

Renewable Energy Systems Overview



TERRATEK
ENERGY SOLUTIONS INC.

Company Background

- ✧ Company started in 2005
- ✧ Headquartered in Courtenay, BC
 - ✧ Serve Southwest British Columbia
- ✧ LEED Accredited and C.E.M. Professionals



Conservation Vs. Generation



High Efficiency Washer
244 kWh/year
\$1500



Top Load Washer
950 kWh/year
\$500

Cost of solar system to generate 706 kWh/year = \$3000!

Solar

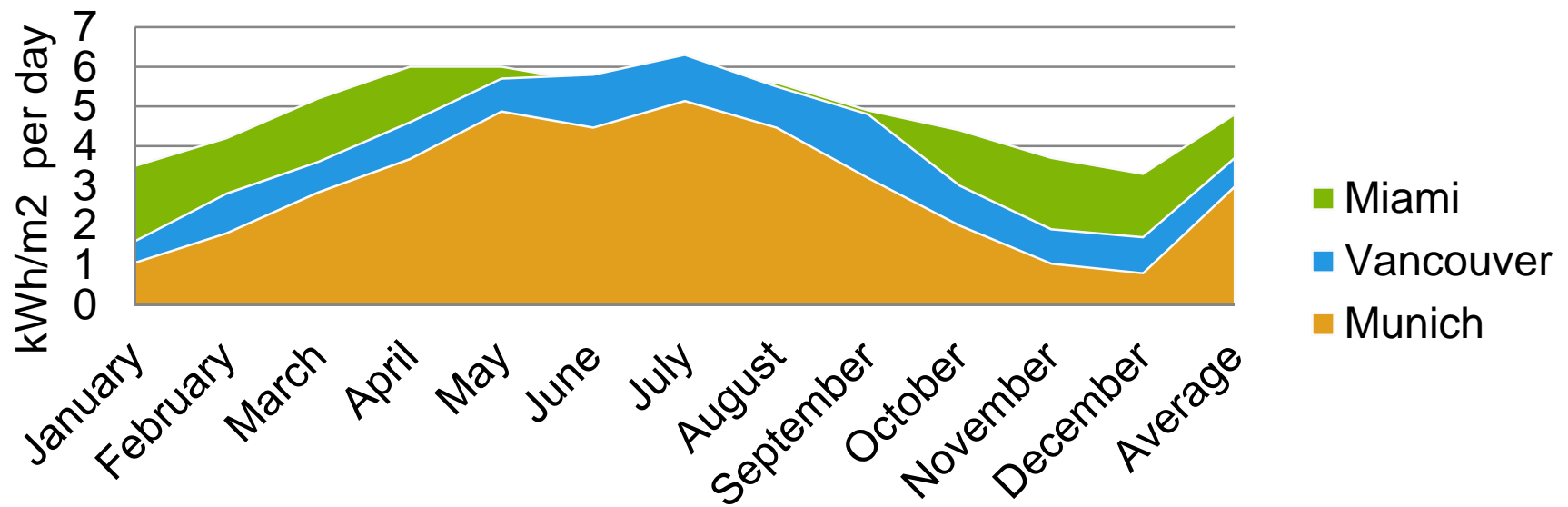


⌘ Photovoltaic

⌘ Solar Thermal

Do We Get Enough Sun?

Average Daily Solar Insolation



Does Solar Work in BC?



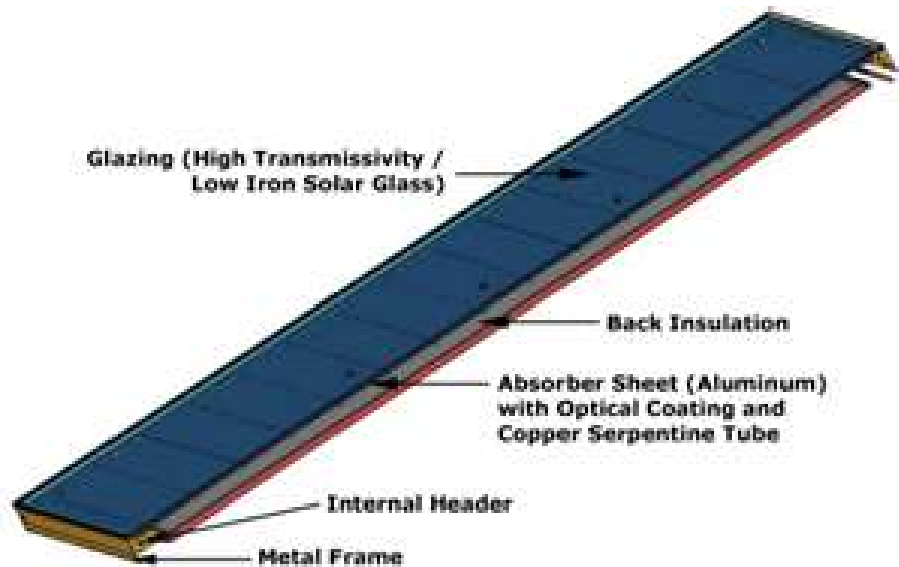
- ✧ Average annual insolation in Vancouver is *only 8% less* than Miami
- ✧ Germany has the *second highest implementation rate* of Solar Thermal and Solar Photovoltaic in the world
- ✧ In B.C. we can get *40-60%* of our annual hot water needs from Solar

