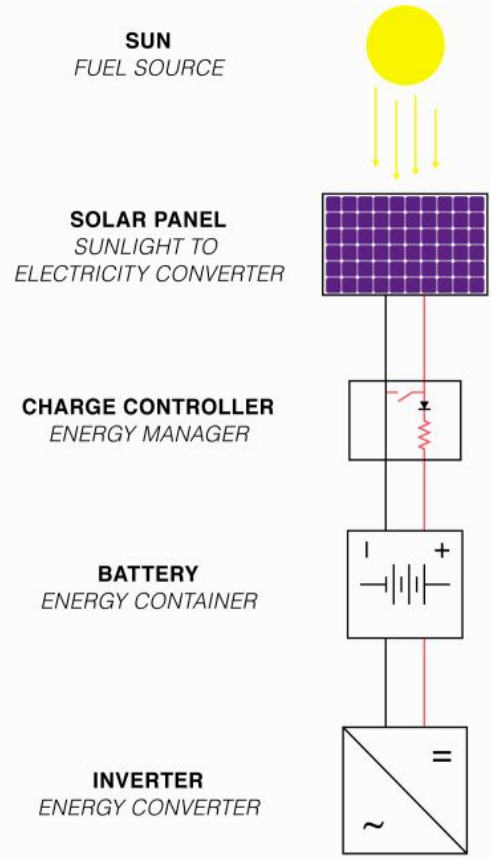


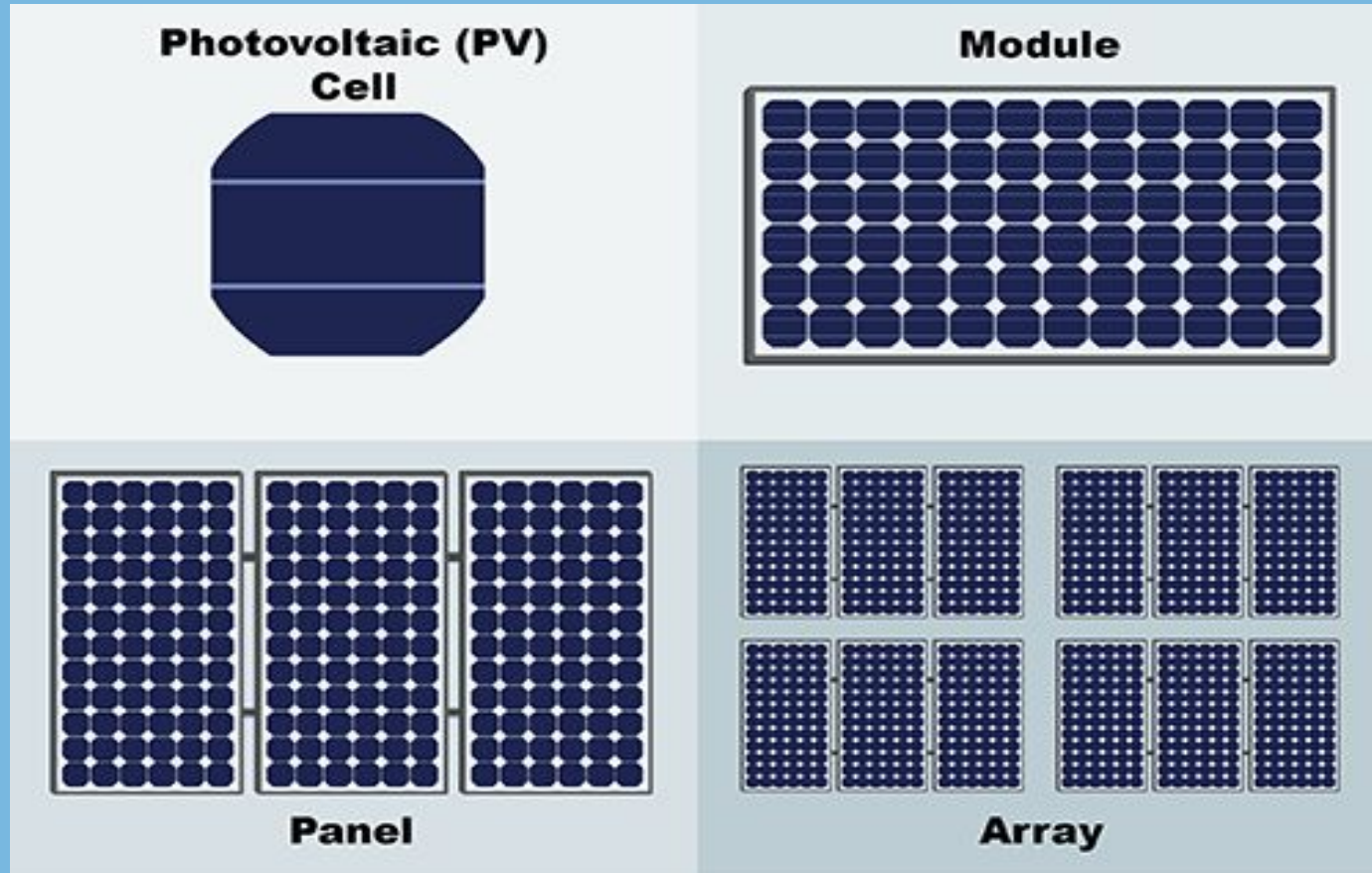
Components of a Solar Battery System





Basic Components for Off Grid Solar

