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Continuing Education Course #195
Solar Power Part II
Design for Grid-Tie Systems - an Introduction

1. A typical solar system is comprised of what basic components?
- a. solar panels, low voltage disconnect, batteries, inverter, monitor, and wiring.
- b. solar panels, charge controller, batteries, generator, monitor, and wiring.
- c. solar panels, charge controller, batteries, inverter, monitor, and wiring.
- d. solar panels, charge controller, batteries, inverter, monitor, and grid-tie.

2. True or False: All Grid-Tie systems **must** have a connection to a Power Company's electrical lines.
- a. True
- b. False

3. The electricity produced by solar PV panels may be used how?
- a. Consumed
- b. Stored
- c. Sold
- d. All of the above

4. Solar PV system inverters are used for what?
- a. To convert DC volts into AC volts
- b. To reverse the polarity of the batteries
- c. To reduce the voltage from 48VDC to 12VDC
- d. To reset the charge controller

5. Who should the designer always contact before beginning any solar PV system design?
- a. The local Building Department
- b. The local Power Company
- c. The architect
- d. The contractor

6. What does NOT supply AC power to the Main Breaker Box?
- a. The inverter
- b. The controller
- c. The Power Company

7. Of the two types of Power Company meter installations, which is the preferred?
- a. One bi-directional meter
- b. Two uni-directional

8. Where should the Solar AC Disconnect be installed?

- ○ a. Beside the Main Breaker Box
- ○ b. In the mechanical room
- ○ c. Behind a locked door
- ○ d. On the outside of the building

9. What provides electrical power to a building with a standard Grid-Tie Inverter during a local Power Company outage?
- ○ a. Sunlight
- ○ b. Batteries
- ○ c. Generator
- ○ d. None of the above

10. In a Grid-Tie system, batteries are _____?
- ○ a. required
- ○ b. not allowed
- ○ c. optional
- ○ d. None of the above

11. Using DC circuits will typically _____ your system efficiency?
- ○ a. increase
- ○ b. decrease
- ○ c. have no impact on
- ○ d. None of the above

12. Generally speaking, which building is easier to have a Solar PV system with an Emergency backup installed?
- ○ a. An existing building
- ○ b. A new building
- ○ c. No difference

13. What is required for a new or existing building to have an emergency backup power system?
- ○ a. Solar or battery power
- ○ b. AC Coupled Grid-Tie Inverter
- ○ c. Emergency AC Breaker Box
- ○ d. All of the above

14. A good way to size your solar PV array for an existing building is by using the_____?
- ○ a. weekly average of your daily electric usage
- ○ b. monthly average of your daily electric usage
- ○ c. yearly average of your daily electric usage
- ○ d. None of the above

15. For a structure in the southern U.S. with a yearly power usage of 15,000 kwh, the minimum solar array size should be _____ for a $0 yearly net electric bill?
- ○ a. 8.2 kw
- ○ b. 6.8
- ○ c. 10.4
- ○ d. None of the above

16. Of the different types of solar panel's available today, which is the most efficient?
- ○ a. Polycrystalline
- ○ b. Amorphous

○ c. Monocrystalline
○ d. None of the above

17. During the winter months, the angle of inclination for adjustable solar mounts should do what?
○ a. Decrease by 10 degrees
○ b. Increase by 10 degrees
○ c. Not change
○ d. None of the above

18. A system design requires 8,000 watt-hours per day and receives 4 hours of useable sunlight daily. How many solar panels are needed?
○ a. Eighteen 100-watt panels
○ b. Twelve 150-watt panels
○ c. Nine 200-watt panels
○ d. Eight 250-watt panels

19. What voltage would be selected to use the smallest wire diameter size?
○ a. 6V
○ b. 12V
○ c. 24V
○ d. 48V

20. An emergency power backup system requires 4,000 watt-hrs per day and you want to provide for 4 days of backup, how many watt-hrs does your battery bank need to be sized for?
○ a. 10,000
○ b. 10,500
○ c. 16,000
○ d. 20,500

21. The most effective charge controllers are _____?
○ a. Two-stage PWM
○ b. Three-stage PWM
○ c. MPPT
○ d. None of the above

22. Of the three types of Grid-Tie inverters, which produces the best power?
○ a. True Sine Wave
○ b. Modified Sine Wave
○ c. Square Sine Wave

23. Inverter stacking provides 240 VAC when connected in series and doubles the output amperage for 120VAC when connected in parallel.
○ a. True
○ b. False

24. The generator is used most efficiently when used in which charge stage/s?
○ a. Bulk
○ b. Absorption
○ c. Float
○ d. Bulk and a portion of the Absorption

25. Which statement is true for batteries and solar panels wired in series?

- ○ a. Current stays the same.
- ○ b. Current doubles.
- ○ c. Voltage stays the same.
- ○ d. None of the above.