Solar Thermal

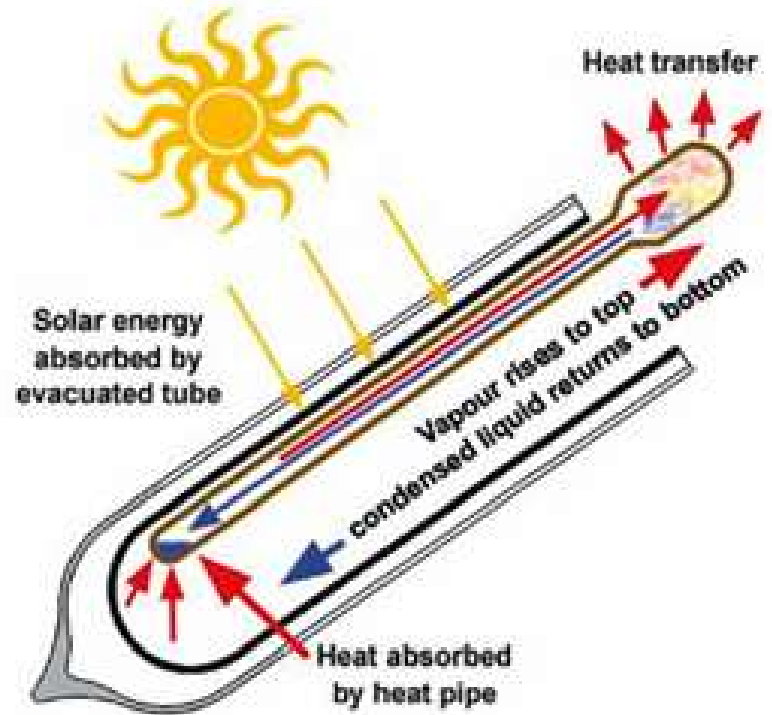
- ✧ A technology for harnessing solar energy for heat
- ✧ Ideal as a preheating system for Domestic Hot Water
- ✧ Can be married with other renewable energy technologies



