

Vacation Homes That Pay Their Way

Low-Impact Vacation Homes

These four projects not only leave light footprints, they serve as power generators when not in use.

BY SUCHI RUDRA

MAYBE IT'S A GREATER NEED for an escape from the daily routine, maybe it's an investment for the future. Whatever the reason, second and vacation homes are rising in popularity. According to a 2011 report by the National Association of Home Builders (NAHB), around 7 million housing units that qualify as second homes exist in the U.S. A 2014 survey by the National Association of Realtors puts that figure at 8 million. The resources required and energy consumed by these millions of "extra" homes, even when left vacant, is creating an enormous environmental impact. Can they ever be justified?

For commercial buildings that consume a large percentage of the country's resources, it's clear why the Department of Energy has created an initiative stating that by 2025, all new commercial construction must be net zero—and California is requiring the same by 2030. So why shouldn't second homes, which serve as part-time residences and often sit vacant half the year or more, also be built to net-zero-energy standards?

For the most part, building a net-zero-energy home is still perceived as cost prohibitive; there's a large investment in a renewable system, and around 10 years of waiting to see any return. But this is quickly changing as technology evolves and states offer better green building incentives and rebates. Those builders who turn to net zero for eco-minded clients are drastically minimizing energy bills and designing for low maintenance—and of course treading more lightly on the environment. There are other factors to consider, too. In real estate, location is everything. But when it comes to second homes, location also determines how far the homeowner and his or her visitors will have to travel, which impacts the carbon footprint left behind. Is the house near an urban hub, or only accessible by plane? Are there walking/biking/public transport options within the community and in the surrounding areas?

As builders continue to experiment, net-zero homes that integrate solar and wind power will only get smarter. In the not-too-distant future, houses will not only be able to completely power down, like a computer, they will serve as "power houses," generating energy whether occupied or not. These four projects offer a glimpse of that future, today.

Low-Impact Vacation Homes Checklist

When planning for the construction of a vacation or second home, this list of guidelines will help you minimize its footprint—and even turn it into a "power house."

- Super-efficient building shell and windows.
- Low-impact HVAC (heat pump or geothermal).
- Sufficient photovoltaics or wind turbines to run all mechanical systems.
- Safe, low-impact septic systems (composting toilets or the next best thing).
- Low-maintenance roofing such as standing seam metal, clay tile, concrete tile or recycled rubber.
- Low-maintenance siding, such as fiber cement, stucco, manufactured stone or brick.
- LED lighting throughout.
- Water-conserving fixtures.
- Energy-efficient and appropriately-sized appliances.
- Remote control and monitoring of energy systems.
- Appropriate size.
- Siting that minimizes impact to sensitive habitats.

Low-Impact Landscaping

- Drought-tolerant, native plants—no lawns!
- Automatic drip irrigation systems.
- Rainwater cisterns and/or graywater irrigation.
- Porous driveways and walkways.
- Natural swimming pools only.



PHOTO CREDIT: TRAVIS LAMINACK PHOTOGRAPHY

PHOTO CREDIT: COURTESY HELIOS NW ECO-HOUSE

Mindful Vacationing Helios NW Eco-House

BEND, OREGON

Attractive Vacation Package.
Natural materials, a modern
aesthetic and energy and water
conservation features helped
earn the award for Top Vacation
Rental in Bend in 2012.

Low-Impact Vacation Homes

WHEN SARAH AND HER HUSBAND (surnames withheld) purchased what is now the Helios Eco-House in Bend, Oregon, the primary goal was to achieve LEED standards. But after doing much research, the biotech and engineer couple discovered that “if you’re willing to go a little further, it’s really painless to go net zero.”

When the couple purchased the 2,145-square-foot house in 2010, construction hadn’t been completed due to the drop in the housing market in 2006. Sarah considered this a unique opportunity.

“It’s one thing to read about green building, and another to immerse yourself in it,” she says. By March 2011, the couple completed construction on the three-bedroom, three-bath house to achieve LEED Gold for Homes (the first in Oregon), and the property began to operate as a short-term vacation rental. The rental income was immediately reinvested into the house, including the installation of the PV array, and by June 2011, Helios Eco-House had achieved net-zero energy.

