



THE SELF-RELIANT HOME

BY TORREY KIM | PHOTOS COURTESY OF WINDIMAGERY, LLC

CHECK OUT THIS ARCHITECTURE THAT'S OFF-GRID-READY

WHEN THE POWER GOES DOWN IN YOUR NECK OF THE WOODS, ARE YOU RUNNING FOR A HOTEL ROOM SO YOU CAN STAY WARM AND CONNECTED TO THE OUTSIDE WORLD?

You don't have to. If your home is designed and built properly, you can be self-reliant and off-grid—no matter what is affecting the rest of your town.

The key to ensuring that your home can protect you even during fires, floods or power interruptions is to start with the right architecture, according to Taylor Webb and Bob Phillips, owners of Manifold Design and Development. The company focuses on high-performance, super-sustainable building for residential and commercial projects so owners can be off-grid-ready at all times. American Survival Guide sat down with Webb and Phillips to find out how our readers can benefit from their company's expertise.

ASG: What does it mean for a home to be “off-grid-ready?”

Webb: It can go from being completely self-reliant to just having a solar system for backup if the power goes out. We just finished a home that has the potential to be off-grid. It is designed to have very low energy loads; it has solar hot water and photovoltaic panels to produce its electricity and heat beyond what can be harvested from the sun and the internal gains (occupants, appliances, etc.). To be fully net-zero, the owner just needs a battery backup for those times when energy isn't being produced from the sun. People can decide how far off-grid they want to be, and we help them find the resources to get there. The benefits of this are endless. Homeowners can use up to 90 percent less energy for heating and cooling, which lowers the need for energy—as well as the bill—significantly.

FOCUS: INSULATION, VENTILATION

ASG: Which types of sustainable strategies are employed to make a house off-grid-ready?

Phillips: When designing the house, we focus on how to reduce the energy needed for it; we ensure that the insulation is sound throughout the walls, floors, windows and roof. We also design to limit the amount of air leakage through the walls and windows. Better insulation and improved air-tightness result in a much higher level of efficiency. The higher the efficiency level, the less outside inputs it will require in terms of energy needed.

“THE HIGHER THE EFFICIENCY LEVEL, THE LESS OUTSIDE INPUTS IT WILL REQUIRE IN TERMS OF ENERGY NEEDED.”

—BOB PHILLIPS, MANIFOLD DESIGN

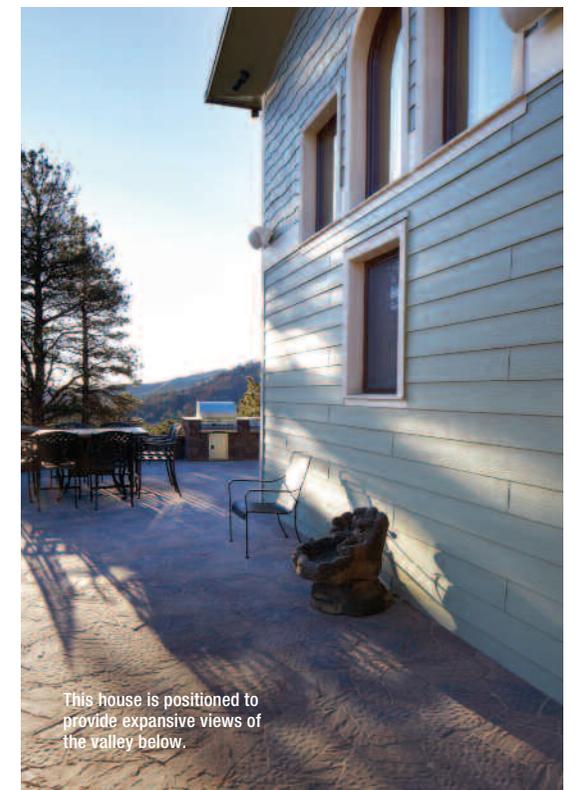


PHOTO COURTESY OF MANIFOLD DESIGN

Walls were constructed with a second, 12-inch-deep insulation layer outside of the air-sealed sheathing to provide a superior building envelope. R-70 walls and roof with an R-50 floor and air-tightness tested at roughly 10 times better than a standard house results in approximately 80% less energy demand than a typical house; this is offset with a small photovoltaic and solar hot water system.

PASSIVE HOUSE DESIGN

Manifold Design uses the philosophy of “Passive House” construction to ensure that it builds efficient, self-sustaining houses. The philosophy behind Passive House design is that the home uses the most “free” energy so it can rely less on outside energy sources. For more on Passive House design, visit the Passive House Institute's website at www.passivehouse.us.



This house is positioned to provide expansive views of the valley below.