How Solar Collectors Work



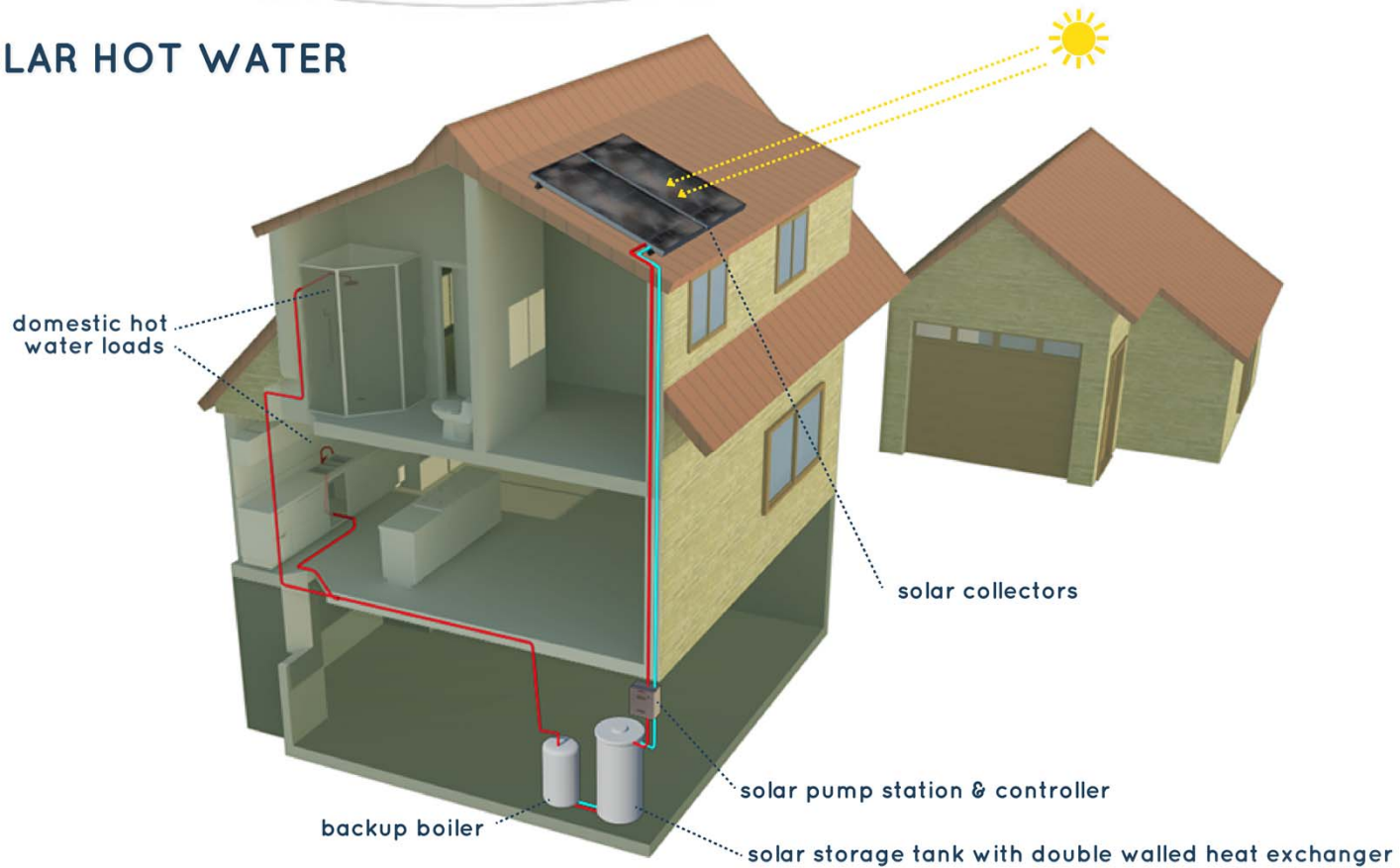
Flat Plate Collector



Evacuated Tube Collector

How Solar Thermal Works

SOLAR HOT WATER

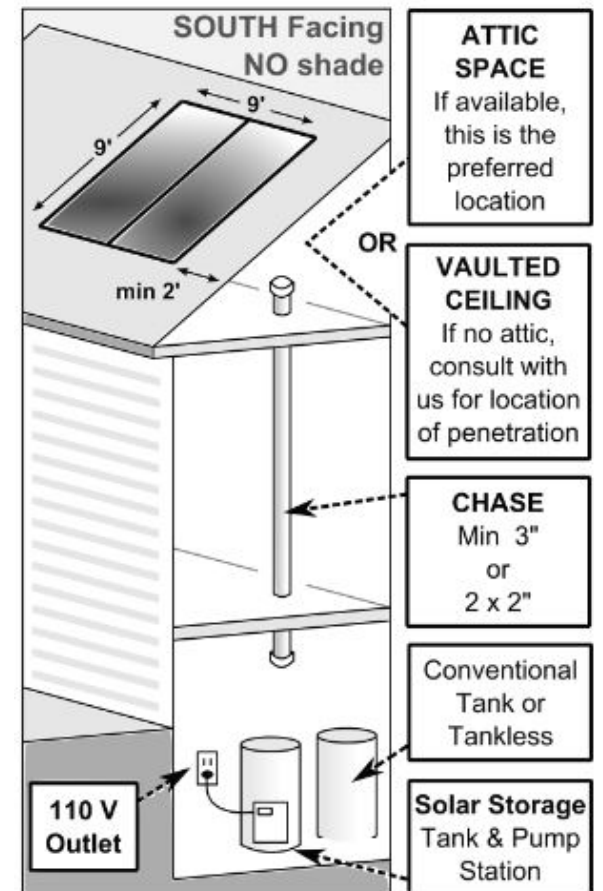


What Solar Thermal Looks Like



Self Assessment

- ⌘ Do You Have Room for a Solar Storage Tank?
- ⌘ Do You Have an Unobstructed South Facing Roof in Good Repair?
- ⌘ Is There an Adequate “Chase” For the Solar Piping?
- ⌘ Does Your Household or Business Use Alot of Hot Water?



Reliability / Maintenance

- ✧ Typically Only One Moving Part
- ✧ Glycol Flush and Recharge
- ✧ 10 Year Warranties
- ✧ Established Technology
- ✧ System Longevity

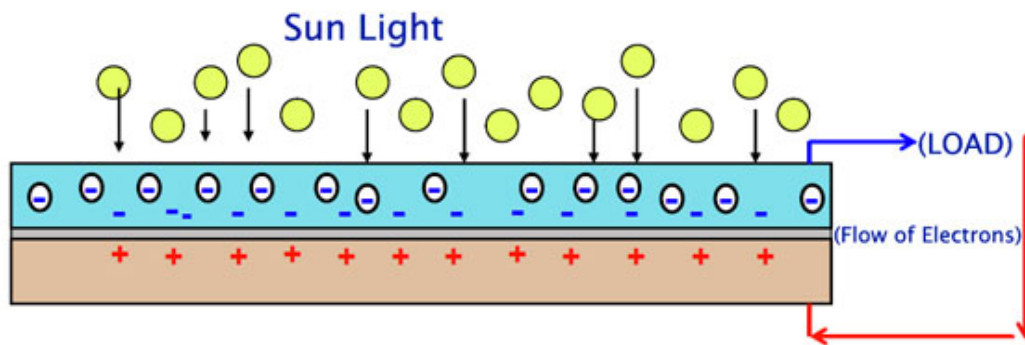


Photovoltaics (Solar PV)

- ✧ A technology used for creating electricity using sun's energy
- ✧ Grid Tie: Used to supplement electricity consumption
- ✧ Off Grid: Used to charge a battery bank
- ✧ Typically rack mounted

