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Going Green, Step by Step

By Asa Foss, for the PATH Partners

Undoubtedly, the new 2005 Title 24 energy standards will affect your next project. The standards significantly alter lighting requirements, largely by mandating the use of CFLs and control devices. The new time-of-day valuation of energy requirements will also penalize homes with high peak energy use, which may at the very least affect your selection and placement of windows.

The Partnership for Advancing Technology in Housing (PATH), a program of the U.S. Department of Housing and Urban Development, has interviewed several Title 24 experts in California who have examined the new standards and the most cost-effective ways to meet the code. You can meet the new Title 24 standards at minimal cost by considering the advice of these building energy experts.

Four Steps All Builders Should Take

First, builders should look at what they're doing now. Many builders may very well be using energy-efficient technologies and practices that they aren't taking credit for. Darrel Kelly, an energy consultant at Builder's Energy Services in San Jose, recommends that builders investigate the quality insulation installation credit, whose requirements are easy and inexpensive to meet. All that is needed is third-party field verification. This will be particularly cost-effective if builders are already working with a home energy rater.

Once builders have assessed what they've already achieved, Doug Beaman, energy consultant and coordinator of the California Home Energy Efficiency Rating Services (CHEERS), recommends three upgrades. First, install a 13 SEER air conditioner and make sure you take advantage of the EER valuation credit. (SEER, the Seasonal Energy Efficiency Ratio, is a measure of efficiency over an entire cooling season. EER, the Energy Efficiency Ratio, rates peak demand efficiency, which the new Title 24 standards seek to reduce.)

Second, add thermostatic expansion valves. Third, be sure you have tight ducts.

"Manufacturers can't manufacture 10 and 12 SEER air conditioners after January 23, 2006 because of the federal appliance standards," said Beaman. "So at some point early in 2006, builders will have to buy 13 SEER equipment because the less efficient equipment will be unavailable."

Although much 13 SEER equipment is rated as 11 EER or higher, a Title 24 energy consultant will assume that it is only 10 EER. To receive credit, builders must use a unit that has been verified by ARI to be 11 EER or greater. This is worthwhile since it will represent a significant improvement in the efficiency of the cooling load. In addition, a thermostatic expansion valve (TXV) will maximize the efficiency of the air conditioner by allowing the optimal amount of refrigerant through the air conditioner's coil. Most older air conditioners allow only a fixed amount through.

"Most of the 13 SEER units will come with a TXV, so that's another 10 percent boost to my cooling budget," said Beaman. "My incremental cost will be somewhere between zero and \$50. If the HVAC contractor has to buy it separately, they are not going to pay more than \$25 for it. If the coil already comes with it, it won't cost anything."

His third recommendation is to install a tight duct system, which needs to be certified by a third party as having less than 6 percent duct leakage.

Beaman said that the incremental cost for the HVAC contractor to install a tight duct system is \$100, and it shouldn't take more than half an hour over the typical installation time. But to get below that 6 percent, contractors must follow the Mechanical Code precisely. Using duct mastic around the start collars, they should apply mastic and mechanically fasten the ducts at the intersections. Then, they should install cork tape where the refrigerant lines go into the coil, and seal along the gap between the ceiling cans/boxes and the sheetrock.

If all three measures are used, Beaman foresees significant savings. "Between the TXV, the 11 EER air conditioner, and tight ducts, I have a total reduction in my energy consumption of about 13 percent."

That 13 percent may vary depending on the climate, since these measures have a larger impact on cooling than heating loads. However, those savings apply to most of the state.

Because the three measures require independent verification, builders will also have to pay a Home Energy Rating Systems (HERS) verification fee. If production builders get a HERS verification on all their homes, the rating will cost around \$100 per home. So, for all three measures, you're likely to spend about \$200 to \$250. (Other experts suggest that this cost could be higher.)

In addition to these measures, Beaman also suggests that builders consider tankless water heaters as a way of reducing energy use—especially in milder climates where the upgrades to the cooling system won't have as large an impact on total energy savings. Tankless water heaters are about two to four times the cost of conventional tank water heaters, but they save up to 20 percent of water heating energy. They also take up far less space, which can be a significant benefit for smaller homes.

