Alternative Energy

Chapter 4 Part 1: PV System Configuration

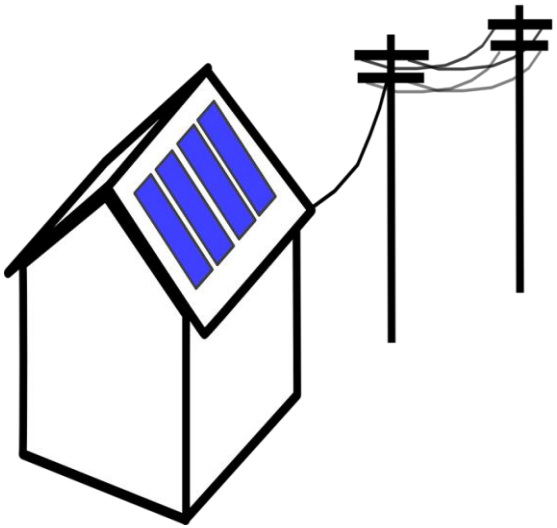
by
Mohd Shawal Jadin
Faculty of Electrical & Electronic Engineering
mohdshawal@ump.edu.my

Chapter Description

- Expected Outcomes
  - understand about PV system configuration
- References
  - Grid-connected Solar Electric Systems: The Earthscan Expert Handbook by Geoff Stapleton and Susan Neill, 2010.
  - Stand-alone Solar Electric Systems: The Earthscan Expert Handbook for Planning, Design and Installation by Mark Hankins, Earthscan, 2010.

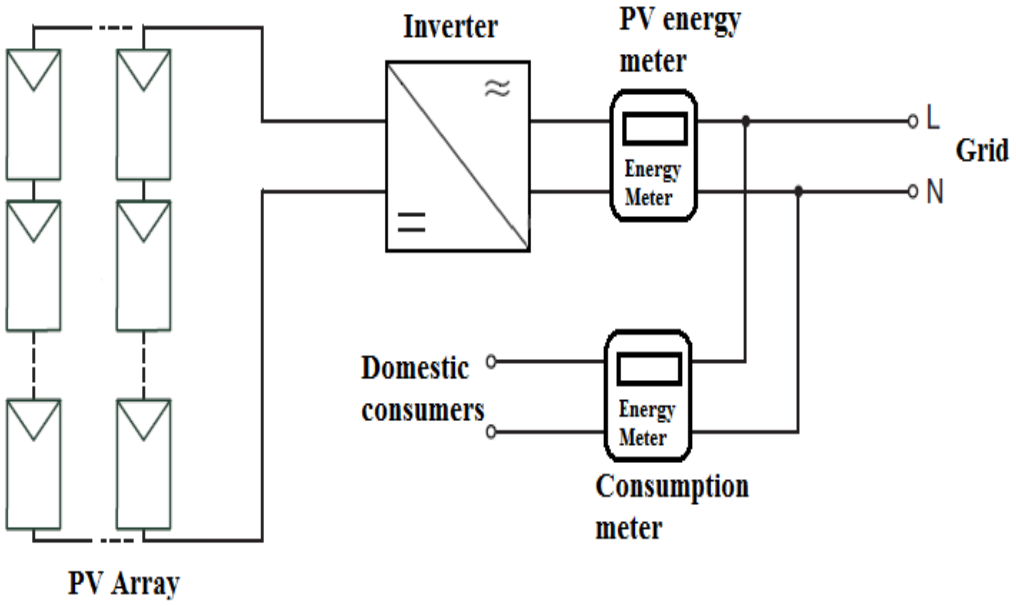
PV System Configurations

- The configuration depends on the type of PV system
- PV systems are generally divided into three major categories:
  - *grid–connected* (also known as *grid - tied*) systems that are interfaced to an electricity grid;
  - *stand-alone (off grid)* systems that are self - contained.
  - Hybrid system



Grid-Connected System

- The main components for a grid-connected system is PV modules, grid-inverter and energy meter
- Inverter will convert from DC voltage into AC voltage
- Use two energy meters: PV meter and consumption meter



