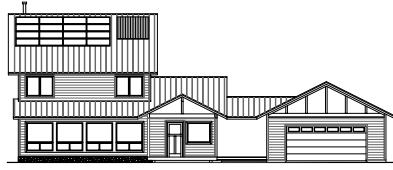
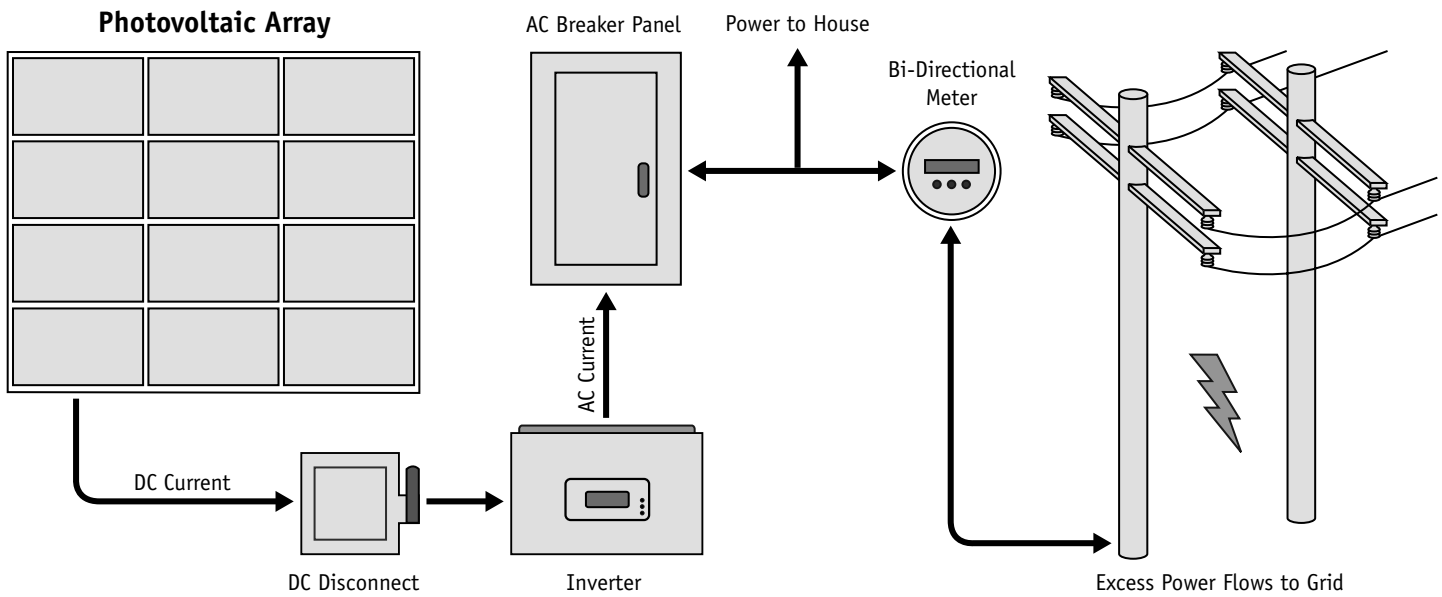


# Eco-Home at Hawk Ridge

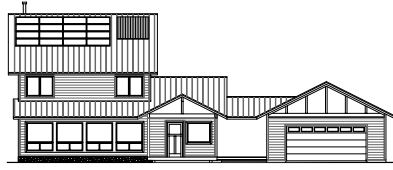


A solar model demonstrating energy efficiency, renewable energy and green building

## Schematic Diagram : Solar Electric System



# Eco-Home at Hawk Ridge



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A solar model demonstrating energy efficiency, renewable energy and green building

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## Renewable Energy Systems

Besides being very efficient in its use of energy and harvesting the sun's energy directly through the windows, the Eco Home is equipped with three active renewable energy systems. A solar electric system turns sunlight directly into electricity which helps meet the home's electrical load. A solar hot water system heats water for showers, sinks and other uses. A wood stove in the living room allows for the use of our region's only source of stored renewable energy in the form of firewood as a fuel. Together these systems help reduce the need for imported fossil fuel energy and its environmental impacts.

### Solar Electricity or Photovoltaics

The Eco Home has a 2-kilowatt solar electric system on the roof. The roof of the house was designed and built at a pitch that works well in our climate with solar technologies. In areas that don't get as much snow as we do here it is common to install solar panels flush on any roof. In snow country we cannot do that on a low pitch roof without losing several months of production when the panels are covered with snow. This system is "grid tied" with no on-site storage. The solar panels generate high voltage direct current electricity when the sun is shining and feed it into a device called an inverter in the mechanical room. The inverter changes it into 240-volt alternating current just like what the utility provides. It is fed into a breaker in the breaker panel and helps power the home's electrical loads. When the home is consuming more than the system is producing the rest is purchased as usual. If the system is producing more than is being consumed the extra is fed into the utility grid and the electrical meter records a credit. The system requires no maintenance. It simply turns on when the sun is shining and shut off at night. This system will produce, on average, over 3,100 kilowatt-hours of electricity a year which will keep over 5,600 pounds of CO<sub>2</sub> out of the environment, by replacing some coal burning at a local power plant.

### Solar Hot Water System

The second active renewable energy system in the home is a solar water heating system. Unlike photovoltaics, which convert sunlight into electricity without involving heat, the solar hot water system converts the sun's rays directly into thermal energy to heat water. The energy is used to heat water in an 80 gallon tank, stored for use when needed. A collector on the roof, which holds sixteen evacuated tubes, will produce about 80% of the hot water used by 2-3 people. Evacuated tube collectors have a few advantages over the more common flat plate collector. They are able to perform a bit better in very cold weather, are easier to handle and install, and individual tubes can be replaced if ever needed without draining the system or removing the collector from the roof. A heat transfer fluid, consisting of water and antifreeze, moves the collected energy from the collector down to a double walled heat exchanger suspended in the bottom of the water storage tank. An electronic controller turns on a small pump when the collector temperature rises above the tank temperature by a few degrees and shuts it off when it cools down after the sun sets.