Solar Energy

3. Installation and operation of PV systems

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In this video you will learn:

- The basic steps involved in PV installation
- The most important variables to consider when doing a site evaluation
- The most important considerations while installing system components

Steps in PV Installation

- Site Assessment
- Preparation for installation
- PV Array Installation
- Battery Installation
- Connection of the Charge Controller

Site Assessment

An initial visit to the site is critical in the system design process.

It serves **to confirm feasibility of the installation and aids in planning** of the system installation.

In carrying out the site visit, the following factors need to be checked:

- Space availability
- Presence of obstacles – trees or tall buildings
- Site layout
- Site orientation

Preparation for installation – tools needed

Site Assessment

- Tape measure
- Compass
- Maps (reference for location latitude and magnetic declination)
- Digital camera

Installation

- Angle finder
- Torpedo level
- Fish tape
- Chalk line
- Cordless drill
- multiple drill bits (wood, metal, masonry)
- Hole punch
- Torque wrench with deep sockets
- Nut drivers
- Wire strippers

Installation

- Crimpers
- Needle-nose pliers
- Lineman's pliers
- Slip-joint pliers
- Small cable cutters
- Large cable cutters
- AC/DC multi meter
- Hacksaw
- Heavy duty extension cords
- Caulking gun
- Fuse Pullers

PV Array Installation

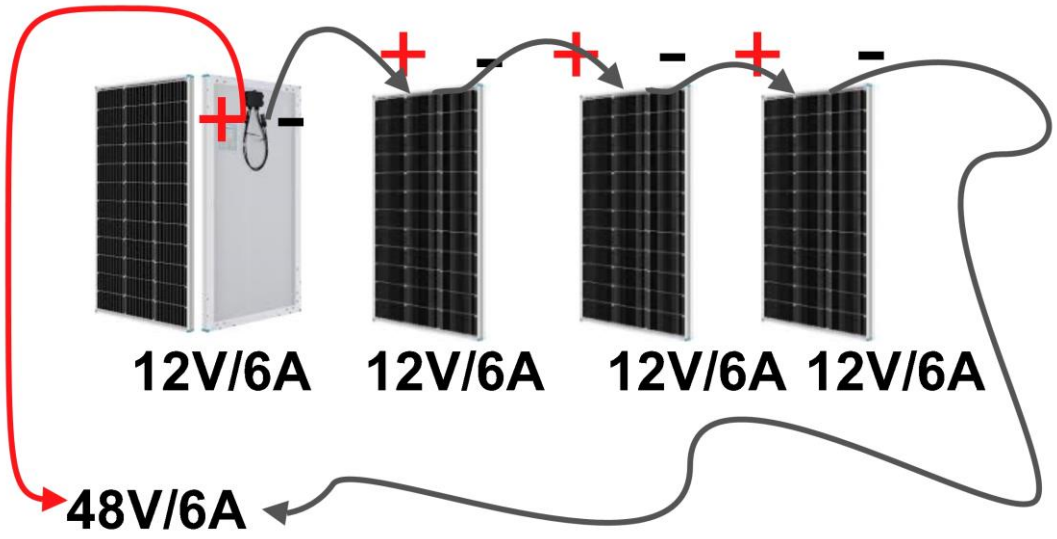
Solar panels produce the most electricity when they are perpendicular to the sun.