The idea is to put your money where it has the most impact and longevity, so we advise people to focus on the building envelope—good windows, roof and insulation. Quality building envelopes can last 200 years and solar systems will only last about 30, so the money should go toward the most longevity and most impact. If you can knock your energy needs down low enough, you don't have to rely on bringing in gas; the house can run entirely with site-produced electricity generated by a much smaller system (PV panels, generator, wind, etc.).

Webb: Even on a more basic level, depending on the climate, the Passive House concept means the house will have such a low load-requirement that just the people in the house and their activities, like cooking and showering, along with solar gains from the windows, can sometimes generate the only heating necessary. A lot of the energy load in a house is for heating, so instead of putting in a big furnace, we pay attention to the quality and position of the windows so you get a lot of free heat and light from the sun and then shading in the summer that blocks it. In climates where cooling is more important, using windows with a low solar heat gain coefficient (SHGC) limits the amount of heat gained from the windows during the summer.

Phillips: Another important thing to keep in mind is the ventilation system. When a super airtight house is built, it will need outside air to replenish what the occupants use. This not only helps the house to be healthier and to have more oxygen in it, but it's also a means of filtering any outside pollutants and contaminants for the occupants. We use a heat recovery ventilation system to bring in outside fresh air, filter it, transfer the heat from the outgoing air to the incoming air, distribute the warm fresh air throughout the house and then exhaust the cooled, stale air back out.

ADD AN INDOOR GARDEN

ASG: Many of our readers grow their own food. Is there a way to integrate that into the home design?



The main space of this home is filled with natural light that provides almost all of the heat required by the home in the winter. In the summer, the sun is shaded by overhangs.

IS SACRIFICE REQUIRED?

You may think that a home can only be energy efficient if it's a tiny, one-room box, but the reality is that you can create a net-zero home at any size.

"A good house will balance it out, no matter the size," Phillips says. "I was in a home last summer when it was 103 degrees out, but inside it was 72 on the first floor and 74 on the second floor; the home has no air conditioning system. Likewise, in the winter, the owner uses a couple small plug-in heating units to offset what energy cannot be gained from the activities in the house and the sun during the coldest days, and it isn't a small house."

Windows are positioned to provide views of the surrounding mountains.



FIRE AND FLOOD RESISTANCE

Not only can you make your home self-reliant, but you can also use it to protect yourself and your family against natural disasters such as floods and fires.

"If you're in a fire-prone area, we can integrate materials and construction details during the home-design process to resist fire," Webb says. "We can use non-combustible materials and design an airtight ventilation system in addition to sealing off any holes in the home or insulation that would allow smoke to travel in to the house."

If a fire is approaching the house, the homeowners can close out the ventilation system, or any other openings, and the smoke fumes can't get into the home.

Manifold also offers flood protection on its designs.

"We can use materials that aren't susceptible if submerged in water," Phillips says. "The insulation and wallboards would be of types that wouldn't be affected by water and should be resistant to mold."

"PEOPLE CAN DECIDE HOW FAR OFF-GRID THEY WANT TO BE, AND WE HELP THEM FIND THE RESOURCES TO GET THERE."

—TAYLOR WEBB, MANIFOLD DESIGN

Webb: Absolutely. If the client wants a kitchen garden or greenhouse, we'll integrate that within the design of the house. You typically don't need quite as much light as people think to grow plants, so instead of doing that giant plastic translucent box that leaks energy in the winter, you can put in fewer windows—but make them better windows—and add light shelves to bounce extra light back into the windows. The window ends up being a light and heat source during the day and an energy source for growing plants.

Phillips: We try to get the full picture of what the homeowner wants to grow because the more plants you bring in, the more moisture you bring in. We look at the wall systems in a special way to design the walls so the moisture from the plants won't cause the walls to get moldy. We pay a lot of attention to how the house breathes.

ASG: Many people believe that building in this kind of net-zero manner is more expensive. Is that true?

Webb: In the long run, that's more of a myth than reality. Each project is custom and we work toward what the client wants. If you're building for yourself, you can set your budget and therefore your priorities. If you're concerned about efficiency, you'll get better walls and windows but less fancy countertops. Set your budget and we'll do what we can to give you the best possible house that meets your needs. Over the long-term, there is a significant return on your investment in efficiency because utility bills and maintenance costs are so much lower. **ASG**

FOR MORE INFORMATION

► Manifold Design is based in Colorado, but its staff members will go nationwide to design net-zero homes. Want to build your own place but aren't sure where to start? The company's architects can also serve as consultants to get you on the right path in creating your sustainable house. Visit www.manifoldinc.com for more information.