Components of a photovoltaic solar system



Parts of a photovoltaic solar panel

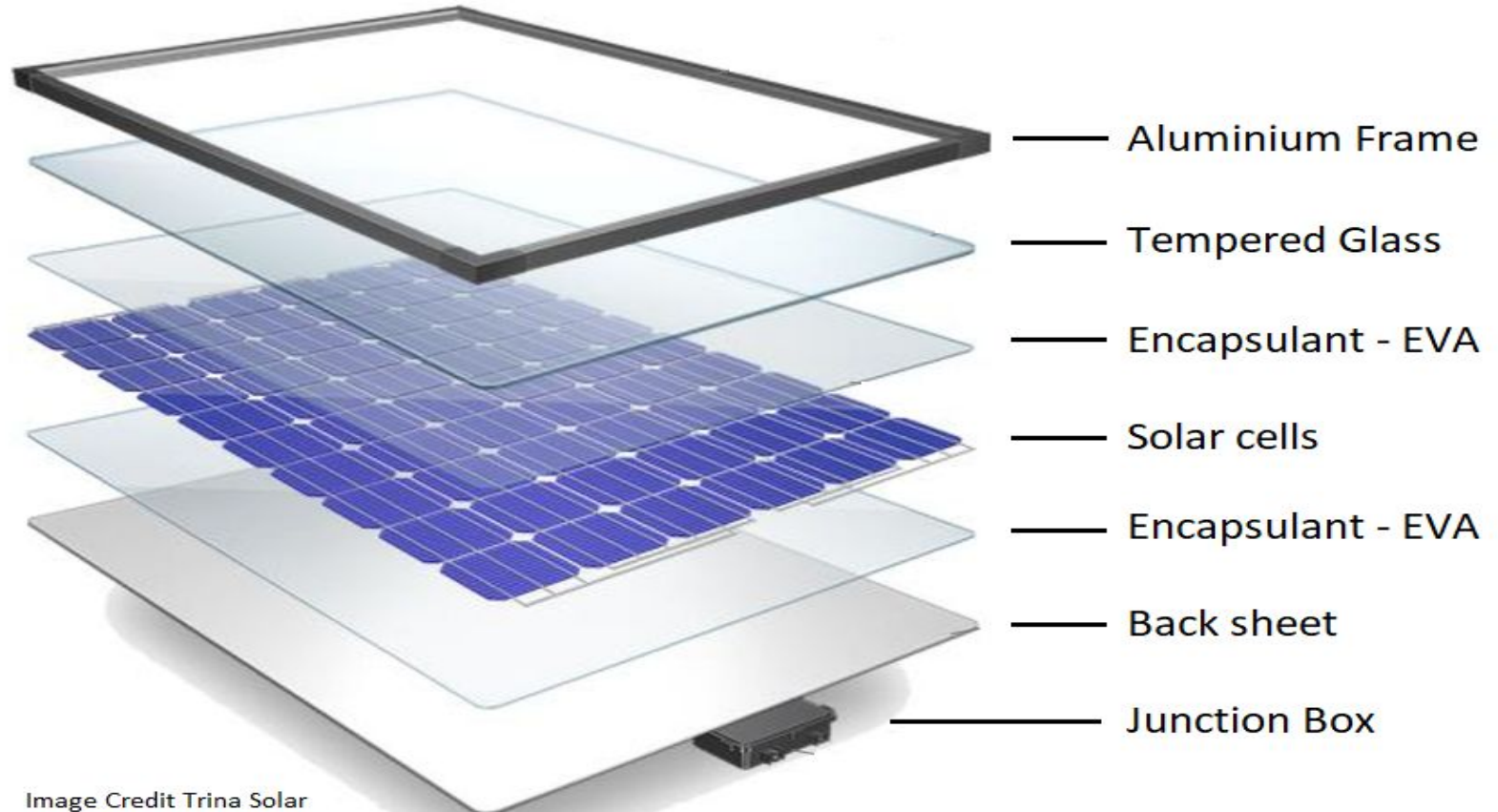
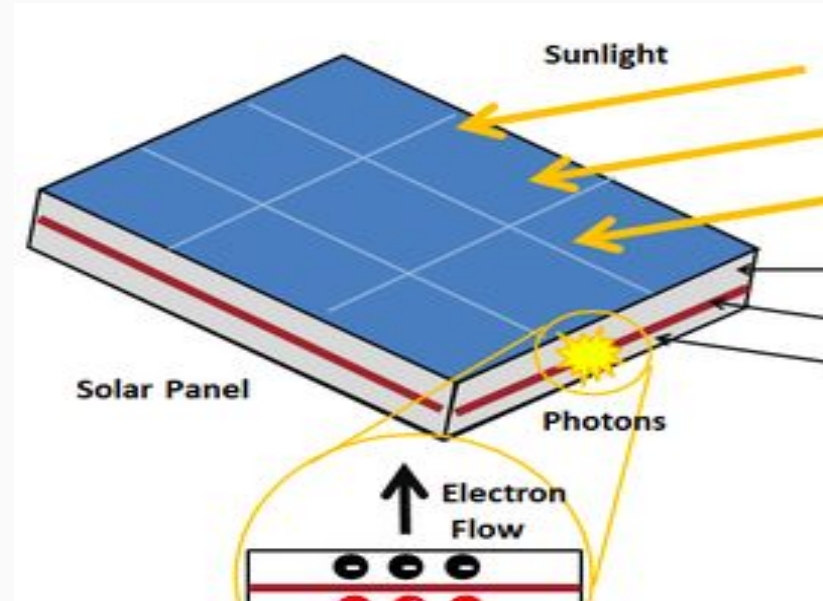


