

## **Saving money, Saving the Earth**

### **Home tour shows how to conserve energy and water**

Sustainable Las Vegas wants to give area residents ideas about how to save money and conserve precious natural resources by improving their homes.

SLV's fourth annual Sustainable Homes Tour features local homes that provide examples of how electrical and heating bills can be reduced or even eliminated by using the energy of the sun as well as various conservation measures. One home on the tour actually *makes* money by using solar panels and selling the surplus electricity back to PNM! The homes also include greywater systems and rainwater harvesting to reduce or eliminate dependence on well water or city water.

Different designs and approaches are showcased in the homes chosen for the tour. One of the homes is a conventional home that has been extensively modified by the owner to be far more energy and water efficient. This home is a fine example of what owners of existing homes can do to reduce water and electrical usage.

**The first home** on the tour uses a passive solar approach. This architect designed home constructed in 2004 gets most of its heat from the sun using 13 south-facing patio door-sized windows. Winter sun (which drops low in the sky at this time of year) penetrates deep inside while appropriate roof overhangs exclude summer sun, which is higher in the sky. Successful passive solar design also requires a massive internal structure to absorb the sun's heat. A concrete floor with radiant heat as well as massive walls and plaster provide the mass here. The backup propane-fired boiler is rarely used but a wood stove is used most evenings.

A solar water heating system was added in 2007 and provides all of the home's hot water. Two glycol-cooled panels send heat to an 80 gallon storage tank.

Because the home was designed to be energy efficient with a tight building envelope and energy efficient appliances the home uses almost no fossil fuel and consumes only 200 kW hours of electricity per month.

About one year ago a 1.8 kW grid-connected PV system was installed. During its first year in operation it has provide all the electrical needs of the home and sold over 1300 kW hours back to the grid.

Rain water is collected from some roofs and used for landscaping. A vegetable garden employing drip irrigation was very successful. Greywater from laundry, shower and bathroom sinks is distributed to landscaping as well.

**The second home** featured is an Earthship. This owner-built home was undertaken as an experiment in conservation and simplicity. According to its originators an Earthship creates its own utilities including electricity, water and climate and is made using readily available and sustainable materials. (<http://en.wikipedia.org/wiki/Earthship>) Heating and cooling of the home are provided entirely by the sun. South-facing glass and a tight, massive building envelope do the job here as well. The home is earth bermed and partially earth covered. Ventilating skylights help keep the home comfortable in summer.

Electricity is supplied by a 1.5 kW off-grid PV system capable of producing about 250 kWh/month. Even this seemingly small system provides enough power for a conventional

refrigerator, two desk-top computers, a washing machine as well as lights, water pressure and small appliances. With a set of replacement batteries the system is performing even better, recovering more quickly after several cloudy days.

Central to the owners' experimentation was relying on catchment alone as their source of water. Could it be done in the arid Southwest? The answer is yes but not without some adjustments in life-style.

Rainwater is collected from all roofs, including out-buildings. Water used for drinking is purified using filters and ultraviolet light, but apart from that the plumbing is the same as for any home.

The home was built by its owners and they can tell you how labor intensive Earthship construction can be. But sweat equity can be its own reward and using recycled materials such as tires and bottles met their conservation objectives.

Additions to the home are built with highly insulating straw bales. However, lacking passive solar they do not heat nearly as well as the sunlit central home, which shows the added benefit of capturing the sun's heat.

Improving the performance of an existing home is the best way to save energy. **The third home** on the tour is a conventional home that has upgraded by its owners to conserve energy and water. This home in Ojitos Frios will give tour participants great ideas on simple strategies to improve the performance and comfort of their current homes.

Built in 1996, this Ojito Frios home formerly used an inefficient boiler to heat the radiant concrete slab floor. The owners replaced it with five glycol-cooled solar panels to supply space heat and domestic hot water. The system was expanded to seven panels recently and does the job for a family of six. A converted garage serving as a guest house is warmed by solar air heaters and requires little additional heat.

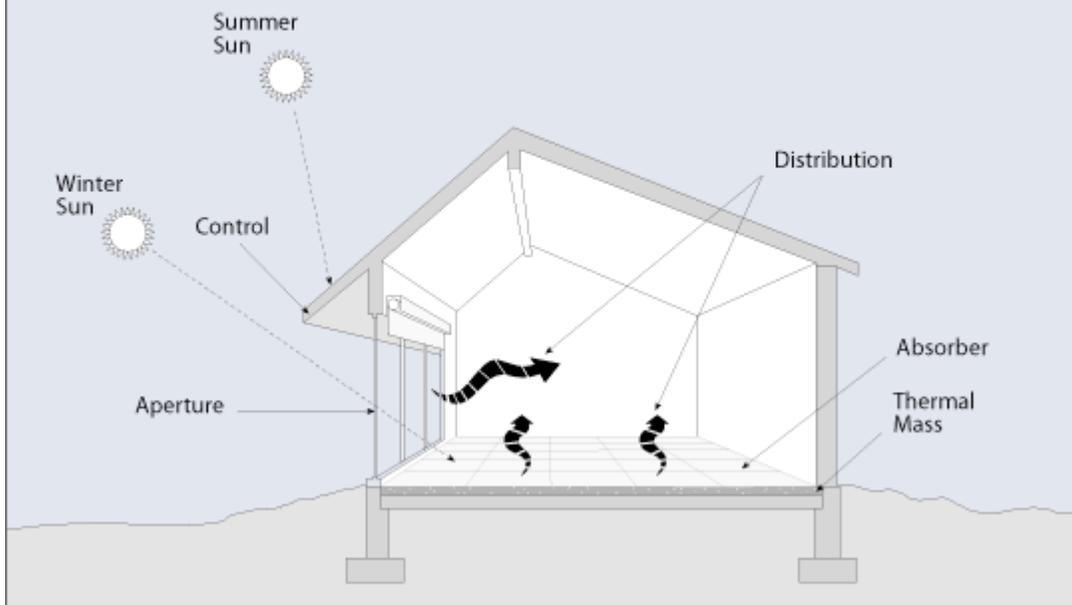
Severe water shortages afflicting the area were addressed by an extensive rain water catchment system. The family has relied solely on rainwater for all its needs for two and one half years, including 4500 gallons reserved for livestock and pets. Twenty thousand gallons of above and below ground tanks store water from the roofs. Water for the household is purified by passing it through a series of filters followed by ultra-violet light.

An addition to the home currently under construction has a concrete floor placed over four inches of rigid Styrofoam. Greywater from the bathroom will be sent to an aeration tank before distribution. A composting toilet will be installed. This entire project shows how careful water management can be accomplished; the family, including teenagers, uses 500 gallons per week.

**How to attend** - Sustainable Las Vegas' Fourth Annual Sustainable Homes Tour is on Saturday, January 14 from 9 a.m. until 12:30 p.m. and from 1 until 4:30 pm. at the Las Vegas Arts Council building at 140 Bridge Street. Since the homes are outside of the city, the tour includes van-pooling to the sites; a guide will describe the features of the homes and encourage discussion. A donation is requested to cover transportation costs. **Space will be limited** so reserve your place by contacting Emelie Olson by phone 454-3920 or by email [eolson@desertgate.com](mailto:eolson@desertgate.com). Reserved places will be held until 15 minutes before departure; you may sign up on the day of the event at the Arts Council.

The event is co-sponsored by the NMHU Conservation Club and Community First Bank.

## Five Elements of Passive Solar Design



## Earthship Design Principles