“It’s the only net-zero property in the area that I know of,” Sarah says.

Powering the home is a 2.59-kW grid-tied photovoltaic solar panel array on the roof. Each solar panel has its own microinverter, which leaves the whole array unaffected if one panel breaks down. “Little decisions like that helped maximize what we’re doing,” Sarah adds.

Typically, the house is able to send back excess energy into the grid on a monthly basis, except for a small dip in January and February, depending on the snowload. But Bend is located in what’s known as a “high desert” climate and enjoys a prime solar environment, with over 300 days of sun a year. A display in the garage and online allows visitors to monitor the performance level of the PV array.

Guests can leave a minimal carbon footprint by walking to local restaurants, cafés and markets and cycling or taking a shuttle bus to nearby attractions. The house also maintains a “mid-century modern” aesthetic, complete with vintage furniture, which allows guests to try out an eco-friendly lifestyle without sacrificing ease or comfort.

“People can stay very comfortably and not have a lot of waste as a result of their stay,” says Sarah. “And other guests come because they are specifically interested in the concept of this house.”

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Air Quality

No-VOC YOLO paints used throughout; cabinets made from wheatboard; non-toxic sealers on wood flooring; fresh air exchanger.

Exterior Materials

Recyclable metal roof; cedar siding from Oregon forests finished with TimberPro UV water-borne stain containing no VOCs.

Walkability

Helios is located in a pedestrian-friendly neighborhood, close to markets, parks and restaurants.

Renewables

2.59 kW PV array from Sunlight Solar Energy.

Heating and Cooling

Radiant floor heating; high-efficiency (96%) boiler; ductless mini-split air conditioner.

Windows

Low-E, aluminum-clad wood windows from Sierra Pacific.

Water Conservation

Multi-level and trellised gardens maximize greenspace, xeriscaped with drought-tolerant plants and no lawn area.



Novel Remote Sensing Technology. The Wally moisture detection system uses existing electrical wiring within a home's walls in tandem with sensors to detect leaks and changes in humidity. It uses a fraction of the energy of wireless communication systems.

Remote Control

Lowering Energy Bills and Maintenance in Vacant Homes

Installing a remotely controlled thermostat can help minimize energy costs in a vacant home. Google-owned Nest and Honeywell's *Lyric* thermostats allow homeowners to remotely program and monitor the indoor temperature from mobile apps or on the web, offering vacation settings and energy consumption reports. Ecobee and Venstar also offer wireless thermostats.

Monitoring the indoor climate can help in the prevention of mold growth and water leaks. Karl Mutchnik, portfolio manager at Trane, offers some tips:

- When running a heat pump in the cooling mode, overcooling may cause condensation on cold surfaces. To reduce likelihood of condensation during cooling operation, set it higher to conserve energy. In humid climates, refrain from operating the heat pump system in cooling mode with continuous fan operations.
- Eliminate sources of moisture; for example, decorative waterfalls, dripping faucets and running toilets.
- Turn off all ventilation and shut off the water supply valve. If you cannot shut off water supply, install an automated water sensor underneath the domestic water heater, washing machine and toilet tanks to detect and alert you of water leaks. Install a motorized water valve that can shut off water supply automatically, or shut off the valve remotely if a water leak occurs. (New on the market, the \$300 Wally home sensor system tracks water leaks, humidity, temperature and include six sensors. *WaterCop* offers various automatic water shut-off valve systems for under \$400.)
- Leave closet doors open to provide natural circulation during humid heating conditions.
- Heat pumps should be properly sized for cooling functions. Additionally, variable-speed systems should be installed with compatible variable-speed indoor blowers to provide necessary dehumidification at low cooling capacities. If needed, install an energy-efficient, whole-house dehumidifier.
- Select a properly sized air conditioner or heat pump with a high cooling set point. The most energy-efficient solution is a tight house with minimized infiltration. Additionally, one can install mechanical ventilation when needed.