Image Credit Trina Solar



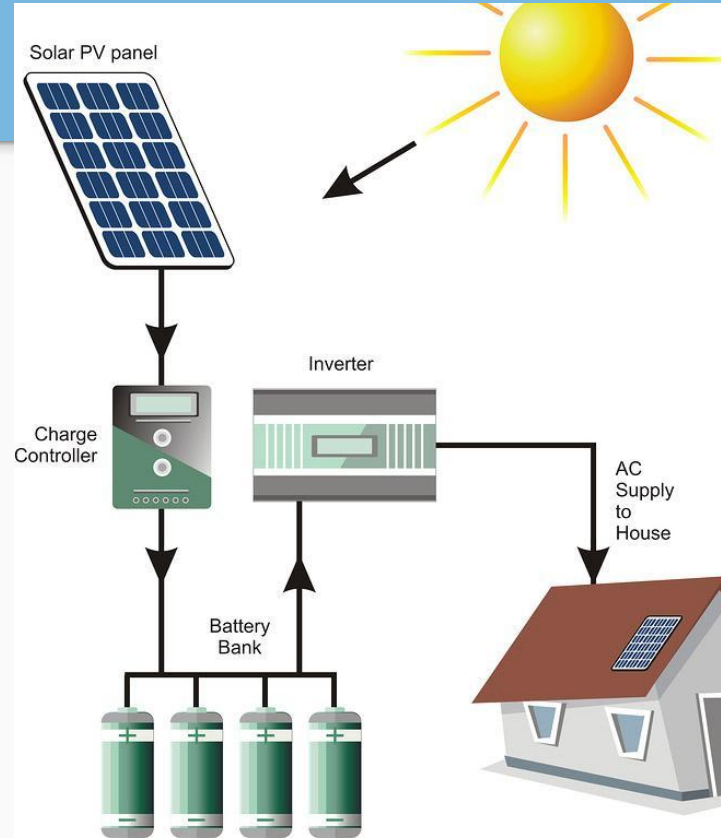
How a PV Cell Works

- Photovoltaic cells convert the sun's photons into an electrical charge
- Photons push through the PV layer towards the back of the PV cell
- Electrons want to return to the top of the cell through the path of least resistance



