



Above: a view of the south side of Colin and Christine's home. Large south facing windows and a greenhouse heat the home with sunshine. Photovoltaic modules on the roof provide the electric power. The solar oven in front of the house is baking bread. Photo by Richard Perez.

## Just say, "Yes" to sunshine

Richard Perez

**L**iving with renewable energies means graciously accepting what Nature offers. Colin McCoy and Christine Reising do just that. Their Oregon mountain home is heated and powered by the Sun. This owner designed & built, earthbermed building uses only energy resources found on site. Colin and Christine have made a home that is warm, sustainable, independent, and inexpensive. They accomplished this for themselves by accepting the plentiful renewable, natural resources that surround them.

### Location

Colin and Christine live in the mountains outside of Jacksonville, in southwestern Oregon. At their elevation of 3,000 feet, there is abundant sunshine above the fog that often blankets the nearby lower valleys. Their homestead is located about one mile from the nearest hard surfaced road or commercial electrical hookup.

### Colin & Christine's Homestead

In the short period of two years, Colin and Christine built their home themselves. The house is earth bermed on its north and east side. Solar heat warms the home from its large south facing windows and from the a greenhouse attached to the home's southeast corner. Air is circulated through this two-story, 2,000 square foot home by natural convection currents.

Colin and Christine are serious about construction. Colin realized that heavy equipment was the best way to move all the dirt and rock necessary to make his homestead. Colin bought a used small bulldozer and used it to construct the earth berm for the house, to rough out the garden, and to dig two ponds.

The concrete work that forms the north and east sides of the house was accomplished by dry stacking concrete blocks. Colin mentioned that the dry stack technique did not require constructing wooden forms. The blocks were reinforced with steel rebar and filled with cement. The wooden portions of the walls in the south and west were insulated to R-19 or R-24 with fiberglass. The floor is a six inch concrete slab reinforced under the 2.5 ton masonry chimney and stove in the home's center. The home employs virtually no north facing windows, but instead uses skylights for natural lighting.