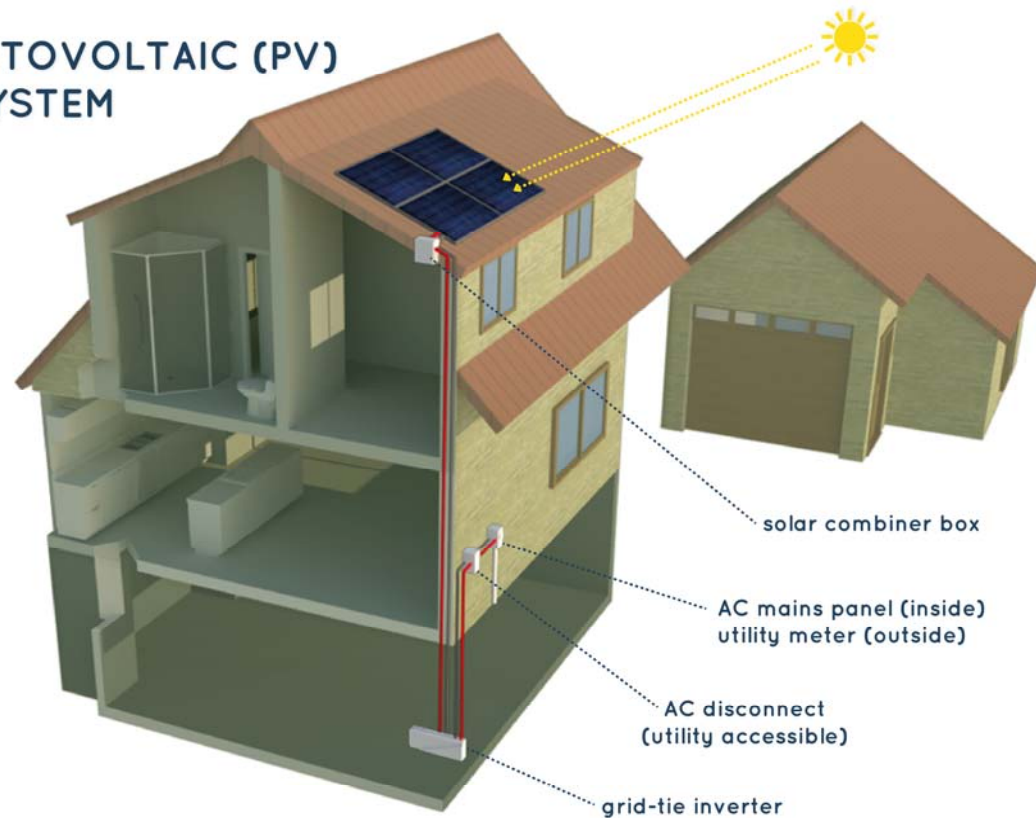


How Solar PV Works



Solar PV Grid Tie System

SOLAR PHOTOVOLTAIC (PV) GRID-TIE SYSTEM



What Solar PV Looks Like



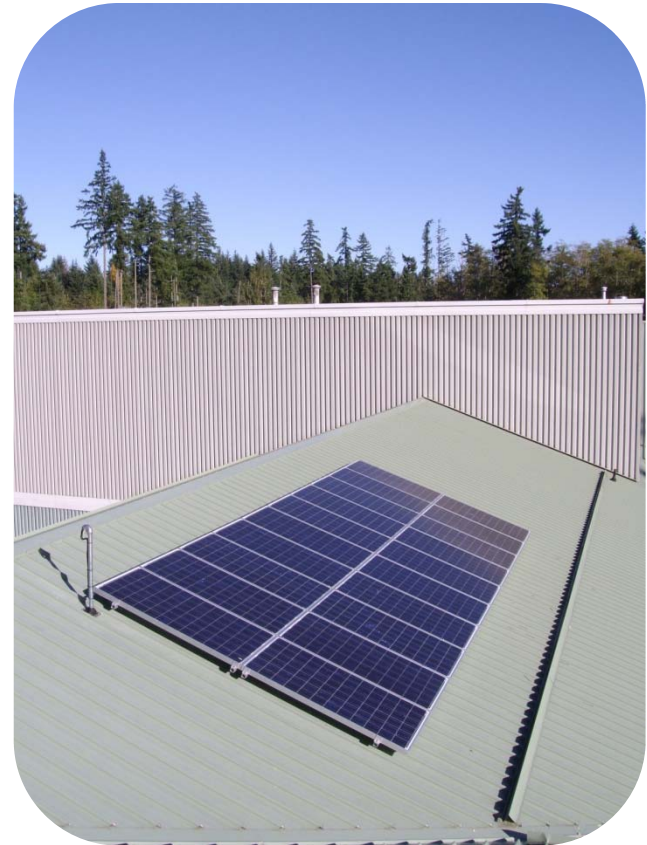
Self Assessment

- ⌘ Do You Know Your Annual Average Electricity Consumption?
- ⌘ Do You Have an Unobstructed South Facing Roof in Good Repair?
- ⌘ Do You Have Adequate Wall Space Available Near the Electrical Panel?
- ⌘ How Much Energy Do You Want to Offset?



Reliability / Maintenance

- ✧ 25 Year Warranties
- ✧ Module Cleaning
- ✧ Resilient to Falling Debris
- ✧ System Longevity



Wind Turbines

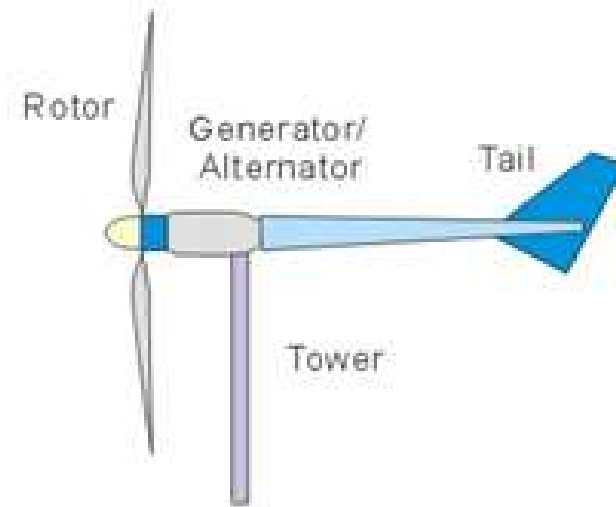


- ⌘ A technology used to create electricity using wind's energy
- ⌘ Grid Tie: Used to supplement electricity consumption
- ⌘ Off Grid: Used to charge a battery bank
- ⌘ Typically tower mounted