Site Sensitivity South Mountain Company

**CHILMARK, MARTHA'S
VINEYARD, MASSACHUSETTS**

WHEN KAREN AND DAVE DAVIS decided to build a second home in Martha's Vineyard with absolute minimum environmental impact, they chose to work with local design/build firm South Mountain Company. Founder John Abrams and his team had been building finely crafted and sustainable houses since 1975, and quickly realized that the site for this particular house near Chilmark Pond was a designer's dream: a south-facing slope with wonderful views of the south shore. However, this very slope and the narrowness of the site also proved challenging to work around.

"Zoning restrictions regulated the height, roof pitch and footprint, and we also wanted to be very conscientious of the view of the building from the beach and the neighbors downhill," says Abrams. "Additionally, the traffic on South Road moves noisily by the house just to the north."

These factors led the team to build into the hillside, burying the side of the house that is exposed to the road and winter winds, and opening up the house on the south side "like a flower" to the sun and the view. A large part of the 3,300-square-foot, four-bedroom house is below grade, making the house feel smaller than it is. By using the basement as living space and shifting it out from under the first floor, Abrams says the house becomes less massive from the south and the feeling of being in a basement is diminished. Part of the house has a living roof, which replaces some of the rain absorption area that is typically removed when a building covers the land.

Abundant daylight is delivered to the northernmost rooms and basement through a clerestory that arches in the middle "to mimic the path of the sun," and via strategically placed interior windows and glass block in the floor. Good daylighting, as well as efficient appliances and fixtures, helps to reduce electrical demands.

To minimize fossil fuel use and energy consumption while maximizing comfort and simplifying operation, South Mountain focused on creating a super energy-efficient building envelope. Combining this with passive solar strategies allows the house to be left unheated in the winter without freezing. The envelope also keeps the house cool in the summer—and with the help of ocean breezes, there's no need for air conditioning.

Solar energy from a PV solar array on the garage roof is harnessed to heat water and produces enough electricity to offset household consumption, including the electricity that was consumed during the home's construction. The solar electric system was sized to match predicted future energy demand of a part-time residence, but can be upgraded if the house is occupied full time.

Abrams finds that building net-zero houses, at least locally, tends to cost 7 to 10 percent more in terms of initial capital investment than a typical house built to code, but the investments pay off. Since March 2008, the Davis home has consumed 39,950 kWh (6,323 kWh/year) and generated 44,708 kWh (7,077 kWh/year). The solar has net metering, so the family receives energy from the grid as needed and exports the excess.

Most materials in the building are salvaged, procured from renewable sources or are easy to recycle. The materials were specifically chosen to be timeless and "not necessary to replace once out of fashion," Abrams adds.

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Functional Design. Clerestory windows and glass floor tiles maximize natural light; the terra cotta tiles function as thermal mass.

Renewables

6 kW solar PV array by SunPower; propylene glycol solar thermal system.

Siting

Passive solar orientation includes ample south-facing windows with large overhangs; north side is built into hillside; tile floor functions as thermal mass.

Envelope

Ten-inch walls measure R-44 and include a combination of closed cell spray foam and blown-in cellulose insulation; windows are low-E triple paned.

Water Conservation

Composting toilets by Clivus Multrum; graywater system used to irrigate landscaping; green roof captures stormwater.

Salvaged Materials

Handrails and newel posts made from logs, including driftwood; other sources of wood include redwood from old brewery tanks and waterlogged cypress from southern swamps.

Exterior

Maintenance is kept to a minimum with high-quality materials and no exterior paint.



Solar Power House SheaXero by Shea Homes

PEORIA, ARIZONA



A Boon for Boomers.
The Trilogy communities cater to Baby Boomers, and attract customers with the promise of no electric bills.

