Hardware and Tools
Balance of the system (BOS)

All mechanical and electrical equipment and hardware (besides the major components) that are needed to finish the installation.
Wires

- A copper or aluminium conductor → metals that allow current to flow freely
- Despite its higher cost, copper has lower resistance and is less easily corroded than aluminum
Cables

- Two or more wires inside a single sleeve
  - Sleeve on a cable is present to protect wires from water, UV light, and high heat
Common Wire Types

- **PV** - used to connect PV Modules
- **THHN/THWN** - used inside cable trays and conduits
- **USE/UF** - designed for underground use
- **RHH/RHW** - rubber insulated for connecting batteries
- **NM** - used for AC wire in the interior of the house
Fuses and Circuit Breakers

- Known as an Overcurrent Protection Devices (OCPD)
- Disconnects the circuit when the currents exceed their rated capacity
- Usually within a combiner box
Fuses and Circuit Breakers

- Must have a capacity equal to or less than the conductor to which it is connected or else it will not function
Combiner Box

- An enclosed box to safely combine ONLY parallel connections of conductors
- Bonds multiple wires together when you have multiple strings of PV modules
- Overcurrent circuit protection boxes (OCPDs) are within this box as well
Disconnects

- A device that breaks the circuit to stop the flow of electricity in case of emergency, repair, or maintenance
- Combiner box can also function as a disconnect
- PV array and batteries should each have their own disconnect
Grounding

- Connects all the electrically conductive parts to have the same potential voltage as the Earth by connecting it to Earth
- Reduces the chance of electrical shock
  - Instruction manual will have instructions on how to ground your system
Tools

Kill A Watt Meter

- Measures the power of individual equipment to help determine your consumption per device and possible voltage drops
- Calculates kWh, W, V, A, Hz, VA, PF
- Only plugs into the AC outlet after the inverter
Tools
Multimeters

- Measures voltage, current, and resistance
- Checks for continuity of the circuit
Tools

Clamp Meter

- Equipped with a clamp to measure current indirectly
- Clamps allow measurements to be taken without interrupting the circuit
Tools
Angle Gauge

Determines the actual tilt of the solar array or roof pitch
Tools
Solar Pathfinder
(Hardware or App)

- Measures the path of the sun and the shade in a particular location
- Helps to determine what the PV production will be
Measures the specific gravity in flooded lead-acid batteries

Gravity helps to determine the voltage of each cell

Large voltage differences indicate a malfunctioning or dead battery
Tools

Cable Crimper

- Used to join two metallic ends such as a connector to the end of a cable, or a cable to another cable