Northern Arizona Solar Home

Flagstaff, Arizona

Residential

Wilderness home combines luxury with solar power

Background

You don't have to give up luxury to live in a solar home.

This beautiful house in the mountains north of Flagstaff, Arizona has every amenity – yet it's extremely efficient, using far less energy than comparable homes.

Located beyond the reach of utility companies, the home is, by necessity, built to create its own electricity and to minimize the use of trucked-in fuel. "We're excited about this project," says Andy White, who with his brother Charlie owns the Sedona-based custom installation company, AVDomotics. "The best way to protect the environment and wean ourselves off foreign energy sources is to simply conserve. With homes like this one, we're pushing the envelope through significant energy savings, while also demonstrating the reliability of the solar solutions."

Rustic luxury

If you were to visit this beautiful home, it would be hard to tell it was solar unless someone pointed it out.

The setting is striking. Deep in the Ponderosas pines of Northern Arizona, this home is rustic but large and comfortable, with high-tech systems.

Though the homeowners love the wilderness, they enjoy their technology. AVDomotics installed and programmed several systems from Crestron to make the home more comfortable.

Taking the homeowners' love of music and movies into consideration, AVDomotics designed a whole-house audio and video system based on the Crestron ADMS Intermedia Delivery System™, which provides simplified access to movies, music, satellite television and streaming sources such as Netflix®, Hulu® and YouTube®. They also installed an all-digital fiber-optic network and switching system to ensure the best possible picture and sound quality. It uses

Crestron DigitalMedia™ technology to provide a very high-bandwidth IP network for high-definition audio and video plus gigabit Ethernet for computer.

The home also features automated lighting and shading systems, which simplify life for the homeowners by illuminating whole sections of the house or specific pathways, for example from the bedroom to the kitchen, at the touch of a button.

Crestron touch screens control the audio, video, security and energy systems. "We pride ourselves on providing simplicity for the user," explains Charlie White. "If the least technical person in the household can't figure out how to play a movie or change the temperature just by touching a few buttons, then we've failed in our most important service."

Because of its rustic setting, the homeowners did not want the high-tech gadgets to stand out. "In this case we also would have failed if you noticed the technology when walking into a room," White adds. For example, the TV in the great room is hidden in a cabinet, rising up for viewing only when you're ready to watch. Touch screens are positioned conveniently, but where they might not be noticed. Most of the time the home-owners use their iPad® or iPhone® to control the electronic systems, using the Crestron Mobile Pro® app which mirrors the features of the dedicated touch screens.

Living off the grid

To provide the power for its luxurious systems, the mountain home uses a combination of solar electric panels, solar-assisted heat, and careful programming of its Crestron systems.

Power for the home is a hybrid of electric and liquid propane gas. On sunny days, all needed electric is generated by solar photoelectric cells located alongside the house, with the surplus stored in an array of high-tech batteries, providing electricity at night and on overcast days. If demand exceeds the batteries' capacity, a back-up propane generator kicks in.

To minimize the use of the generator, AVDomotics implemented a strategy known as electrical load shedding, putting off non-essential tasks until daylight hours. "For example, we have a deep-well electric pump for drinking water and additional pumps for septic and gray water systems. We are able to do all of the pumping while the solar cells are active, unless we run into several days of bad weather."

> " The shift between the solar electric and the generator is completely seamless, switching back and forth so quickly that there is no effect on electronic systems, not even a flicker to the lights."
>
> **Andy White,** Owner, AVDomotics

The Crestron lighting control system plays a large part in this strategy. "We have found that simply automating the lighting will save 10% or more on electric bills," White explains. "In a larger home or a commercial building, adding lighting automation can pay for itself quickly."

A second solar system circulates water through solar collectors on the roof. The sun-heated liquid passes through a heat exchanger in the mechanical room, preheating water for a boiler. A propane jet can take the water up to a higher temperature for circulation through the heating system, but much of the time it's not needed. The system also provides hot water for the kitchen and baths.

"It's important to understand that the homeowner is giving up nothing to accommodate solar power," adds Andy White. The heating is a high-end Uponor radiant system, which warms the floors in every room. At 8,000 feet, the homeowner doesn't need air conditioning, but instead uses fans, also integrated into the system, to circulate outdoor air on warmer days.

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Very secure

Security is of utmost importance to the homeowner since the home is mainly used during the summer and for weekend getaways. "We integrated our systems with a standard alarm system, but it's about a 30-minute trip for the Flagstaff police, assuming the roads are clear," White explains.

For that reason, the general contractor installed Roll-A-Shield® security shutters on all the doors and windows, which AVDomotics integrated with the Crestron automation system. "It's kind of like closing a garage door over every potential point of entry, and that makes it a lot harder to break in."

The homeowner can open and close the shutters remotely using his iPad or iPhone, so he can allow contractors or cleaning service into the home as needed, even if he's traveling abroad. Security cameras also provide for local or remote monitoring of the perimeter of the home. It's useful for checking in on the house visually but can also be fun for watching wildlife.

Help is on the way

Because the solar technology is so new and the home so remote, it's important to monitor it constantly to anticipate any problems. "The Crestron system sends us an email twice a day reporting on the various sub-systems, battery levels, water and gas tank levels, and the health of the solar inverters. If a problem develops, it alerts us," White explains.

This built-in intelligence takes away any worries about using these cutting-edge systems. "The watchword on this getaway home is 'easy,'" White adds. "The whole purpose of the automation system is to allow the homeowners to relax."