Charge Controller - The Energy Manager

- Charge controllers handle the solar power and transfer it to the batteries in a safe way
- CC's regulate the voltage and current coming from the solar panels to prevent the batteries from overcharging



Batteries -The Energy Container

- Batteries define how long you can provide provide power without sunshine available
- Known as “deep cycle”, these batterie are designed to be deeply discharged, using a large portion of their capacity, compared to other types



Lead-Acid Batteries

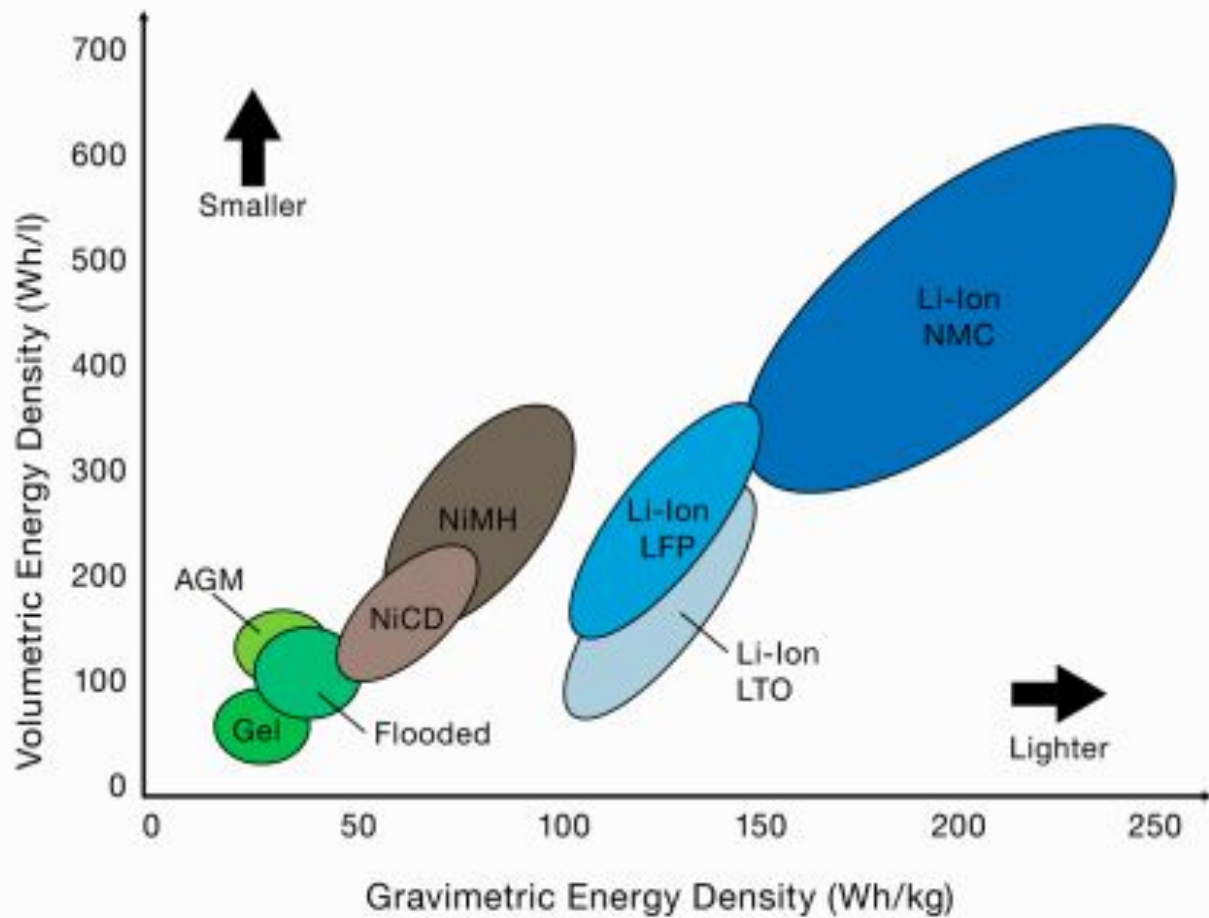
- Most common type of battery
- Function at 80-90% efficiency
- Normally cannot be discharged below 40% (without eventual damage)
- Most off grid controllers and inverters are designed more so for lead-acid batteries than lithium ion