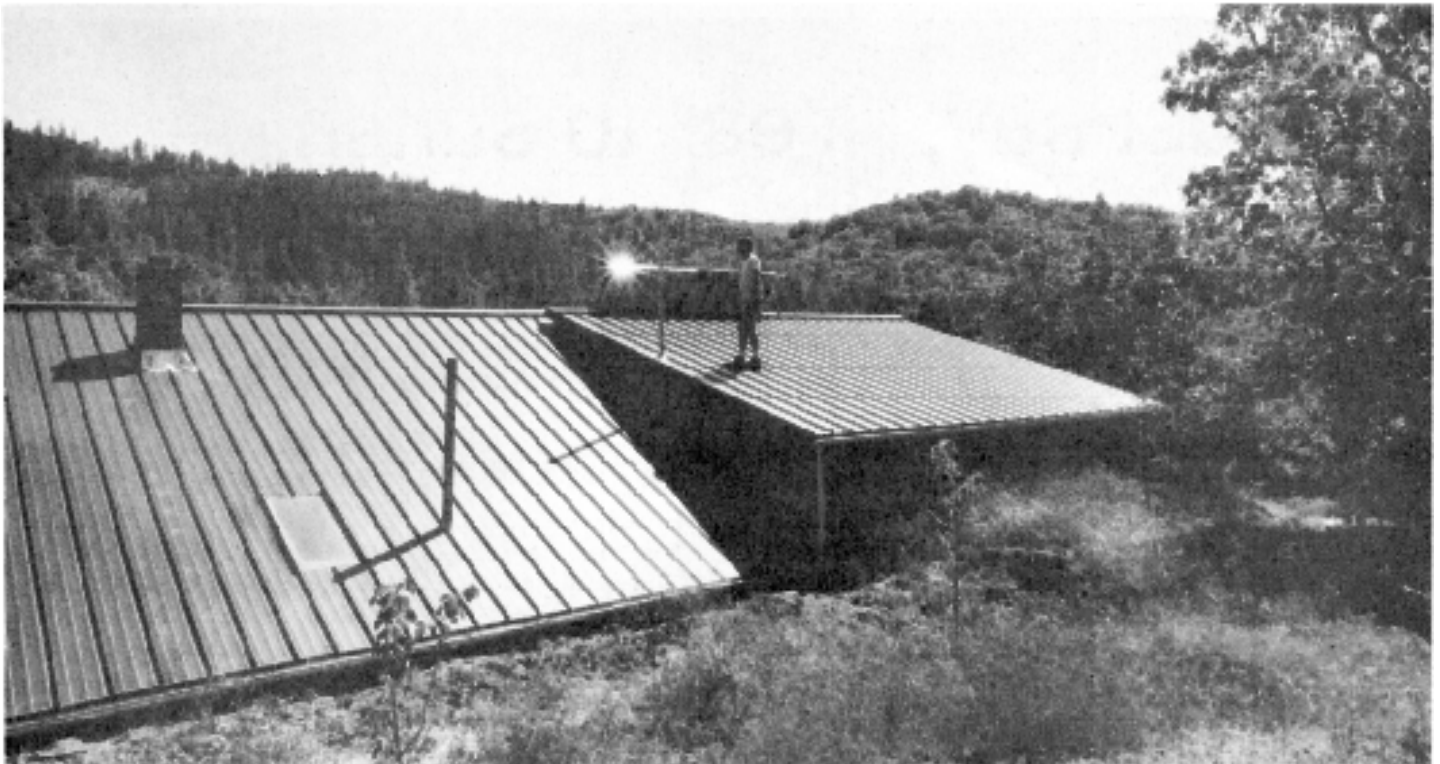
The large south facing windows use two panes of glass to reduce heat loss. Colin and Christine bought these factory-made windows direct from Arctic Glass in Minnesota (715-639-3762) and have found that they work well. During the winter nights or summer days, each window can be covered with reflective curtains that roll down to control the home's temperature. During the winter

these curtains minimize heat loss from the large windows. During the summer the same curtains shade the home's interior and keep it from getting too warm. The large mass of the tiled concrete floor and the monster masonry stove/chimney act as heat sinks. This thermal mass holds the heat during winter nights and keeps the home cool on hot summer days.

Colin designed the home and it is beautiful inside. This is Colin's third home building project and his experience shows brightly in this home. The design is functional and simple to build. The interior spaces are large and open. The kitchen and the library are the twin focuses of the home's design. This is a home in which it is impossible to feel either alone or gloomy. A riot of color and life flourishes in the gardens just outside the large south facing windows.

#### **Solar and Wood Heat**

If the sun doesn't provide the heat, then wood does. Southwestern Oregon has a mild enough climate that a solar heated home is a working reality. Adding a greenhouse and using its hot air for the home, adds even more heat during the winter. Only during days of continuously cold and stormy weather is the backup wood Russian type masonry heater used.



Above: the north side of Colin and Christine's home. This side is built into the earth for thermal stability- making the home warm in the winter and cool in the summer. Colin is on the roof checking out the PV array. Photo by Richard Perez.



Above: a view of the kitchen. Note the heavy masonry stove/chimney. Below: a view of the library. Photos by Richard Perez.





Above Left: Colin built this monster woodstove into the chimney's east end. Above Center: the wood cookstove is built into the chimney's westend. Above Right: with a large garden, the Sun Frost RF-12 stores many home-grown veggies.

Photos by Richard Perez.

Colin and Christine burn about one and one-half cords of wood yearly. They merely clean up the dead hard wood on their property and use it for space heating, cooking food, and heating water.