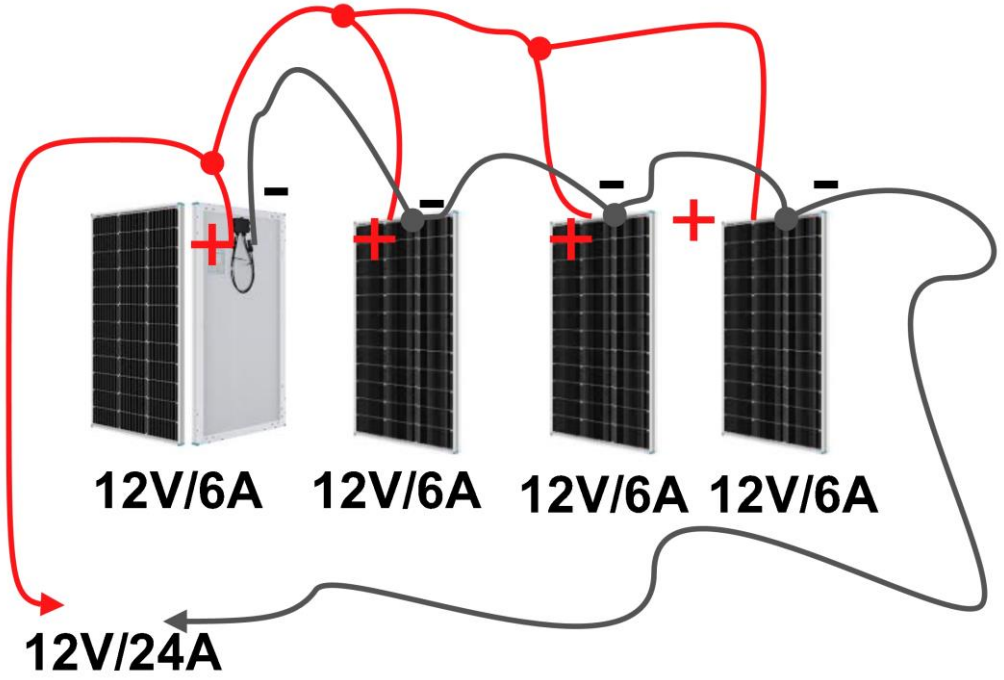
Three factors will influence the performance of the array:

1. **Shading**: must be avoided or minimized
2. **Orientation:** North preferable (in southern hemisphere)
3. **Tilt**: about 15° angle to the horizontal is recommended for self cleaning

PV Array Installation

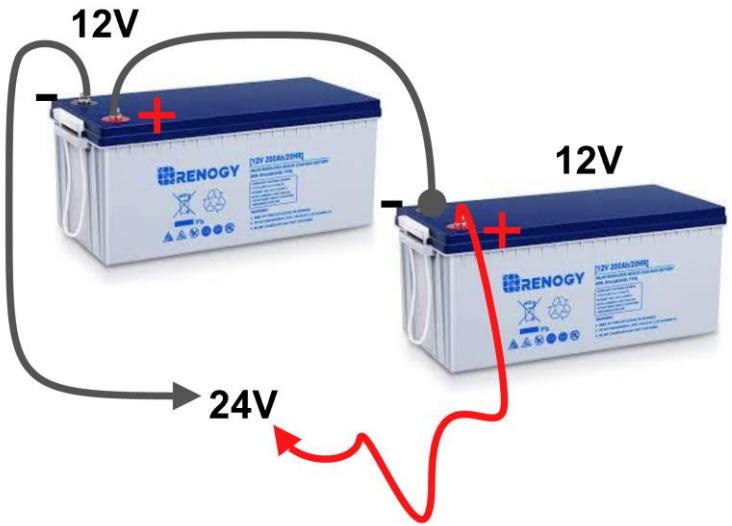
For increased voltage and current solar panels can be connected either in **series** or in **parallel**.



