



Case Study: Green Home Solutions by Grupe Lodi, CA



Grupe's first Home Performance with ENERGY STAR retrofit.

Innovative New Home Builder in California Enters Whole-House Retrofit Market

In July Green Home Solutions by Grupe completed its first Home Performance with ENERGY STAR retrofit of a 22-year-old, 3-bedroom home in California's Central Valley. The home marks the first foray into the retrofit market for the award-winning Sacramento area production builder, who was constructing over 300 homes a year prior to 2007. "We see retrofitting as a whole new market for us, and we are excited about the potential," said Mark Fischer, the chief financial officer and a senior vice president at Grupe.

Fischer heard about Home Performance with ENERGY STAR at the 2008 EEBA (Energy and Environmental Building Association) national conference in Phoenix in September. "After the conference, I started reading about it, and by January of this year, we decided we were going to try it," said Fischer.

Home Performance with ENERGY STAR, a national program from the EPA and DOE, promotes a comprehensive, whole-house approach to making energy-efficiency improvements. The program is available in cities where a local sponsor (typically a utility company, state agency, or local association promoting energy efficiency) has agreed to partner with ENERGY STAR. The local sponsor recruits home improvement contractors and trains them to perform comprehensive home assessments and best-practice improvements based on whole-house building science.

The California Building Performance Contractors Association (CBPCA) is currently the only organization in the state providing contractor training for Home Performance with ENERGY STAR. The training is funded primarily by Pacific Gas and Electric, Southern California Edison, and the Sacramento Municipal Utility District according to Pat Colburn, director of CBPCA's Support Services.

"Our signature training is called the Green Home Energy Upgrade. It is a 9-day course divided into three 3-day segments or levels. At the end of the third level, our participants can take the written test from the Building Performance Institute (BPI)," said Coburn. All four BPI specialty written tests are offered on the third day of level three. Participants can be certified in one or all of these specialty areas: Building Analyst Professional, Envelope Professional, Heating Professional, and Air Conditioning/Heat Pump Professional.

Once trained, the participating contractors provide recommendations and services to homeowners to make their homes more comfortable and energy efficient, while reducing their utility bills and protecting the environment.

BUILDER PROFILE

The Grupe Company, DBA
Green Home Solutions

3255 West March Lane
Stockton, CA 95219
(209) 473-6000

Founded: 1966

Employees: 70

New Homes per Year: 300-400
In July, completed 1st Home
Performance with ENERGY STAR retrofit

Featured Project: A home in Lodi, CA,
in California's Central Valley

Home Built: 1987

Square Footage: 2,129 sq. ft.

"For the homeowner calls and emails I get, I always ask them, 'How did you find us [the CBPCA]?' They say the majority of time that they came to us by going to the ENERGY STAR website, which is huge for us. ENERGY STAR is a brand name. It is a known and respected name. People who don't get answers from utilities, go to ENERGY STAR."

*Pat Colburn, Director of Support Services
with the California Building Performance
Contractors Association (CBPCA)*



(top) The old ducts were leaky and drooped from their hangers with kinks that blocked airflow.

(bottom) The energy audit showed 14 recessed (can) lights that were not insulated and had significant air leakage.

Home Performance with ENERGY STAR: A Whole-House Approach

Rather than focusing on a single problem, like an old heating or cooling system, not enough insulation in the attic, or leaky windows, Home Performance with ENERGY STAR looks at how improvements throughout your home can work together to give you the best results. The Benefits of Home Performance with ENERGY STAR include

- Utility bill savings of 20% or more
 - Fewer drafts and more comfortable rooms
- Work performed by specially trained contractors
- Third-party quality assurance to make sure work gets done right
- Reduced greenhouse gas emissions to protect the environment

Unlike typical home energy audit programs, the goal of Home Performance with ENERGY STAR is to turn recommendations into improved homes. Participating contractors complete the needed renovations or team with other participating contractors who can. Another important element of the home performance approach is that, upon project completion, the contractor assesses the home's performance again to document that improvements were properly installed to achieve the promised energy savings. Finally, all participating contractors are subject to quality assurance reviews by the third-party sponsor to ensure that projects meet program standards and homeowners receive high-quality work.

In January and February of 2009, Grupe trained seven of its staff in the Home Performance with ENERGY STAR approach. "The classes offered by CPBCA are staggered over time, so to save time, we hired Rick Chitwood, one of their trainers, directly," said Fischer. "He came out and spent two straight weeks with us. It was great."

At the end of the two weeks, the participating Grupe staff took the Building Performance Institute test. "Then, we went out and bought the equipment. We bought the blower door equipment, the infrared camera, the duct blaster, the smoking machine... then we started going into homes and learning how to use it," says Fischer. "In July of this year, we completed our first job."

