Solar related definitions

DC: Direct Current Electricity that flows in one direction. PV modules & wind turbines produce DC. Batteries of all kinds store DC power.

AC: Alternating Current Electricity that changes direction (in US 60 times per sec or 60 hz) . AC is easier to transmit than DC, but impossible to store. This is the type of current our appliances use and is the type provided by the grid.

Inverter: (string inverter) The device that that changes direct current into alternating current. Inverters do not last as long as the solar panels do. They need good ventilation. Too much heat buildup will turn them off. They can be tied to a battery. The closer they are to the battery the better…but not in the battery compartment. Some inverters have built in chargers which is good for off grid. Low battery voltage will harm the inverter. Size of cables is important. (inverter on one side of wall and battery on other is good…near but safe)

Micro-inverters are similar to conventional inverters in that they turn the DC solar power produced by the solar module into AC power which can be used in the home and fed into the utility grid. However, micro inverters are different than conventional inverters in that one micro-inverter is attached to each solar module at the back of the module whereas conventional inverters, a.k.a. string inverters, are mounted at ground level, typically in the garage of a home and a single inverter will convert power for about 30 solar modules. (SMA micro inverters made in USA just out in 2014 might be better than those in the past…TBD. Micros inverters are more costly and have higher repair costs…one site spoke of potential damage to roof.

Intertie: the connection between an independent power producer like a PV array and the utility's distribution lines so that power can be drawn or supplied in either direction.

PV or Photovoltic module/panel: A solar panel that makes electricity when exposed to direct sunlight. (PV is short for Photovoltic) . These are the panels that go on your roof. Each panel is composed of cells.

Common Types of PVs
Monocrystalline module: most costly; most watts; most efficient
Polycrystalline module: less efficient; cheaper
Film modules: very inexpensive, very inefficient

Array: an orderly collection of (usually photovoltaic modules/panels) connected electrically and mechanically secure; Very little maintenance except to keep clean for best performance (don't hose when hot) Different panels have different degrees of efficiency. Most panels currently have an efficiency rate between 16% and 22% for a few years. May lose efficiency through time. Some panels are warrantied for 25 years…but there are systems still functioning after 50 years.(late 1960 PV cells in outer space are still functioning … 35 or more years later!)

Net metering: A form of buy-back agreement in which line tied or grid tied house's meter turns in favor of utility when electricity is being drawn from grid… And turns in favor of system owner when generation exceeds needs of house and flows to grid. Usually one pays the other depending on end of month balance. The rules for net metering vary state to state and will probably change more in the near future as more people convert to solar depleting funds needed to maintain the grid infrastructure.

kW Kilowatts: 1 kilowatt=1000 watts…ten 100 watt bulbs need 1 Kw of energy to light up. Most residences use around 5 kW/day. Most utilities don't want you to generate more than you can use…so many solar installers advise around 80% of what you need. This may be due to safety factors… if more energy is fed into the grid beyond its use.

kWh Kilowatt hours: the average household uses around 25 kWh/day but if all electric then more like 30-35kwh/day. It would be very expensive to put together an emergency system for that amount. In the example above: if ten 100 watt bulbs burn for 1 hr they would consume 1 kwh of electricity. Our bills from Pacific Power are in kWh.

Storing of DC electricity for emergency back up or off grid.

Grid tied with battery backup: When the grid is running properly, your home or business will use power generated from your solar panels or pull electricity from the grid. Any excess power generated over and above your needs go back to your utility company for credits on your power bill in areas where net-metering is available.

In the event of grid blackouts, these systems will switch to "off-grid mode" drawing power stored in your battery bank to power your home AND using your solar panels to recharge your battery bank. Remember that low battery could damage your inverter.

Safety is a big concern and utility companies require a fail safe way to keep electricity from going into the grid during an outage… do not want electricity running through the grid when people are repairing it.

Tesla Powerwall: https://www.teslamotors.com/POWERWALL

A typical Powerwall system includes solar panels, an inverter (must also be compatible with Powerwall) for converting electricity between direct current and alternating current, a meter for measuring battery charge, and in backup applications, a secondary circuit that powers key appliances. Which components are required depend on how you use your home battery (the set up)

Tesla PowerWall (note this is not the Tesla websie http://eattomorrow.com/blog/2015/09/tesla-unveils-a-battery-to-power-your-home-completely-off-grid/

"Powerwall is a home battery that charges using electricity generated from solar panels, or when utility rates are low, and powers your home in the evening. It also fortifies your home against power outages by providing a backup electricity supply. Automated, compact and simple to install, Powerwall offers independence from the utility grid and the security of an emergency backup.

Powerwall comes in 10 kWh weekly cycle and 7 kWh daily cycle models. Both are guaranteed for ten years and are sufficient to power most homes during peak evening hours. Multiple batteries may be installed together for homes with greater energy need, up to 90 kWh total for the 10 kWh battery and 63 kWh total for the 7 kWh battery."