How Wind Turbines Work

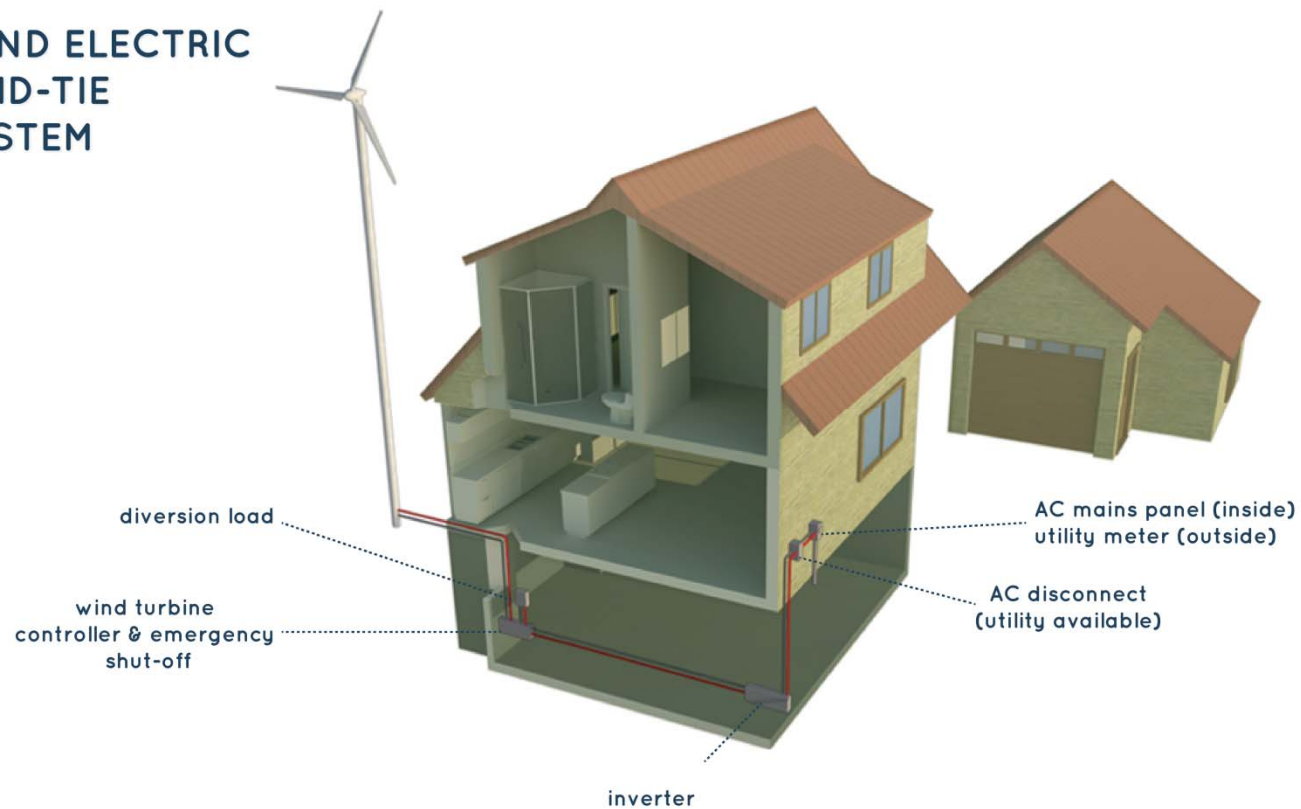


**Basic Parts of
a Small Wind Turbine**



Wind Turbine Grid Tie System

WIND ELECTRIC GRID-TIE SYSTEM



What Wind Turbines Looks Like



Self Assessment

- ✧ Does Your Site Have Above Average Annual Wind Speeds?
- ✧ Is Your Site Free From Turbulent Winds Caused By Adjacent Obstacles?
- ✧ Is Your Site Limited By Height, Zoning or Spatial Restrictions?
- ✧ How Much Energy Do You Want to Offset?

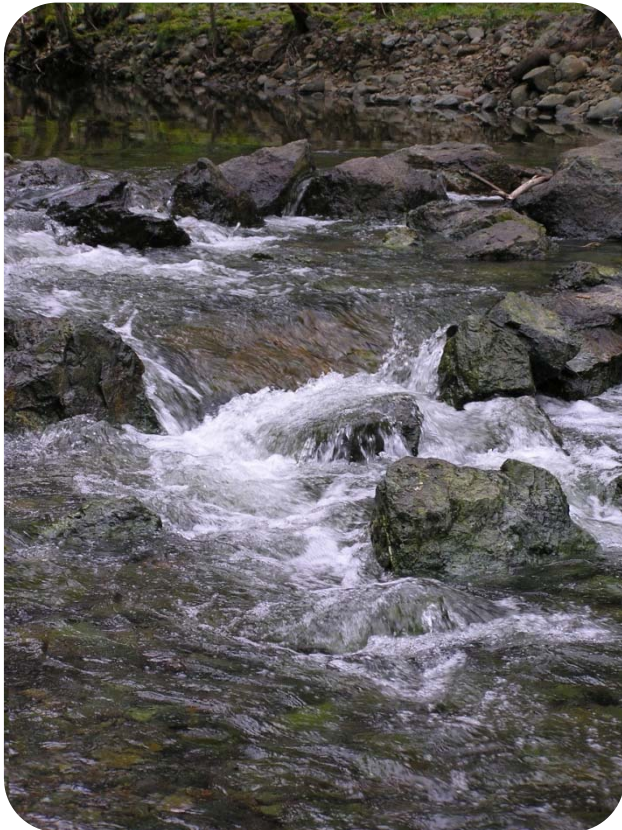


Reliability / Maintenance

- ✧ Annual Visual Inspections
- ✧ Bolt Tightening
- ✧ 10 Year Warranties
- ✧ Preventative Maintenance

