

CALIFORNIA RANCH HOME GETS NET ZERO ENERGY CERTIFIED

JAEGER SOLAR ELECTRIC ECONOMICS.

1. Solar electric system cost after incentive: \$19,917.
2. Cost added to 30 mortgage at 5% is \$107 per month.
3. Roof space required: 429 sq. ft.
4. Amount of electricity produced per year: 11,100 kwh.
5. Fixed cost of solar electricity provided for the next 30 years is \$0.116 per kwh.
6. Electric rates provided by local utility company range from \$0.13 to \$0.47 per kwh and increase on average 5% per year.
7. For similar size house in similar location monthly utility cost would be \$283 per month. (Mortgage costs are tax deductible but utility payments are not.) Jaeger's after tax savings will be over \$300 per month. His accountant will also be very proud of him.



The very quiet Daikin Altherma air to water heat pump.

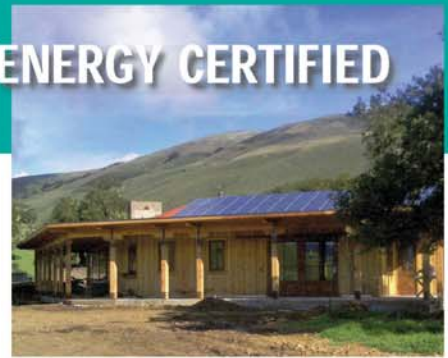
When building contractor and cattle rancher Bryan Jaeger was first planning to build his rustic home on a working cattle ranch on 146 acres in the heart of Carmel Valley, Ca. he did not consider "going green". It wasn't until his environmentally minded daughter, Michele, convinced him to go with her on a solar home tour she heard about at school that he started to change his mind. "I thought it would be too expensive," he explained, "Or that I would have to make sacrifices in my design."

"I thought it would be too expensive."



DESIGN AND LIFESTYLE NOT AFFECTED

Shortly after the tour, Jaeger was convinced that his home could be solar powered when he attended a Net Zero Energy seminar presented by David Knight of Monterey Energy Group MEG), a mechanical engineering and energy efficiency consulting firm based in Pacific Grove, CA. Knight is also the founder of Net Zero Energy Certified (NZEC), a consulting company that is in the process of certifying over 60 net zero energy buildings. Knight explained the simple concept of net zero energy as "Your home producing the same or



The Jaeger residence, which is Net Zero Energy Certified, is the site of the first California installation of the Daikin Altherma™ air to water heat pump.

more energy than you consume on an annual basis." Knight's presentation convinced Jaeger that his home would be a perfect candidate for net zero energy and Knight assured him that the style of his home or his lifestyle would not be affected.

DECREASE IN COST OF SOLAR ELECTRIC

Knight, his partner Abe Stallcup, P.E. and the staff at MEG, designed a grid tied solar electric system for Jaeger's home that was sized to produce the energy required for all lights, appliances, heating, cooling and domestic hot water. MEG also designed the radiant floor heating system and ceiling mounted air conditioning system. According to Knight, "Recent dramatic decreases in the cost of solar electric systems combined with the introduction of efficient electric heating and cooling equipment makes constructing or remodeling buildings to achieve net zero energy practical and affordable. In 2009, the cost after incentives of grid tied solar electric systems came down by almost two thirds.



PV power inverter installed by Jim Dunn.

HOW NET ZERO ENERGY CERTIFIED WORKS

1. Mail or email building plans to NZEC.
2. NZEC either reviews or performs energy compliance calculations.
3. NZEC issues standard and non standard power consumption worksheets for the exact floor plan provided.
4. Homeowner reviews power consumption worksheets and can increase usage but not decrease.
5. NZEC calculates kwh required annually and sizes solar system to provide that amount.
6. During construction NZEC reviews mechanical – solar design and HERS inspection reports.
7. Once completed NZEC issues certificate.



Mechanical contractor John Lockwood standing next to Daikin's indirect water heater with supplemental electric backup.

"NZEC takes all the guess work out of the system design."

By the time solar contractor Jim Dunn of Western Sun Systems was on the job, architect Jon Erlandson had already made sure the home had adequate south facing roof area for the solar electric system. MEG & NZEC determined the estimated amount of energy required to size the system properly. Dunn said, "NZEC takes all the guess work out of the system design. They also help with the paperwork required for the state rebate incentive program." Sun Power's solar panels were chosen because they offered more power per square foot and required less roof space. Another consideration Dunn stressed was aesthetics, "With a flush mount installation, the PV array fits in very nicely with the rustic architectural style of the home." Dunn also stated, "Grid tied solar electric systems require almost no maintenance. Just keep the panels clean and they will produce free energy for at least 30 years."

FIRST CALIFORNIA INSTALLATION

While thousands of Californians have installed grid tied solar electric systems, Jaeger's home was the first to have installed a Daikin Altherma™ air to water heat pump. Daikin is the second largest manufacturer of air conditioning equipment in the world and sells about



No design sacrifices were made in the construction of the Jaeger Net Zero Energy Certified home.

50,000 Althermas overseas annually. The Altherma was selected because it efficiently converts electricity into warm water for space heating and domestic hot water. It also reverses in the summer for cooling. Mechanical contractor John Lockwood of Lockwood Mechanical stressed the importance of a properly engineered mechanical design, "The unit is beautifully made and amazingly quiet. However, with heat pumps, the system must be properly engineered in order to determine the heating and cooling loads, supply water temperature and correct equipment sizing. Heat pumps are unforgiving to bad design".

"I catch myself walking around barefoot and it is awesome!"



All flooring is either brick or hardwood. Radiant tubing is embedded under the brick. Ecowarm™ radiant floor panel was used under the hardwood floors.

SAVINGS OF A NZEC HOME VS A PRIUS	JAEGER HOME	SLIGHTLY USED PRIUS
Upfront cost	About \$20,000	About \$20,000
Before tax savings	\$2,112 per year	\$400 per year
After tax savings	\$4,571 per year	\$400 per year
Years of operation	30 minimum	10 on average
Pounds of CO2 gaseous emissions saved per year.	10,284	3,000



B. Jaeger Inc. Construction

“No more cold pockets of air, just a constant source of a nice, even temperature.”

Knight added that both he and Jaeger were fortunate to have Lockwood on the project. “Installing something for the first time is never easy and he did a great job getting all the kinks out.”

QUIET, COMFORTABLE AND WARM

The biggest concern for homeowner Jaeger, however, was comfort. He is very pleased and reported that his Altherma heat pump is very quiet and he loves his radiant hydronic floor heating. “I catch myself walking around barefoot and it is awesome! No more cold pockets of air, just a constant source of a nice, even temperature.” This is remarkable considering there is no carpeting in the home. The flooring is either brick or hardwood. The radiant tubing was embedded in the mortar bed under the brick and Ecowarm™ radiant floor panel was installed under the hardwood floors. Jaeger has four thermostats in the house so he can control temperatures based on room use, and keeps them set around 67°.

Overall Jaeger is most pleased with the amount of savings he will gain having a net zero energy home, along with the peace of mind that he is doing his part to reduce his carbon footprint. His daughter Michele is very proud of him. They look forward to having their home included in the next solar home tour.



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