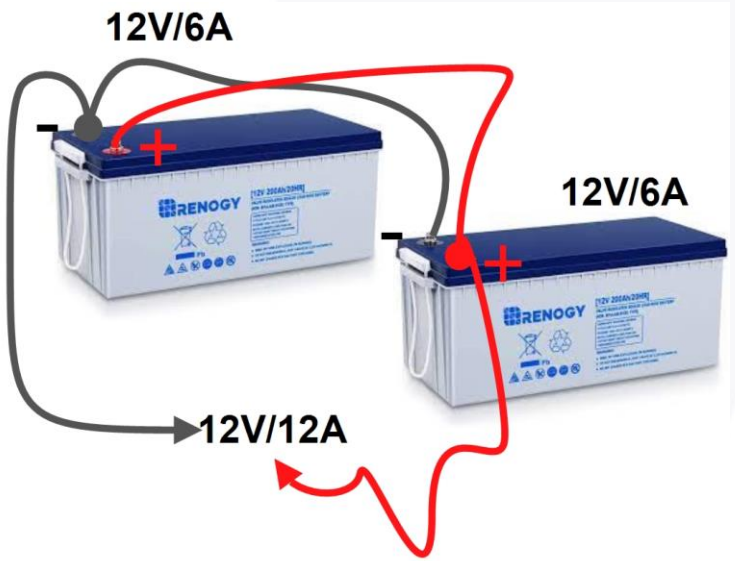


Connection of batteries

When batteries are connected **in series** the voltages add up.

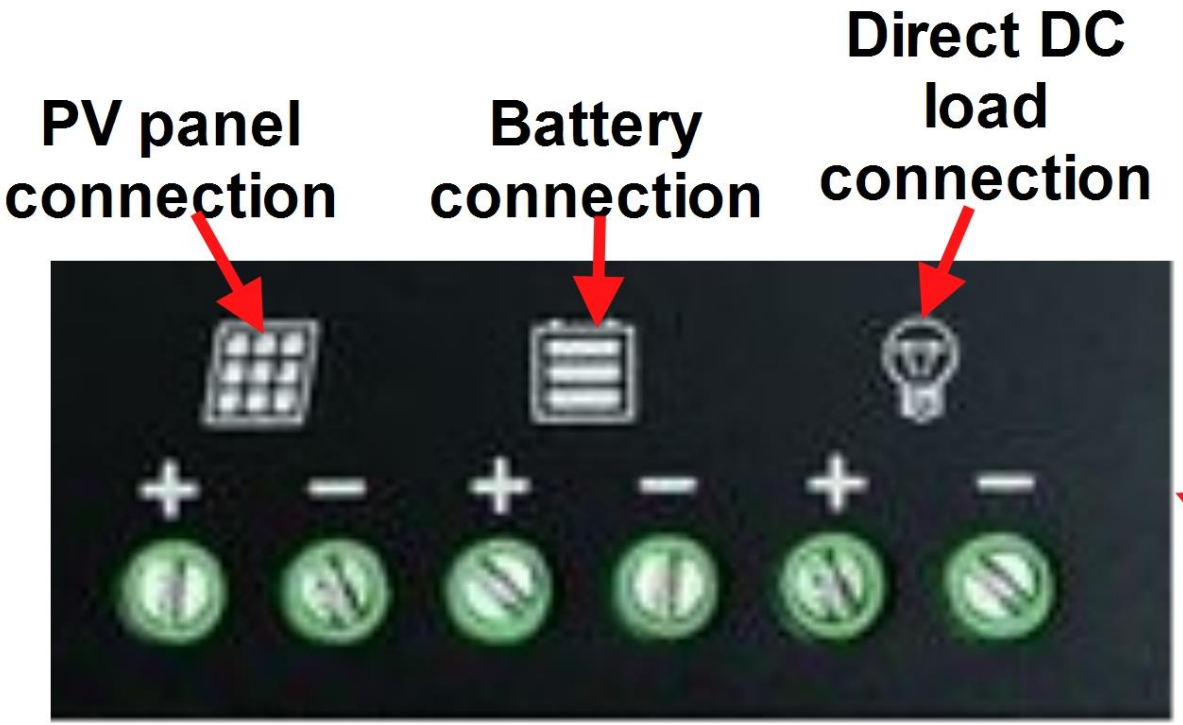


When batteries are connected **in parallel** the voltage remains the same but their capacity is doubled.



Connection of the Charge Controller

The charge controller is connected to the solar panel(s), battery and DC Loads.



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PV **MUST be shaded** when connections are made to avoid SHOCKS!

Summary

- Site Assessment – determine/confirm feasibility
- Preparation for installation- tools and materials
- PV Array Installation – series and parallel
- Battery Installation- series and parrel connection
- Connection of the Charge Controller

THANK YOU

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