *Install a Charge Controller
 - *Install a Regulator/Load Diverter