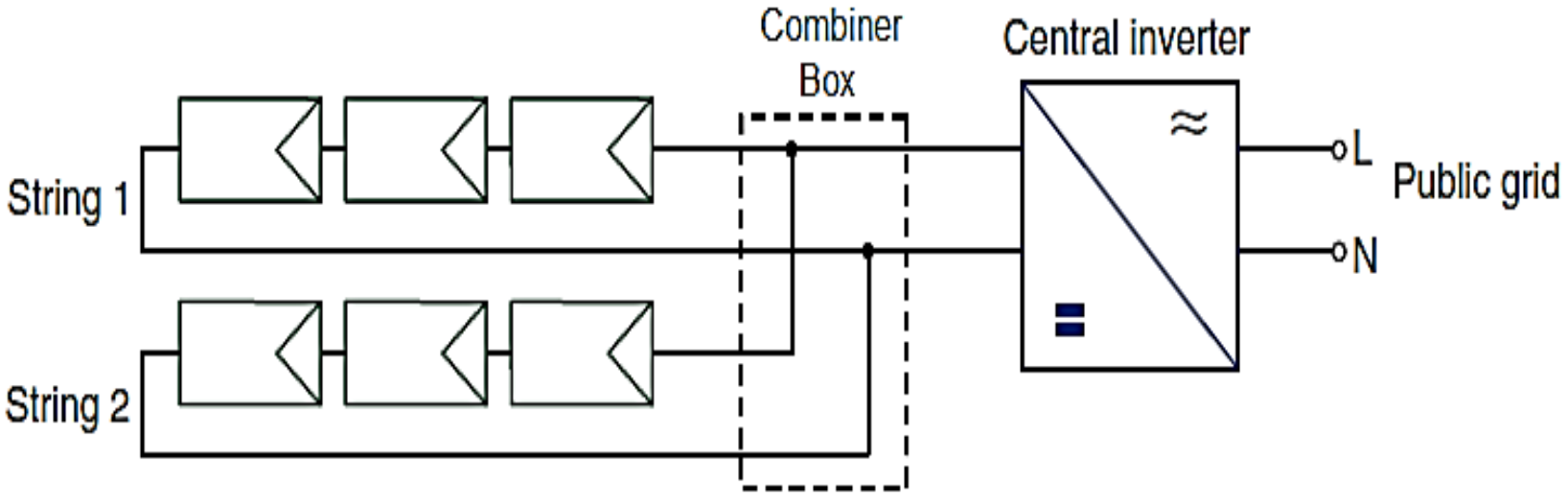
Arrangement of grid-connected PV systems

- Type of grid inverter
  - Central inverter
  - String inverter
  - Multi string inverter
  - Modular inverter

Central Inverter

Use one inverter for the whole PV array

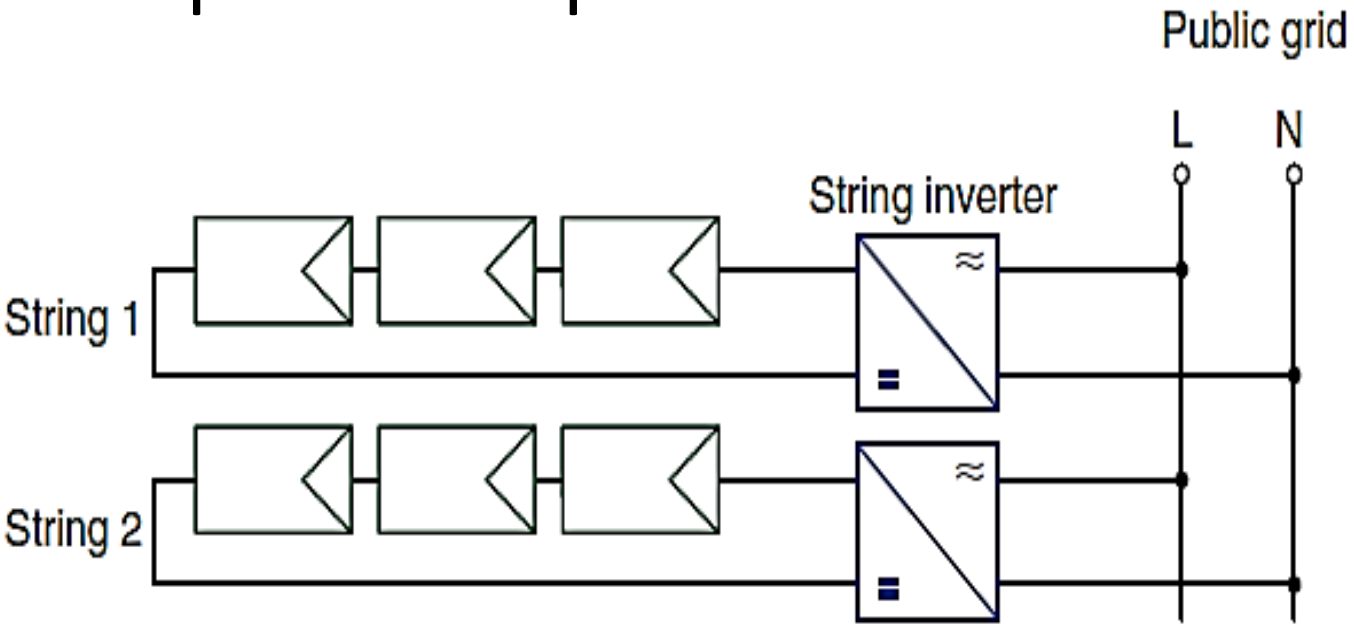
Generally used for a large system (>10kWp)



String Inverter

Connected across on string of PV modules.

