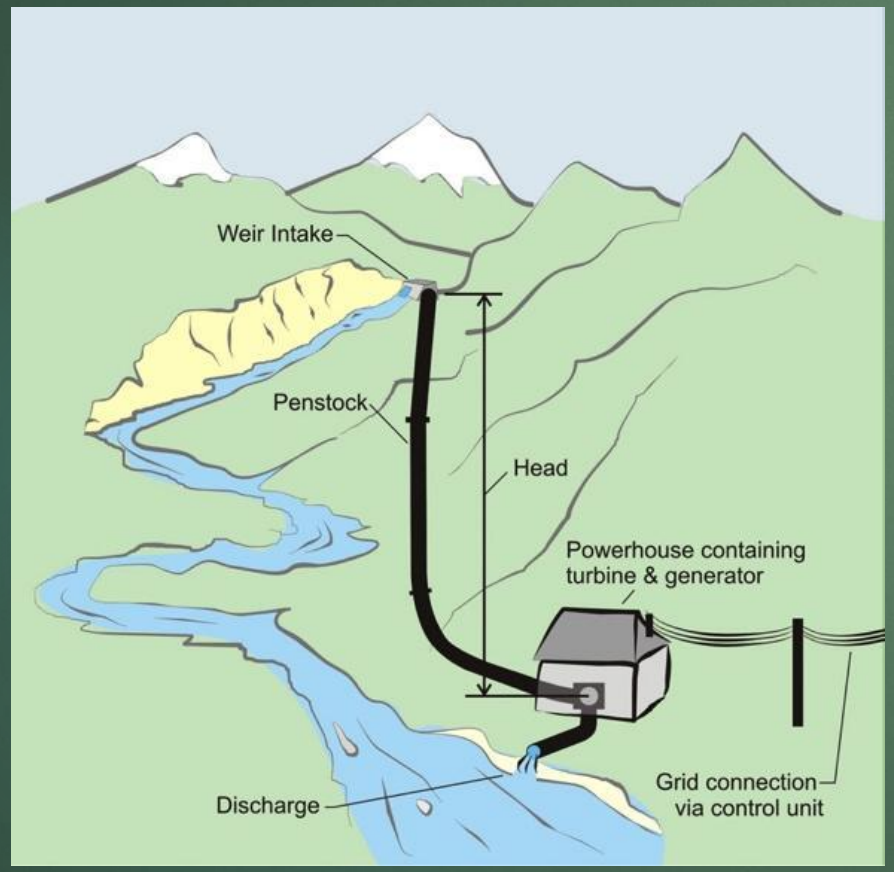
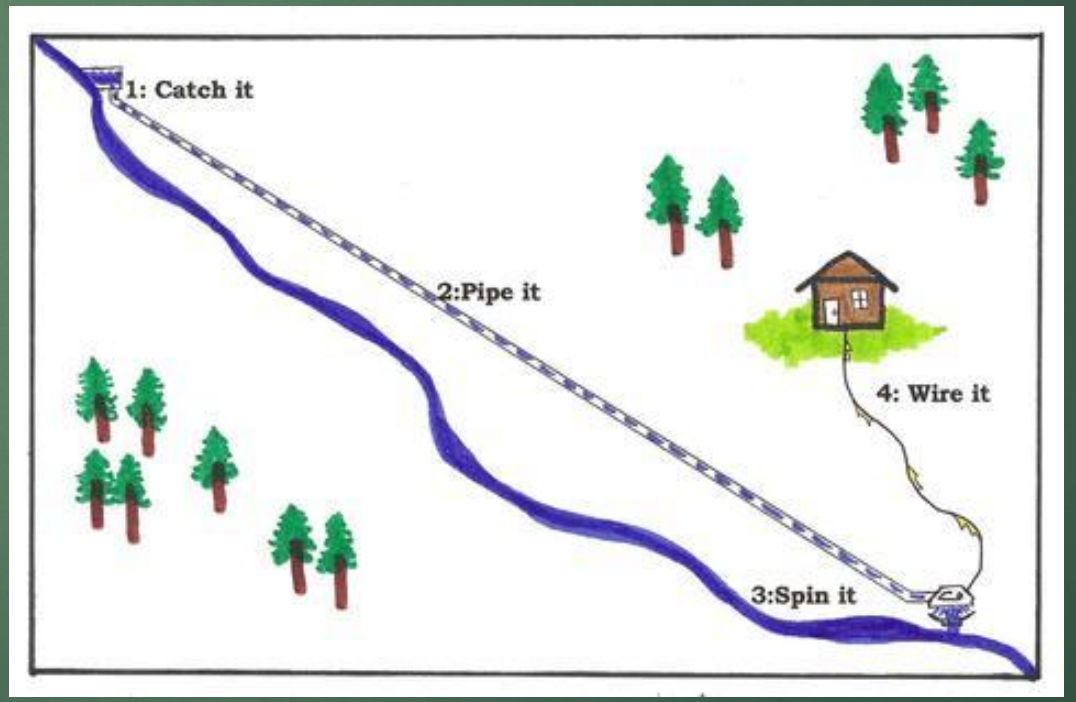
Power Production
Micro-Hydro

- Micro-Hydro - Why "Micro" hydro?
  - How does Hydro power work?
    - High pressure from gravity – 2.3 feet/psi
    - Water piped from Spring to turbine, building pressure
    - Water pressure focused at nozzle, spins a pelton wheel
    - Pelton wheel turns a motor or alternator, producing power
    - Power is converted in order to charge batteries

    - Three total turbines
      - 2 - by bodega - Permanent Magnet Alternator
      - Garden Hydro - High Voltage, greater power

Power Production Micro-Hydro





Power Production
Micro-Hydro

PELTON WHEEL

Power Production Micro-Hydro

Power Production Micro-Hydro

- Turbines by the bodega
  - Permanent Magnet Alternator
    - Produce power in low voltage AC and convert to 48v DC to charge batteries
    - More force from water, faster they spin and more power is produced
    - Need to be near the batteries, low voltage causes greater losses
    - There is significant loss in power from water needing to travel such a long distance
    - Loss of power due to the lower water pressure
    - Simple and Efficient

Power Production Micro-Hydro

- Garden Hydro –
  - Induction Motor – 480v, three-phase AC
    - High Voltage saves losses in transmission of electricity
      - 4 Lines come from garden – 3 hot and 1 ground
    - Location means it is capable of producing much more power but there are significant losses in conversion

Power Production
Micro-Hydro

- Garden Hydro –
- Requires complicated controls and conversion
  - Capacitors to regulate the speed and Ignite the stator
  - Transformers to reduce the high voltage
  - Large Rectifiers to transform the 3-phase AC to DC to charge the batteries