In the center of the home sits a massive Russian type stove & brick chimney. This chimney has a serpentine smoke path fed by two different wood stoves. One stove is built into the chimney and will consume logs up to four feet long. This large wood heater provides backup heat for extended cloudy and cold times. The second stove built into the chimney is a wood cook stove complete with oven. Colin and Christine do all their indoor cooking on this wood cookstove. They don't use electricity, propane, LP gas, or natural gas for any thermal applications. Their wood cook stove is equipped with a cast iron water jacket. Hot water is thermosyphoned through the wood stove and stored in a conventional hot water tank.

The afternoon that Karen and I arrived to meet Colin and Christine, they were baking bread in a newly constructed solar box cooker. They are actively experimenting with solar cookers because cooking with sunshine fits with the way they live. Colin builds a fire and makes breakfast on the cookstove just about every morning. This short fire cooks breakfast, warms the home, and

heats water for the day's use. During the sunny portion of the day, dinner can be made in the solar cooker without warming up the cool house.

#### Colin & Christine's Solar Electric System

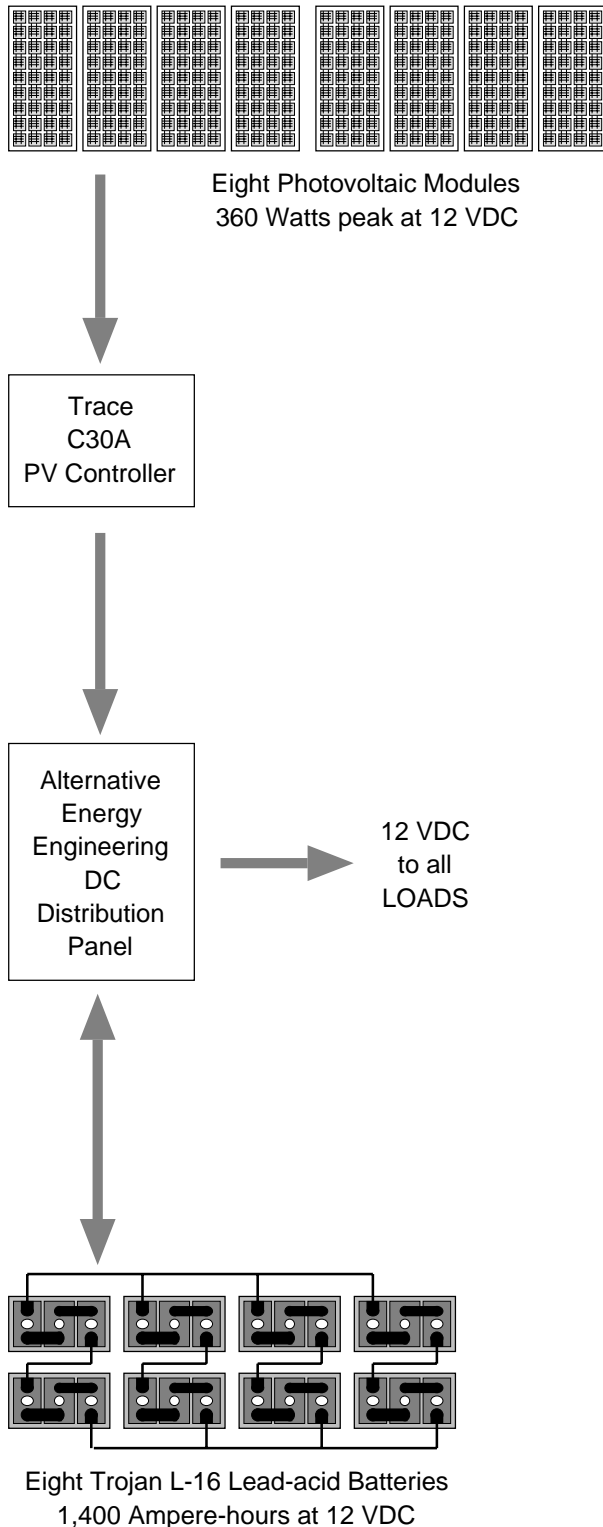
Appliance use is strictly 12 Volt DC. Colin and Christine use electricity for only essential applications like lighting and refrigeration, and maybe a few luxuries like toast in the morning. Christine loves toast for breakfast and makes it on a 12 Volt toaster each morning. The chart below details the appliances used by Colin and Christine. The major consumer is the 12 Volt powered Sun Frost RF-12. This super efficient 12 cubic foot refrigerator and freezer allows Colin and Christine to keep food fresh for only about 440 Watt-hours of power daily. Their light is provided by three 12 VDC fluorescent lights for long