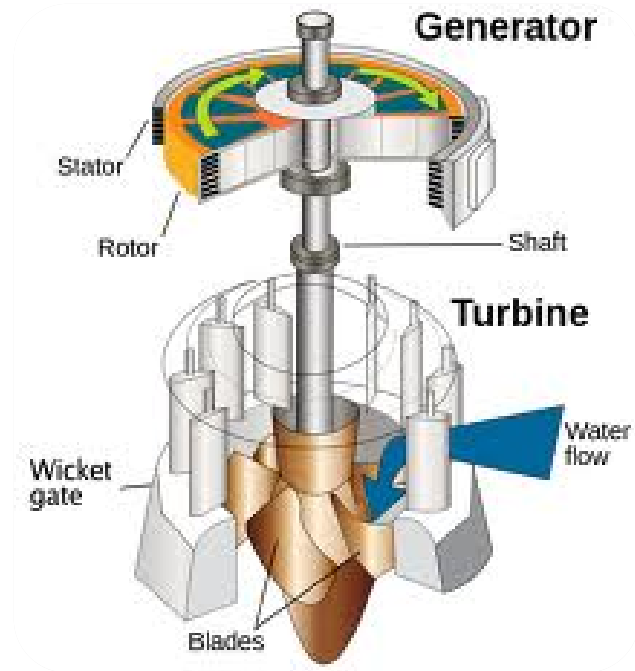


Microhydro

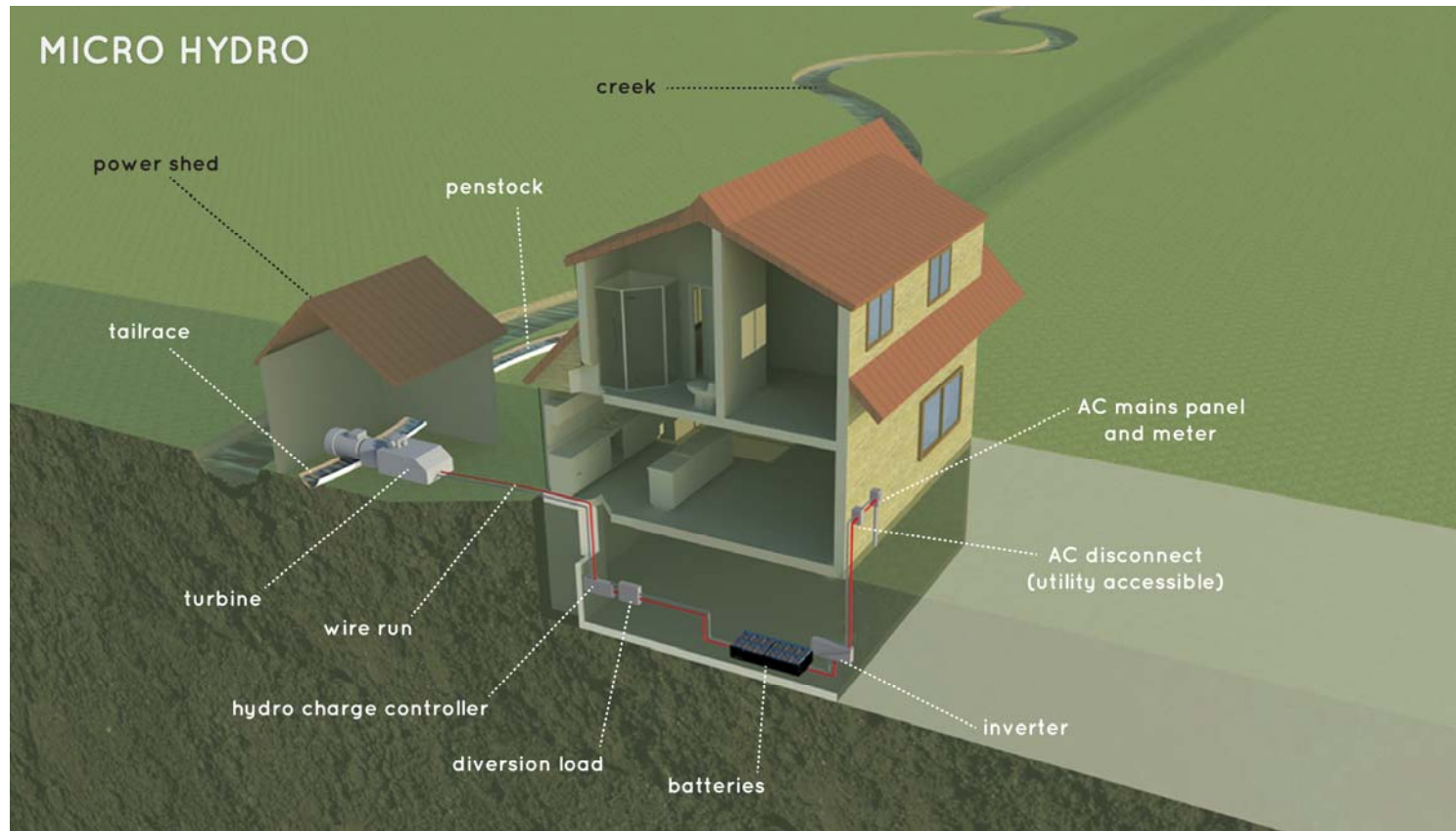


- ✧ Technology to create electricity using energy of falling water
- ✧ Grid Tie: Used to supplement electricity consumption
- ✧ Off Grid: Used to charge a battery bank

How Microhydro Turbines Work



Microhydro Grid Tie System

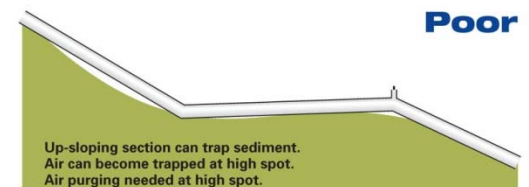
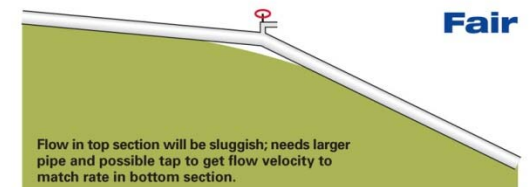
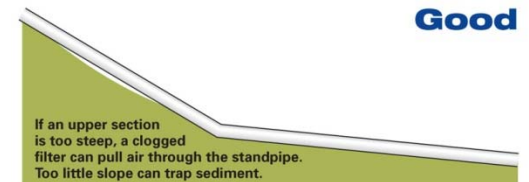
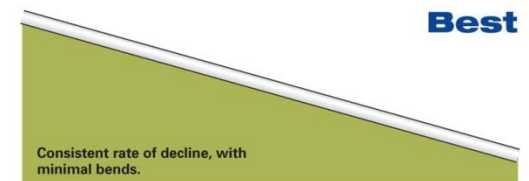


What Microhydro Looks Like



Self Assessment

- ✧ Do You Have an Appropriate Non-Fish Bearing Water Source?
- ✧ Is the Water Source Reliable and a Reasonable Distance From Your Home?
- ✧ Have You Calculated the Flow or Head of the Potential Water Source?
- ✧ How Much Energy Do You Want to Offset?