Lithium-Ion Batteries

- More and more common due to electric vehicle adoption
- Can be discharged up to or past 80% without damage
- Last up to three times longer than lead-acid
- Lighter, smaller, and can operate in higher ambient temperatures





Inverter - The Energy Converter

- Changes the DC electricity from the batteries and the solar panels into AC power usable for your home
 - Inverter is needed when some equipment runs on AC (standard outlets)
- If long power lines are needed, AC is better for long-distance transmission (standard for grid electricity)

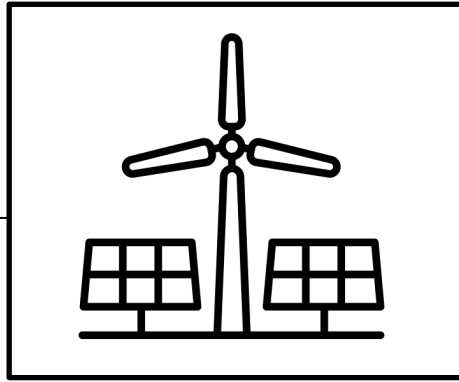


Inverter Extras

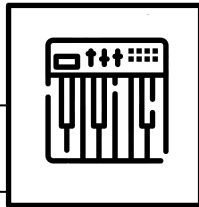
- Inverters (and chargers) use standby power to stay on when not in active use
 - Energy needed for the inverter to be on, warmed up, and ready for work
 - 30 watts as a baseline, can be a drain on the battery
 - Important to factor in on the load calculation table
- Inverters have a designated power rating for continuous use and a larger power rating for a short surge of power
 - Surge power is used for in short bursts (seconds to minutes).

CLEAN(ER) OPTIONS

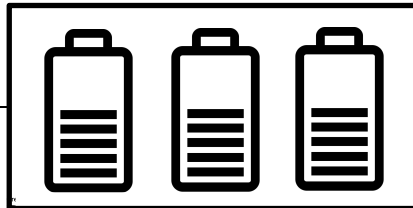
#1
Renewables
+
Storage



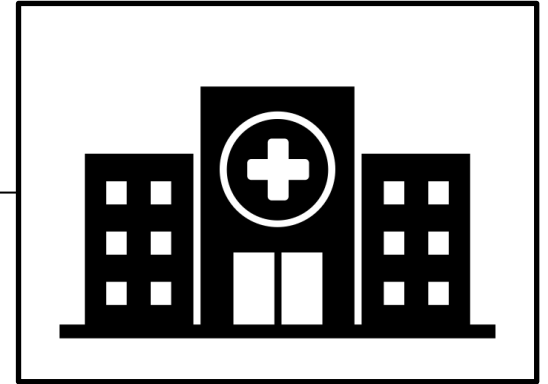
Renewable
Energy
Solar array
and/or wind
turbine



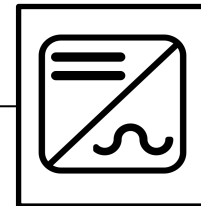
Charger
Regulates power
going to batteries



Battery Storage
Lithium, lead acid
or other chemistry



Site
Critical, useful, and
desired loads

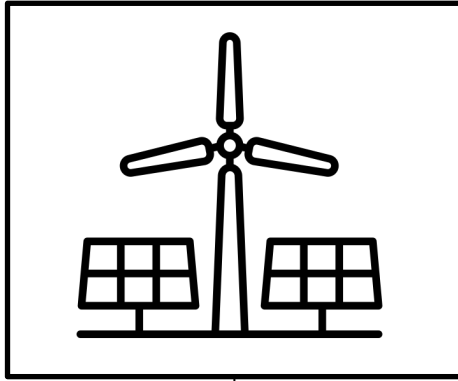


Inverter
Converts power
for use onsite

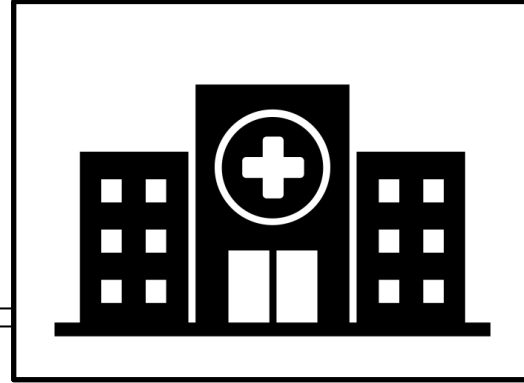
CLEAN(ER) OPTIONS

#2

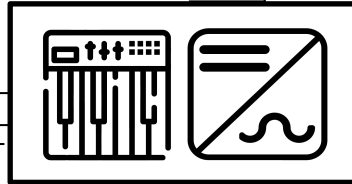
Renewables
+
Storage
+
Back-Up
Generator