The Process—One Home Performance with ENERGY STAR Retrofit from Start to Finish

Grupe's retrofit is a 2,129-square-foot home built in 1987 in Lodi, in California's Central Valley. The homeowners were interested in learning the results of an energy audit because their furnace was old and needed to be replaced, and they thought they were paying a lot in electricity bills. They also complained of the living room supply registers blowing too strongly in both heating and cooling modes.

Conducting a Comprehensive Energy Audit

"Even before we go out to the house, we ask for homeowner's gas and electric bills for a year to assess how much they are spending to heat and cool their home," said Fischer.

In this case, the electric bill for a year was \$5,566 (with a high of \$687 in August) and the gas bill was \$826 (with a high of \$155 in January). The home used on average 1,470 kWh per month, which is high compared to 800 kWh, the average monthly utility bill for a home of its size in California's Central Valley.

Armed with this information, the Grupe team began their onsite assessment. "We follow the Home Performance with ENERGY STAR guidelines. It takes between 4 and 8 hours to do the assessment, and we charge \$500 to \$1000 dollars depending on the size of the home," says Fischer. The homeowner pays this fee and gets it back if the builder does the work.

Following the Home Performance with ENERGY STAR guidelines, the onsite team conducted blower door tests to determine air leakage; used infrared cameras to show heat and air infiltration areas; checked for insulation levels and gaps in the attic/ceiling, walls, floor; studied the types and conditions of the windows; studied details of the mechanical heating and cooling systems; documented details of the water heating system; checked all appliances and lights; conducted combustion appliance testing for safety and health; checked for signs of moisture infiltration; measured humidity levels; measured water consumption levels; and documented ventilation needs.

Making Recommendations

Once the energy audit was complete, the Grupe team prepared a detailed proposal with cost estimates and met with the homeowners to review their findings and recommendations. In this case, the homeowner agreed to all of the recommendations at a total cost of approximately \$17,000.

The homeowners did investigate federal, state, and local rebates and financial incentives for their Home Performance with ENERGY STAR retrofit. They received \$2,600 in tax credits and rebates, including a federal energy efficiency tax credit of \$1,500 and a \$750 utility rebate from Lodi Electric Company. For those interested in rebates and financial incentives for Home Performance with ENERGY STAR, the Database of State Incentives for Renewables and Efficiency (DSIRE) can be accessed at www.dsireusa.org. This site provides a comprehensive source of information on state, local, utility, and federal incentives and policies that promote renewable energy and energy efficiency. Established in 1995, DSIRE is an ongoing project of the North Carolina Solar Center and the Interstate Renewable Energy Council funded by the U.S. Department of Energy.

Doing the Home Performance with ENERGY STAR Retrofit

The work began with sealing the home. During the initial assessment, Grupe discovered that the damper in the living room fireplace would not close completely, which resulted in significant heating and cooling loss. Because the homeowners did not use the fireplace, Grupe sealed the fireplace with a product called “Chimney Balloon,” which must be removed if the fireplace is ever used.

The home had R-30-rated blown fiberglass insulation in the attic except for the cathedral ceiling over the family room which contained R-22 fiberglass batt. An assessment showed that settling had occurred and the blown fiberglass was not at proper depth to provide R-30, nor were the batts in good contact with the drywall in the cathedral ceiling. Grupe removed the fiberglass, sealed air gaps, re-installed the fiberglass, and covered this with blown-in cellulose to reach an R-49 level.

Tests showed the duct system had 15% leakage. The ducts were suspended from the roof framing system in the attic; these ducts drooped and had kinks in several places that restricted air flow. The Grupe team removed the hanging ductwork and installed new R-8 insulated ducts that were mastic sealed and laid on the trusses and then covered with the blown cellulose insulation.

The importance of a whole-house approach to retrofitting became apparent in the recommendations for heating and cooling. The original 80,000-BTU furnace was manufactured by Rheem in 1985 and was oversized by a factor of 1.9 times as the existing heating load was 41,763 BTUs. The 4-ton cooling system was manufactured by Bryant in 2000 and was designed for a load of 48,000 BTUs; it was also oversized by almost 2 tons as the existing cooling load was 30,515 BTUs.

As replacements, the team installed a new Lennox 2.5-ton sealed combustion, two-stage variable speed gas furnace/air handler with an efficiency rating (AFUE) of 95% and a new Lennox 2.5-ton, 15.5 SEER/12.5 EER air conditioning unit, a Lennox HC-10 filtering system, and a new Lennox ComfortSense 5000 touch screen setback thermostat. The new furnace and air conditioner are more than adequate to handle the post-retrofit heating load of 37,020 BTUs and cooling load of 26,029 BTUs. In addition to saving money, these properly sized units solved the homeowners’ comfort complaint of excessive air blowing in the living room.

The original dual-pane, aluminum-framed windows were in good condition. To save money, these windows were not replaced, instead the glass in six of the windows facing west and south was covered with a high-end window film called NV-15; the film, which is made by 3M, reduces solar gain to 0.29 SHGC. Software calculations showed this change reduced the home’s cooling load by 3,500 BTUs.