Reliability / Maintenance

- ✧ Regular Visual Inspections
- ✧ Cleaning Intakes
- ✧ 2 Year Warranties on Turbines
- ✧ Preventative Maintenance



Geo-Exchange

- ✧ A technology that uses the earth's constant temperature to generate heat
- ✧ Makes use of a heat pump to get desired temperature
- ✧ Geo-Exchange systems can be used for space heating, space cooling, or domestic hot water production



Types of Loops



✧ Open Loop

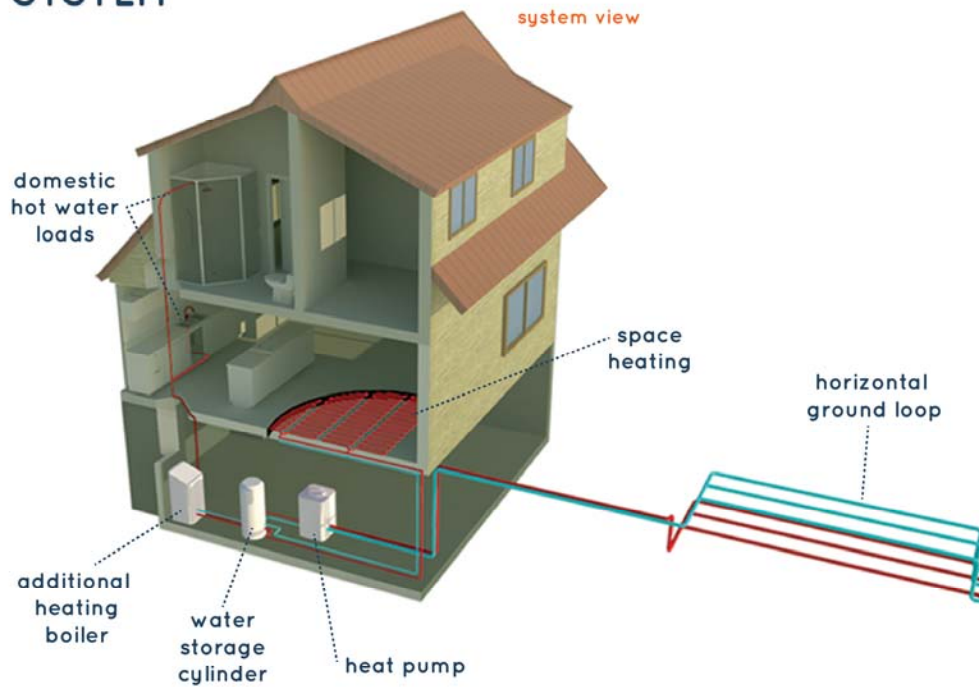
- ✧ Pond
- ✧ Well

✧ Closed Loop

- ✧ Vertical
- ✧ Horizontal
- ✧ Body of Water

How Geo-Exchange Works

GEOEXCHANGE SYSTEM



Types of Heating Systems



- ✧ Forced Air Heating
- ✧ Hydronic
 - ✧ Low Heat:
Radiant
- ✧ Hydronic
 - ✧ High Heat:
Radiators

Self Assessment

- ✧ Do You Have a Large Open Area or Water Source?
- ✧ Do You Currently Have a Forced Air or Hydronic Heating System?
- ✧ Do You Have Room in Your Mechanical Room for a Heat Pump and Associated Components?



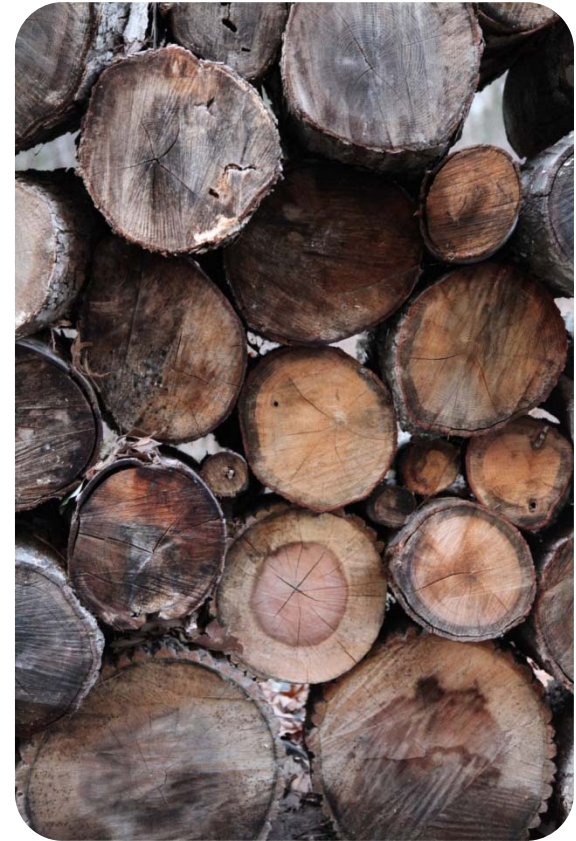
Reliability / Maintenance

- ↳ Typical warranties are 5 - 10 years
- ↳ Distribution and System Checks
- ↳ Monitoring Options
- ↳ Heat Pumps Will Last 15 - 20 Years



Biomass

- ✧ Using organic material as a heating source
- ✧ For residential biomass systems this fuel source is typically logs, woodchips or wood pellets
- ✧ Biomass systems can be used for space heating, domestic hot water production, or both.



Types of Heating Systems



- ↳ Biomass Forced Air Furnace
- ↳ Hydronic Biomass Boiler
- ↳ Biomass Stoves

Self Assessment

- ✧ Do You Currently Have a Forced Air or Hydronic Heating System?
- ✧ Do You Have Room in Your Mechanical Room for a Wood Boiler and Associated Components?
- ✧ Are You Prepared for Labour and Maintenance Required to Own and Operate a Biomass Heating System?



