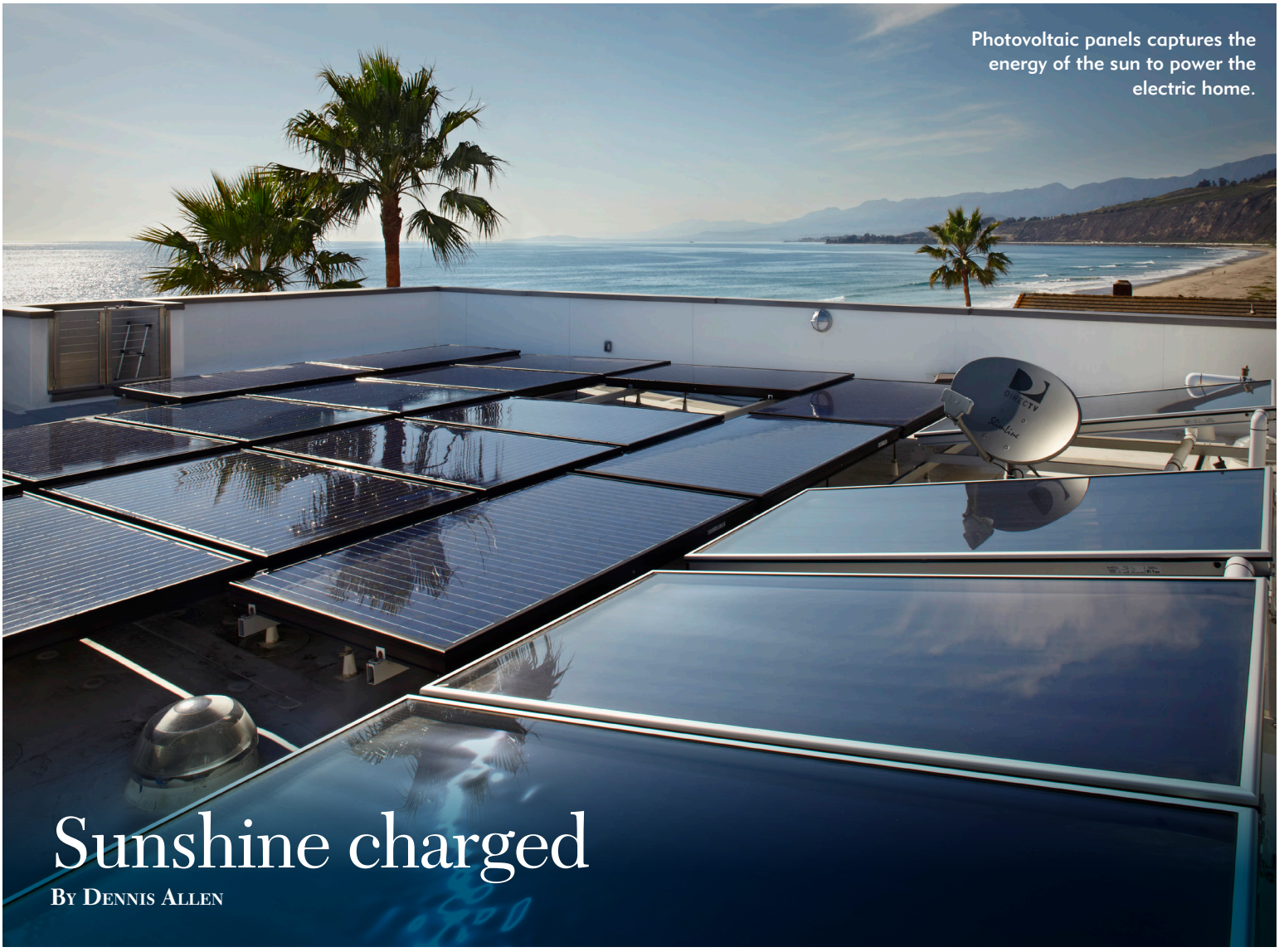

Photovoltaic panels captures the energy of the sun to power the electric home.

# Sunshine charged

By Dennis Allen

Harnessing the sun for our electricity, hot water, and space heating is practical and cost-effective, whether remodeling or building from the ground up. After maximizing use of the sun through passive solar design, consider going all electric, since some or all your electricity can be site-generated. When pursuing this strategy, it's most cost-effective to reduce electrical loads (LEDs, Energy Star appliances, etc.), as fewer photovoltaic panels will be needed.

Heat pumps fit nicely into this strategy. They can heat or cool a home, provide domestic hot water, refrigerate your food, and even dry your clothes. Heat pumps use electricity to move heat from one place to another instead of generating heat directly. Their high efficiency results from their capacity to transfer more energy (heat) than the energy they require to operate. They're rated by COP (coefficient of performance), the ratio of useful heating or cooling provided compared to the energy input. Although they've been around for many years, recent improvements greatly increase their efficiency, achieving COPs in the 2-3 range (compared to 0.8 for efficient gas furnaces or water heaters). Variable-speed motors and scroll compressors in lieu of piston compressors are key recent advances that lower energy consumption, minimize noise, and reduce maintenance. Heat pumps work best in moderate climates.

For the non-scientist, heat pumps conjure up notions of alchemy: extracting heat from already cold outside air and transferring it inside to heat the home, or when it's hot outside, reversing direction to act like an air conditioner, removing heat from the home.

Heat pump appliances such as refrigerators, dryers, or water heaters have condensers built in (water heater condensers can be either built in or located outdoors). Space-conditioning heat pumps always have two main components, an outdoor condenser and an indoor air-handling unit. In recent years, mini-split or ductless units have become popular because of their small size and zone heating/cooling capabilities and significantly reduced operating costs. Ductless systems offer multi-stage filtration that can drastically reduce dust, bacteria, pollen, allergens and other particulates in the air.

Roughly eight million domestic water heaters are sold in the US each year, 80 percent on an emergency basis when an existing unit starts leaking. In such circumstances, owners reflex to lowest price and quickest replacement. The most sensible course, however, would be price plus operating cost, where heat pump water heaters have a big advantage. Such heaters convert a given amount of input energy to about four times more hot water than a gas or electric water heater. The only caution is that heat pump units have a slower recovery time.

Heat pump equipment costs the same or more than comparable natural gas equipment, but the operational savings add up rapidly, especially if run off sun-generated electricity. The super efficiency, along with tax credits, makes it the more economical choice. I'm convinced that the all-electric home run off the sun is the future.

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