Recessed lights, if not properly sealed and insulated, can cause significant air leakage. Grupe replaced 14 recessed can lights with new insulated can lights and sealed these properly.

With the house tightly sealed, Grupe installed a “Fresh Vent” ventilation system to provide continuous ventilation into the home at the recommended air exchange rate of 0.35 air changes per hour (ACH).

The team replaced an inefficient swimming pool heater and pump for a predicted energy savings of 3,000 watts per day in the winter and 5,000 watts per day in the summer.



(top) New ducts were covered with blown-in cellulose for added insulation.

(bottom) New Lennox 2½-ton sealed combustion, two-stage variable speed furnace/air handler.

More than half of the over 66 million single-family homes in the United States were constructed before modern energy codes existed. Many of these homes have no wall insulation, high levels of air infiltration, inefficient heating and air conditioning, and inefficient water heaters and appliances. In fact, over 40% of households report at least some winter drafts, and 62% complain of a room that is too warm in the summer.

Home Performance with ENERGY STAR website

Key Energy-Saving Features

Attic insulation

R-30 blown fiberglass and R-22 batt fiberglass plus blown cellulose to R-49

Central gas furnace

Lennox 2.5-ton sealed combustion, two-stage variable speed gas furnace/air handler with an efficiency rating (AFUE) of 95%

Air conditioning unit

New Lennox 2.5-ton, 15.5 SEER/12.5 EER air conditioning unit

Duct leakage

1,115 cfm, 5.1% leakage

Duct insulation

R-8, properly sealed, buried in blown cellulose

Pool pump and heater

More efficient, saving 3,000 watts/day summer, 5,000 watts/day winter

Lighting

CFL bulbs

Windows

0.29 SHGC coating added

For information about Home Performance with ENERGY STAR training in California, visit www.cbpc.org

For additional information, contact:

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Conducting Follow-up Testing

“Now this is the really exciting thing,” says Ron Rugani, Grupe’s vice president for construction, “to do the diagnostic testing to see what you’ve got, then to go in there and make the improvements, then to go back and test again. We are able to see some really significant improvements.”

The original duct blaster test, which measures duct leakage, showed 15% leakage. The test with the new system showed 5.1% leakage. The original blower door test showed leakage at 2,478 cfm₅₀, which Rugani explained is actually not bad for a house of this age, as standard air leakage for a house of this size is about 2,257 cfm₅₀. By extensive caulking and sealing, “we took this leakage from 2,478 to 1,115 cfm₅₀, a 55% reduction,” said Rugani.

Such a tight house creates the need for a good ventilation system. “The good thing about providing ventilation is that now you control the air that you are bringing in,” says Rugani. “When you have a leaky house, you have no control. It is coming from the attic, through the walls, and from areas that are probably not the best things to breathe. With a ventilation system, when we bring air into the house, we can control and temper it, filter it, and provide good air for the occupant. We did this by providing a ventilation system with the new heating and air conditioning system that brings in fresh air, mixes it with the conditioned air, and ventilates the home.”

As part of the assessment tests, the team took air flow measurements of 1,143 in cooling mode at each of the registers for the 4-ton system. In the test out, the 2.5-ton system delivered 1,095. “We were delivering almost as much air after with a ton and a half less capacity,” says Rugani.

In addition to these tests and more, any house retrofitted under the Home Performance with ENERGY STAR program is subjected to spot inspections by trained whole-house contractors.

Construction leaders like Rugani are not shy about their support for Home Performance with ENERGY STAR. “I think it is fantastic. It is a great opportunity to do great things for homes to make them more comfortable and more energy efficient. I really like that we [Grupe] can do our part to make homes more efficient and do our part to reduce the carbon footprint of homes.”

The Bottom Line

“Both Pacific Gas and Electric Company and California make energy efficiency the top priority when it comes to combating climate change,” explains Charles Segerstrom, manager of Pacific Gas and Electric Company’s (PG&E) Energy Centers. “We have the most aggressive energy efficiency goals anywhere. The California Public Utilities Commission has set a goal of 40 percent in residential energy savings by 2020 and 20 percent by 2015.”

“Home Performance with ENERGY STAR provides the consistency and standardization that are critical as we continue to develop a green economy,” said Segerstrom. “Such standardization is necessary in order to achieve the deep energy-efficient retrofits that result in significant energy savings.”

To find your state sponsor for Home Performance with ENERGY STAR, go to www.energystar.gov. Then, click on *Home Performance with ENERGY STAR*. From here, click on the link labeled “contractors participating in a locally sponsored Home Performance with ENERGY STAR Program.” Or, Google: *Home Performance with ENERGY STAR Locations*.

For more information about Home Performance with ENERGY STAR, visit www.energystar.gov/homeperformance