WHEN ILLINOIS RESIDENTS Dennis Kruepke and his wife decided to purchase a second home in Arizona to be closer to their daughter and grandkids in California, they were instantly intrigued by a gated 55+ community which guarantees “no electric bill.” Shea Homes in Peoria, Arizona offers net-zero-energy homes, which the builder dubbed “SheaXero,” in its Trilogy community of 2,400 homes. Once the Kruepkes settled on specific features of the *Veritas Genova* model they had chosen, the 2-bedroom, 2.5-bath, 2,180-square-foot home took about six months to build.

All homes within the Trilogy community are now built with a solar array, but at the time of the Kruepkes’ purchase, the couple was given an option to lease the solar power generation system. Excited by the prospect of having an eco-friendly home that would also save them money, Dennis agreed to a 20-year lease. As part of the agreement, SolarCity, the company installing the solar array, guaranteed the amount of solar energy the system would provide.

“They didn’t care how much time I’d be living in the house. The estimate was based on historical information,” Dennis says.

As advertised, the Kruepkes’ electric bill is indeed nonexistent. For the months of May and June of this year, the house consumed 277 kWh, for a total of \$13.58, but the couple also received an electric credit of 1,045 kWh. Dennis found that the usual electric bill in Arizona averages from \$300-\$500 a month.

“We’re averaging around 1,000 kWh per month going back into the grid, so we are living off the credits from last year. And at the end of the year, we will get another group of credits for the rest of year. I’m not paying any cost of electricity because of the solar,” Dennis explains.

Although the couple is only at the Arizona home four to six times a year, more frequently in the winter, Dennis says he plans to spend more time there as he gradually cuts back on his work.

“For the cost difference over the long run, a new property that was energy efficient was the right way to go,” Dennis says. Because it would be a part-time residence, and because the couple didn’t want to worry much about maintenance from far away, they felt that a newer property would be easier to take care of. While they’re away, Dennis monitors the lights, controls the thermostats and locks the doors from his iPhone.

“I spent more than I had planned on because of all the energy-efficient features, but I believe that you get immediate payback,” Dennis says. “And when you sell the property, you’ll get additional payback.”

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Renewables

PV array provided with lease from SolarCity.

Smart Features

Occupancy and dimmer switches.

Energy Management

Schlage *LiNK* wireless-remote home management system.

HVAC

Trane 14 SEER HVAC system, 90 percent energy-efficient Trane forced-air gas heating.

Appliances

Jenn-Air Energy Star kitchen appliances.

Envelope

Dual-pane low-E3 vinyl windows, blown-in wall insulation and cathedralized attic insulation.

Sharing Your Home in the Sharing Economy

Sharing your home—and making a little money in the process—has never been easier, thanks to the existence of owner-direct rental sites like Airbnb.com and FlipKey.com. These web-based services are helping second homes that would otherwise remain vacant stay occupied—and bringing in extra cash for homeowners.

Signing up and creating a profile with any or all of these sites is pretty straightforward, but there are several key differences in cost.

You can list your property for free on both Airbnb and Flipkey; each site will take a 3 percent processing fee for every booking you receive.

VRBO (part of the HomeAway company) offers two options: you can pay an annual fee of \$349 to list your space, which means zero processing fees for any bookings you receive, or you can list for free, but pay a 10 percent fee per booking. For a worry-free, hands-off listing, the site team will take over your listing, and you pay a 13 percent fee for each booking.

For a listing on the international community of SabbaticalHomes.com (which also facilitates home exchanges and house sitting), academics pay \$45 for 14 months, or \$65 for non-academics.

Before listing, be sure to understand the rights and regulations of each site.

RESOURCES

[Airbnb.com](#), [Flipkey.com](#), [VRBO.com](#), [SabbaticalHomes.com](#)



PHOTO CREDIT: COURTESY SHEA HOMES

Harnessing the Wind Net-Zero Casita by Ferrier Custom Homes

FORT WORTH, TEXAS

Smart Siting. The Casita was sited to maximize shade from the existing 60-foot trees and 30-foot shrubs “to keep the hot summer sun out of the house—my number-one rule in our hot Texas summers,” says builder Don Ferrier.