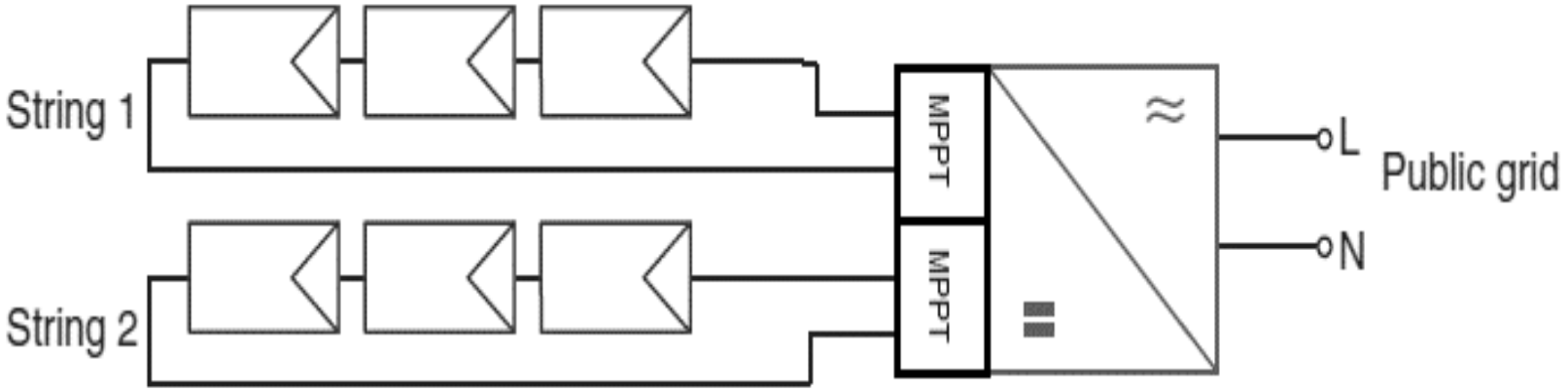
Generally used for in small systems ranging from 1kWp to 11kWp.



Multi-String Inverter

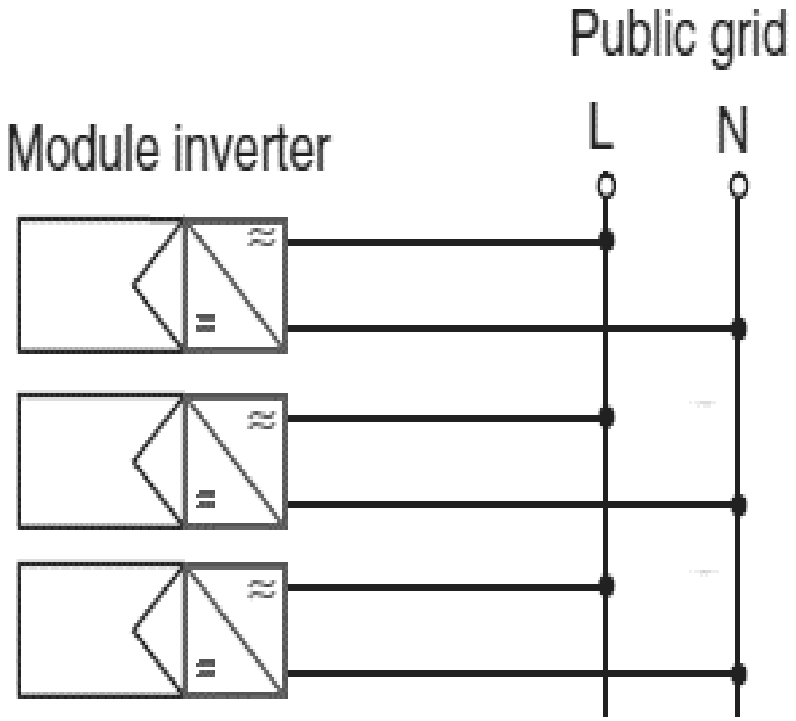
Using only one inverter but has a number of MPPT inputs