*Colin & Christine's 12 Volt Appliances*

Appliance	Watts	On time hrs. / day	Watt-hrs. per day	%
Sun Frost RF-12 Refrigerator/Freezer	55	8	440	56.4%
Lighting (Fluorescent & Incandescent)	60	5	300	38.5%
Toaster	250	0.16	40	5.1%

Total 780

### A Block Diagram of Colin & Christine's Photovoltaic Power System.



duration operation, and three incandescent 12 Volt bulbs for short duration use. Both Colin and Christine practice the "One Person, One Light" rule and immediately switch off lights that are unused.

Colin is planning on adding some 120 vac appliances in the future. Christine is an assistant principal at a local high school and could do some work at home with a computer. Colin already has the wiring in for a 120 vac circuit to be supplied by an inverter. This circuit will power an IBM clone computer and printer. Colin is also looking forward to a few motorized appliances like a grain grinder. Colin and Christine use a hand powered Corona grain mill to make flour for their bread. Many times, I have ground fine flour (three passes through the mill) for two loaves of bread on just such a hand mill. This is a very, very good place for a solar powered electric motor. Fortunately, Colin has planned ahead and their system will support these additional appliances with no problems.

#### The System Hardware

Colin and Christine's PV system is as simple, direct, and effective as everything else in their home. Power is provided by eight photovoltaic (4 Kyocera and 4 ARCO) modules mounted on the roof. There is no backup generator. Photovoltaics supply the only electric power to this home. The photovoltaic array is wired in 12 Volt mode and produces 22 Amperes of peak current. Average power production is around 1,600 Watt-hours daily. A Trace C-30A regulator rides herd on the PVs and protects against battery overcharging and system overvoltage.

Power storage is in eight Trojan L-16 lead-acid batteries wired in for 12 Volt operation. The resulting battery stores 1,400 Ampere-hours at 12 VDC or 17.2 kiloWatt-hours of power. This battery stores enough power to run the home for thirty days of continuously cloudy weather. Cloudy periods this long just don't happen in southwestern Oregon. The batteries, regulator, and distribution panel are located in a garage in the west side of the house. This earth bermed room provides a temperate environment for the lead-acid cells and removes them from the living areas.

Power is distributed by an Alternative Energy Engineering power panel. This low voltage distribution panel provides fused hookups for all the home's 12 VDC circuits. It also contains the battery voltmeter and the battery ammeter. Use of a 12 Volt distribution panel makes the wiring both easy and safe.

Colin & Christine produce about twice as much power as they consume on a daily average. Battery storage is enough to supply twenty days of power with the array totally disconnected entirely. The net result is a stand-alone PV power system that cost about \$4,000. The local utility wanted about \$28,000 to hook up the grid to Colin & Christine's home. The day Colin and Christine plugged into the sun, they saved \$24,000 and

monthly power bills stretching out forever.

### Gardens

Colin and Christine grow large gardens. Inside their amazing world of heirloom plants lives berries, flowers, beans, potatoes, corn, tomatoes, and many other plants. Colin is very active with the local Tilth group. They grow ancient varieties of plants for seed and pass them around so that the strains are not lost. The garden is filled many heirloom strains such as "Howling Mob" corn and fava beans from the Aprovecho Institute. The storage room in the house is jammed with home canned garden produce for use in the winter.