Build Efficiency into Design

George Nesbitt, a building performance contractor, HERS rater and owner of Environmental Design/Build, believes that these cooling systems measurements are a great way to meet code, but also recommends that builders start by considering energy use at the design stage of their projects.

"The cheapest way to meet code would be to design the building to perform efficiently, using the performance software as a design tool," said Nesbitt. "If you make the right choices up front, you will far exceed Title 24, and at no extra cost. If you are 15 percent above Title 24 code, you can have your home Energy Star qualified and may be eligible for utility rebates; 50 percent above 2003 International Energy Conservation Code and you get a \$2,000 tax credit."

Nesbitt recommends properly sizing mechanical equipment – specifically the HVAC system.

"If you properly design and install the HVAC, it will be less expensive to purchase and operate than oversized equipment," he said.

Proper installation requires the HVAC contractor to use the Air Conditioning Contractors of America's Manual J for sizing rather than rules of thumb, which tend to result in too large of a unit. Correctly sized units are less expensive and more energy efficient, dehumidify better, last longer, and provide better comfort than larger, incorrectly sized equipment.

Once the HVAC system is sized properly, builders should make sure it is installed according to code so they can take credit for the tight ducts.

Most of these measures are relatively inexpensive, but they do require some advanced planning. It is recommended that builders start thinking about energy use early on; the sooner they do, the more cost-effective the measures will be. Last-minute upgrades, as most will agree, can be quite

expensive.

"You'll only run into trouble if meeting code is a tail-end decision of, 'Oh, yeah, we have to comply with the code,'" said Nesbitt.

California Green Builder Program a Cost-Effective Solution to Building Energy Efficient Homes

Thanks to the California Green Builder program, sponsored by CBIA and its affiliate the Building Industry Institute,

the dream of a cost-effective yet environmentally friendly home is becoming a reality.

California Green Builders (As of November 2005)		
Builder	Location	# of homes
Castle and Cooke	Bakersfield	1,457
Centex	San Luis Obispo	30
Greystone	Quartz Hill	180
Pardee	San Diego	517
Treasure Homes	Sacramento	32
Victory Homes	Victorville	37

Through the end of 2005, more than 1,300 California Green Builder homes have been built or are being built by six pioneering homebuilding companies, said Robert Rivinius, CBIA's President and CEO. Some 5,000 more are in various stages of planning and development.

"Our voluntary program was designed by builders to feature reasonable, cost-effective, and understandable standards that allow the environmental benefits to be calculated and verified. In fact, it's one of only four programs in the country that features third-party testing to ensure each new home complies with tough program requirements – and it's the only program that's actually resulting in thousands of green homes being built," Rivinius said.

Builders participating in the program so far are Castle and Cooke, Centex, Greystone, Pardee, Treasure Homes, and Victory Homes. Several other major builders are seriously considering joining the program as well, Rivinius noted.

The California Green Builder program focuses on five major areas:

- Energy efficiency: Homes are 15 percent more efficient than California's toughest-in-the-nation energy standards – and as much as 30 percent more efficient than homes built in most other states.
- Water conservation: Landscaping is designed to use as little water as possible, and in many cases advanced water-efficient plumbing designs are included in the homes.
- Wood conservation: Much of the lumber used in California Green Builder homes is grown in sustainable forests. In addition, builders use engineered wood products as efficiently as possible, saving two, three, or even more trees per home.
- Advanced ventilation: Homes feature advanced heating, ventilating and air conditioning designs to ensure proper ventilation and filtration. In addition, paints, carpets and other products are selected that give off few or no volatile organic compounds.
- Construction waste diversion: Builders divert at least 50 percent of the job-site waste from local landfills – sometimes as much as 80 percent.

"And now, the program is even more environmentally friendly because we have partnered with the Metropolitan Water District to incorporate many of the MWD's California Friendly water conservation requirements into the program," Rivinius said.

For more information, see the new California Green Builder Web site, www.cagreenbuilder.com.