PHOTO CREDIT: TRAVIS LAMINACK PHOTOGRAPHY

WHY PAY BIG UTILITY BILLS for a home that’s only occupied part time? This was the question that led Kevin Eden to incorporate wind power into his lakefront cabin, resulting in a net-zero-energy “Casita” along Eagle Mountain Lake near Fort Worth, Texas.

When green builder Ferrier Custom Homes entered the scene in 2010, determining the client’s lifestyle was important to the energy modeling process. Since the two-bedroom, two-bath house was not meant to be a full-time residence, Don Ferrier, the firm’s founder, inquired about the client’s habits:

“How often do you open the windows to delay turning on the AC? How many days of the year do you plan to occupy the home? Will your family occupy it more during the summer when temperatures will be the highest?”

It’s more cost-effective to conserve energy than to produce it; Ferrier always begins his homes by maximizing energy efficiency

and then adds renewable energy systems to make the final jump to net-zero energy—in this case, a 45-foot-tall, 3 kW *Skystream* wind turbine, at a cost of \$16,500.

Because the client wanted the 1,015-square-foot Casita to look like it had always been on the lot, materials were chosen for their rustic appearance. Ferrier’s near-zero-energy homes tend to cost \$160 to \$180 per square foot, but certain client-requested elements, like sourcing and transporting reclaimed siding and beams from a specific company in California, increased the building costs from \$240,000 to around \$300,000.

“A similar project could be built for less than this, as well,” says Ferrier. “It just hinges on your priorities—level of energy efficiency, design, finish out, etc.—and how that meshes with your budget.”

While Texas still lags in the incentive and rebate department, the client was able to take advantage of some rebates offered by his electric power company, as well as federal government tax credits. **GB**

Roof

The corrugated Galvalume steel roof contains over 50 percent recycled material and reflects 70 percent of the sun’s rays.

Framing

Structural insulated panels (SIPs) by FischerSIPs used in the 6-inch walls and 10-inch roof were made with OSB comprised of recycled wood chips and an insulation core made from re-ground EPS.

Heating and Cooling

Seisco tankless water heater; high-efficiency Carrier air conditioner with Energy Star programmable thermostat.

Appliances and Fixtures

Energy Star appliances; ultra-low flow faucets and dual-flush toilets.

Water Harvesting

Rain barrel tanks around the house are used to water plants and save treated potable water.

Reclaimed Wood

Reclaimed barn siding used for exterior siding; 100-year-old front porch beams; 150-year-old subflooring reclaimed from chicken coop.

Siting

Existing house pad utilized; passive solar orientation maximizes shade from existing trees and shrubs.

Renewables

Grid-tied 3 kW *Skystream* wind turbine.

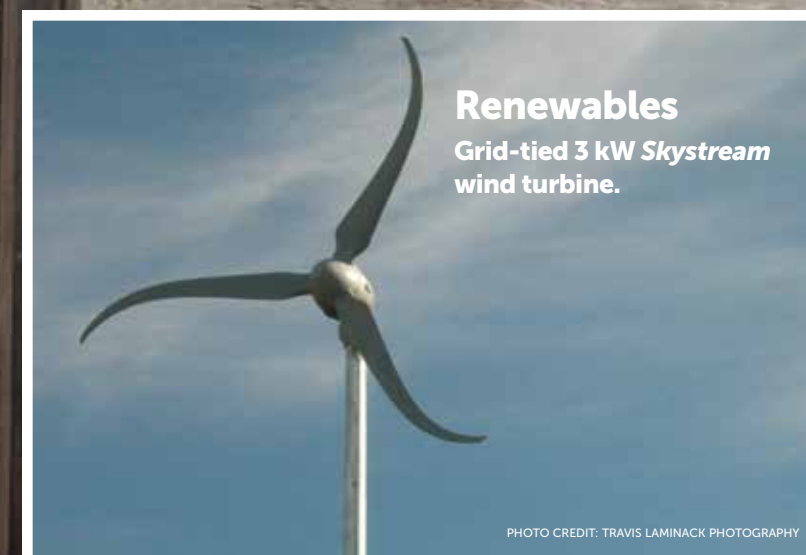


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