The garden's house is also solar powered with a single SolarWatt 32 Watt PV module, four Trojan T-105 batteries, and a Sun Selector charge controller. This small system provides power for lighting in the garden house.

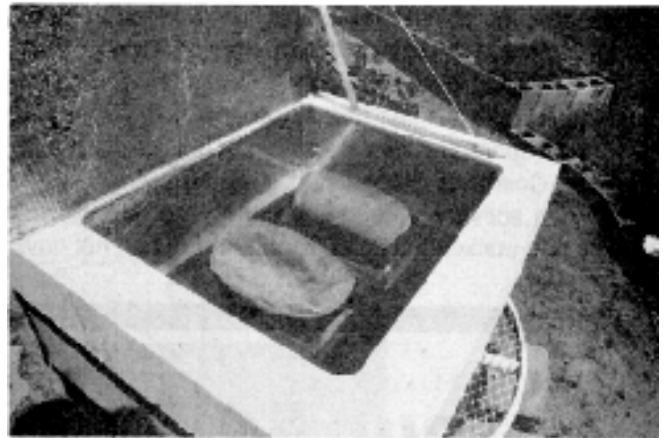
### Water Systems

Colin has constructed three water systems. They all use naturally available water from rain as their source. There are no pumps or electrical power involved in any of the three water systems. Domestic water is supplied by a rain harvesting catcher system located about 400 feet from and 40 feet above the house. A 20 foot by 20 foot metal roof catches rain water and stores it in two 1,500 gallon concrete tanks sealed with ferroseal compound. This rain-catcher system allows Colin to collect the water forty feet above the house. This provides water pressure for the home without using a pump. This system supplies the domestic water for the house, except for the flush toilet/septic system. The toilet is operated from rain water collected by the house's roof.

Colin has constructed, with the aid of his bulldozer, two large ponds on the property. These ponds are located about 20 feet above the garden areas. One pond is used to irrigate the extensive gardens, and the other pond is held strictly in reserve for fire protection. Capacity of both ponds combined is about 300,000 gallons— enough for even the driest summer. These pond refill themselves by rain and natural water run-off from the land. Colin spoke of his dream to turn one of the ponds into a wildlife area, filled with local plants and berries, for the local animals and birds.

### Colin, Christine, and their fuzzy friends

I often judge folks by the critter company they keep. In the case of Colin and Christine, they keep the company of some wonderful furry friends. They share life with a large, friendly sheep dog named Maggie and a minipig named Dandy. Dandy is a Vietnamese Pot Bellied Pig and is definitely part of the family. Dandy is allowed inside the



Above: two loaves of bread baking in a solar box cooker.  
Below: Dandy the minipig graciously accepts a few raisins from Christine. Photo by Richard Perez.



house and behaves like a perfect gentleman. He sits and snorts when he asks to be fed his favorite food in all the world— raisins. Christine told of training Dandy to sit before accepting food. It took one evening and Dandy had it mastered by breakfast the next morning. Dandy has a bed inside during the winter and a pen outside during the summer. Colin has constructed a watering bowl where Dandy can activate a lever and get a drink. Dandy also

has his own sunken tub outside for dunks during hot days. All in all, Dandy is the most personable pig I have ever had the pleasure to meet.

### **Homesteading**

Colin and Christine have worked out a division of labor used by many homesteading families. One partner works out and the other works in. Christine works out in her professional capacity of school administrator. Colin remains home to do the full-time job of homesteading. By adopting this division of labor they have the dual advantages of some cash income from one partner and many hours of homesteading labor from the other.

The key to Colin and Christine's success is sensible, appropriate use of what nature has offered them. They have aligned their lives so that each of them can work with their best skills. They have accepted natural and renewable sources for their food, water, shelter, and energy. They have surrounded themselves with a growing community of plants and loving friends.

As I sat eating a slice of their solar cooked bread, I thought to myself how very easy it is to just say "yes" to sunshine.

### **Access**

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