The advantage of this inverter: it still can produce higher power output although the strings are facing at different direction



Modular Inverter

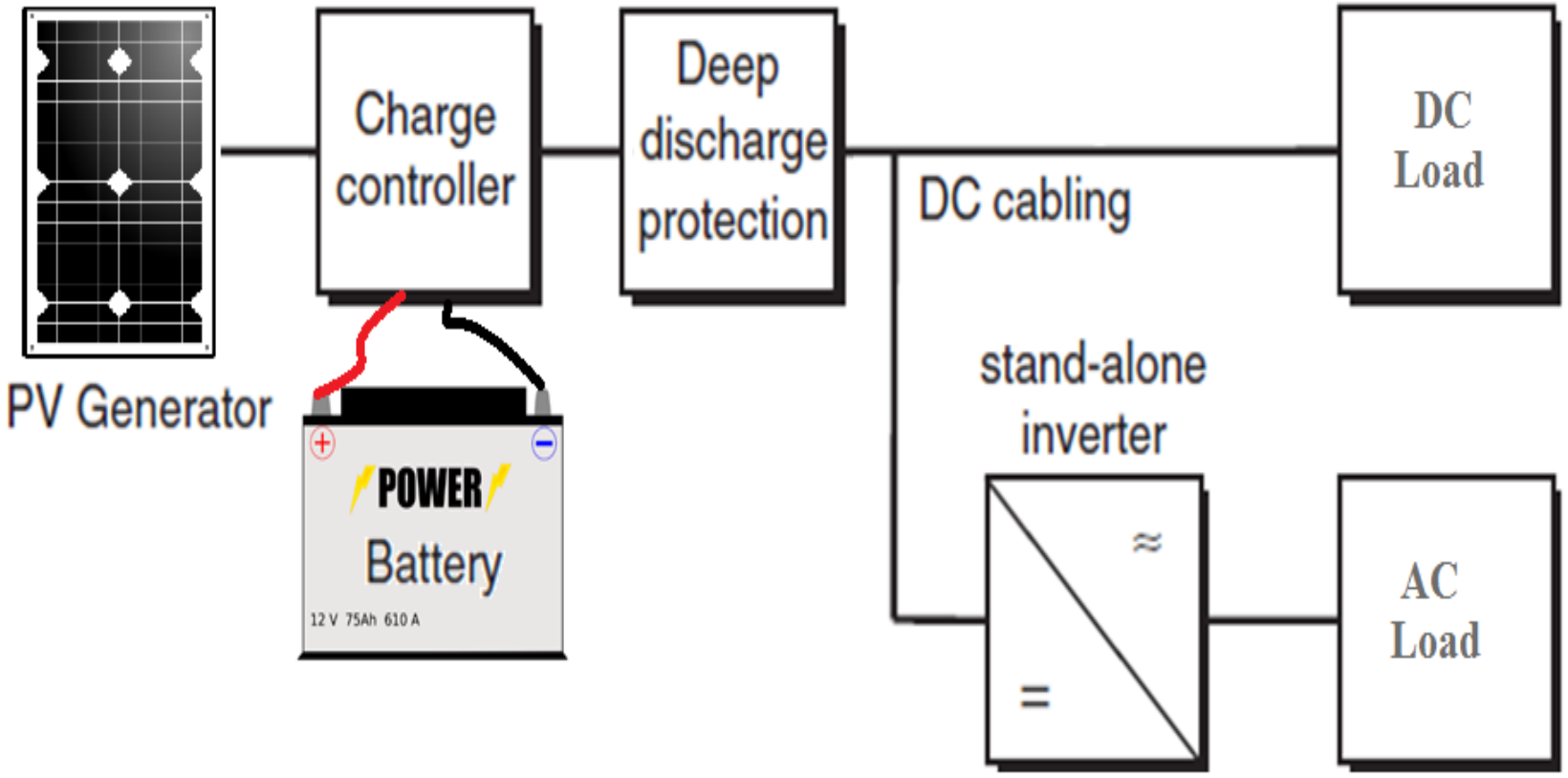
- Modular inverters (micro-inverters) are small transformer-less inverter
- Normally it is designed to be mounted on the back of the PV module



PV Stand-alone Systems

- PV stand-alone systems (off-grid system) are typically used when there is no electric grid or the costs for connecting to a grid are too high.
- Various stand-alone PV schemes are possible, depending on the application:
  - *Without battery storage or inverter*
  - *With battery storage, without inverter.*
  - *With inverter, without battery storage.*
  - *With inverter and battery storage.*

PV Stand-alone Systems



Structure of a simple PV stand-alone system

Thank You