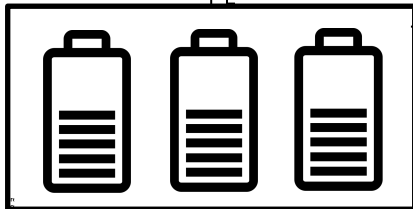
Renewable
Energy
Solar array
and/or wind
turbine



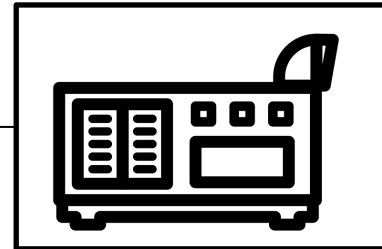
Site
Critical,
useful,
and
desired
loads



Inverter/Charger
Regulates power to and
from variable sources



Battery Storage
Lithium, lead acid
or other chemistry

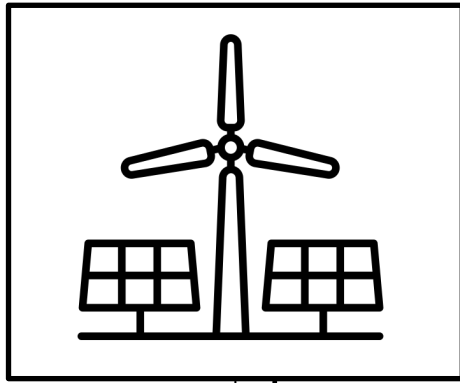


Back-Up
Generator
Gas or diesel

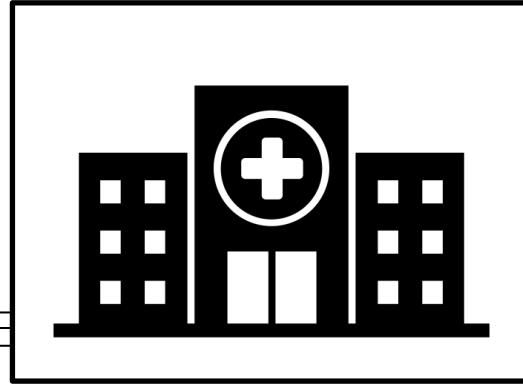
CLEAN(ER) OPTIONS

#3

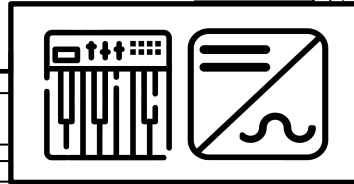
Renewables
+
Storage
+
Back-Up
Generator
+
Grid Tie



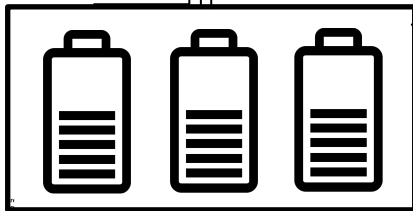
Renewable Energy
Solar array
and/or wind turbine



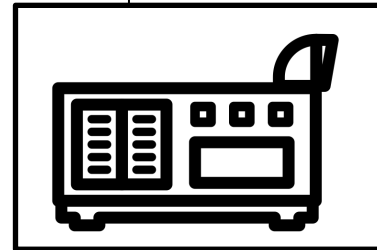
Site
Critical,
useful,
and
desired
loads



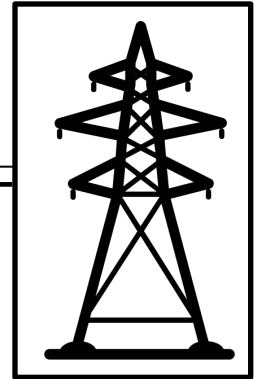
Inverter/Charger
Regulates power to and
from variable sources



Battery Storage
Lithium, lead acid
or other chemistry



Back-Up
Generator
Gas or diesel



Power Grid