HOME PERFORMANCE RETROFIT CONTRACTING AND NON-ENERGY BENEFITS
An Overview for the California Public Utilities Commission

Bob Knight, Bevilacqua-Knight, Inc.
rknight@bki.com, 510.444.8707 x223
for the California Building Performance Contractors Association (CBPCA)

Program sponsors in 20+ states are beginning to transform the home improvement marketplace beyond free "clipboard" home energy audits and single-measure rebates with a whole-house approach to energy efficiency, demand response, renewable energy and "carbon footprint" issues. The CBPCA sponsors utility-funded non-resource projects based on this concept in California under the *Home Performance with ENERGY STAR®* program. Since home performance contracting involves a comprehensive analysis and retrofit of both envelope and energy-using systems in the home, maximum energy and demand savings per home are achieved. This approach provides a powerful new platform for utilities and state agencies implementing energy efficiency programs to make a bigger difference in their huge existing residential market.

Home Performance with ENERGY STAR® is a national program from the U.S. EPA and U.S. DOE that promotes a comprehensive, whole-house approach to improving energy efficiency and comfort at home, while helping to protect the environment. The program is managed by a local sponsor (CBPCA in California) who recruits home improvement contractors and trains them to perform comprehensive home assessments and best-practice improvements. The assessment includes the heating and cooling systems, non-HVAC/baseload energy uses, windows, insulation, flow of air into and out of the house, and a safety check of gas appliances. Based on this assessment, participating contractors offer and deliver one-stop solutions to fix comfort and health/safety problems and address high energy bills.

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 work closely with other participating contractors who can. Another important element of the home performance program approach is that, upon project completion, the contractor assesses the home's performance again to document that specified 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 are assured of high-quality work.

But there is a serious regulatory flaw that makes such programs virtually impossible to approve for funding in California. Home performance retrofits are almost always chosen by homeowners primarily for their non-energy benefits such as comfort, indoor air quality and its health effects, permanent elimination of moisture and mold problems, combustion safety, and a sense of environmental responsibility. This is very unusual among energy efficiency programs. In addition, home performance programs are essentially market transformation or creation, building the industry capacity in the form of trained contractors who continue adding further home retrofits and their long-term energy savings indefinitely. But the present benefit/cost tests essentially ignore these benefits, which in California's relatively mild climate result in low b/c scores.

The problem rests primarily with the TRC test. That test, which dominates the program selection process, allows no credit for the homeowner's non-energy benefits yet requires that the full participant cost be included. Since home performance retrofit costs can be high (currently about a $15,000+ average in California and often higher), yet with full customer satisfaction, that cost dominates the TRC calculation relative to other program costs and results in a very low TRC result. Even using the E3 Calculator's use of "cookbook" average measure-by-measure costs in place of the usually-higher actual costs, the lack of consideration of the broad range of participant-cited non-energy benefits results in an unacceptably low TRC.

The result of this anomaly in the TRC's logic is that major home energy and peak demand savings are turned into long-term lost opportunities. Long industry experience shows that most HVAC improvements are improperly selected and installed, even under "quality installation" guidelines. In addition, the building's thermal load reduction opportunities are virtually never addressed—at all, let alone adequately—when HVAC systems are replaced or repaired. This results in dramatically oversized equipment and typically undersized and poorly installed ducts that never can perform properly, thereby wasting energy with short-cycling, causing unnecessary noise and drafts, and failing prematurely. In addition, the presence of the home performance contractor, who is most often a remodeler, provides a unique opportunity to provide personalized assistance in baseload energy improvements such as CFL installation, pool and spa energy savings, and recommendations for appliance replacements and plug load management. No other programs offer such a broad range of energy saving opportunities, most of which are permanently installed for long persistence.

Home performance contracting is an extreme case of the unacknowledged weight of non-energy aspects in public benefit. But it is not only radical programs such as home performance contracting that can benefit from proper involvement of non-energy benefits. Any program design that can demonstrate a non-energy benefit's value to either the involved consumers or the society at large should be allowed to claim that value—either in an addition to the avoided-cost benefit numerator or a downward factoring of the participant cost in the denominator of the benefit-cost test. This would allow some very important expansions to realized energy savings for California, both in increasing incentives for participation in existing programs as well as in increasing the number of programs to be funded based on cost-effectiveness. This in turn would increase justification for further societal expenditure on energy efficiency programs in general, whether through public goods charges or power procurement funds.

Home retrofit performance contracting is emerging as a viable field-proven concept. The major California electric and gas utilities are collectively considering this concept for larger-scale use in the 2009-11 program cycle. But they see the current TRC process as a barrier that must be removed before any such programs can be fielded. The CPUC's support is essential for this to happen.

For further information, see the following ACEEE paper, which includes a more detailed study of this issue as well as an extensive bibliography. ACEEE itself is also soon to publish its own paper supporting the need for NEB consideration.

Knight, R. and S. & L. Lutzenhiser (2006). "*Why Comprehensive Residential Energy Retrofits are Undervalued*." Paper 726, Proceedings of the ACEEE Asilomar Summer Seminar. American Council for an Energy Efficient Economy, Washington, DC, August 2006.