Reliability / Maintenance

- ✧ Clean Ash Box /Sweep Chimney
- ✧ Source is only a good as supply
- ✧ Typical warranties are 5 -10 years
- ✧ Distribution and System Checks



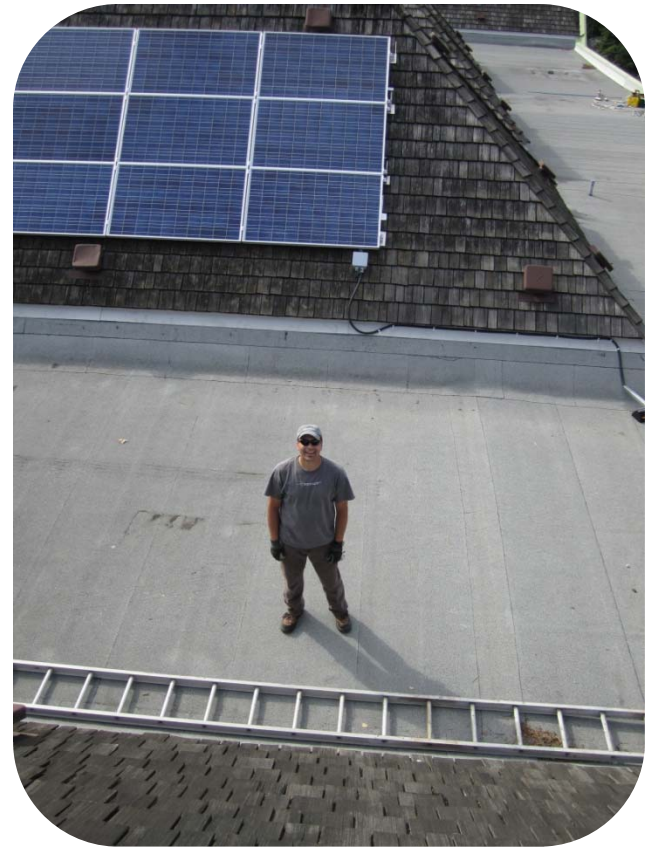
A standard log-fuelled boiler.



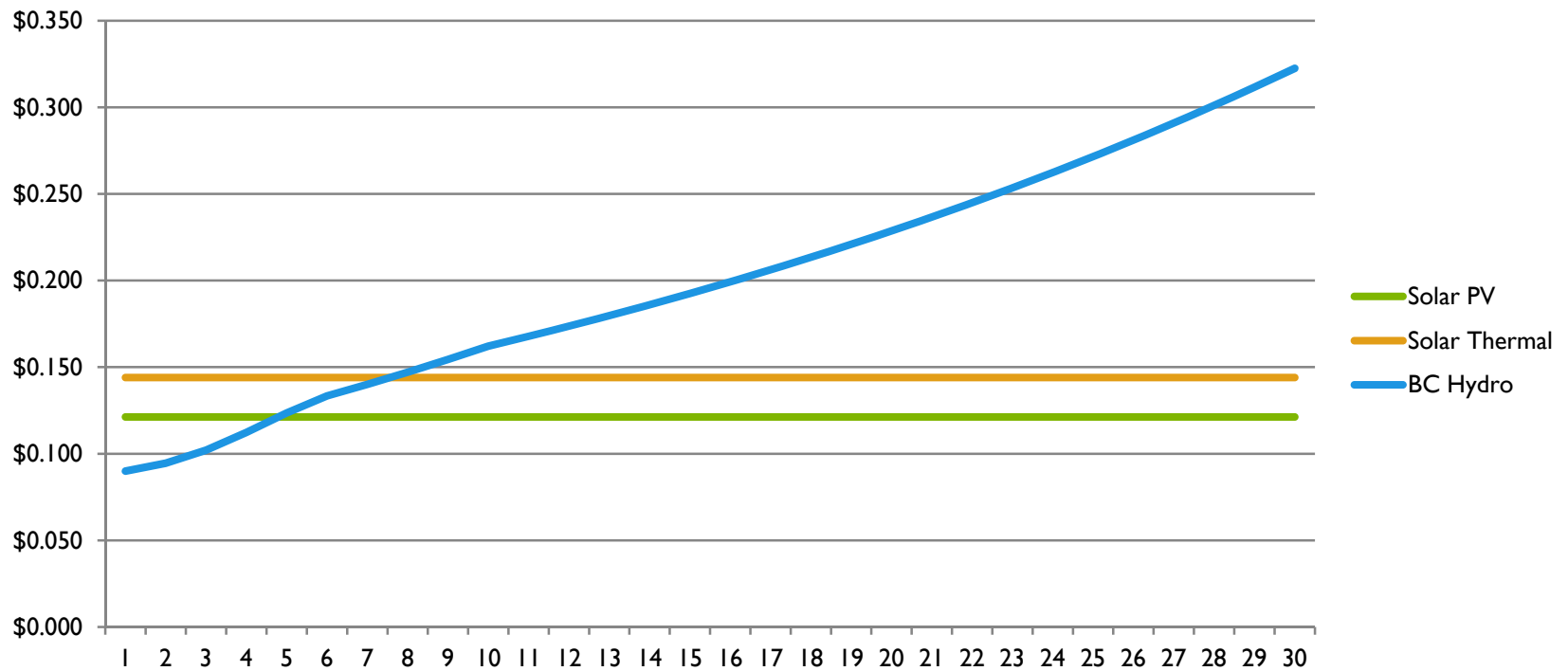
A standard wood chip furnace.

Why Use Renewables?

- ⌘ Long Term Energy Security
- ⌘ Home Rating Systems
- ⌘ Non-polluting Clean Energy
- ⌘ GHG Reduction
- ⌘ It's the Right Thing To Do



Energy Security



Your Gateway to Green Energy

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1.877.335.1415



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