

CASE STUDY: Rivergate Commons

Setting Goals: Determining a 2008 Code Baseline Efficiency Standard

The intent of the PEEHP is to provide costs and feasibility data for constructing single and multi-family houses to the 2008 Oregon Residential Energy Code (2008 Code) in comparison with constructing homes that perform 15% and 30% more efficiently than the 2008 Code.

To track the relative improvement in efficiency of the homes in this case study, appropriate efficiency measures were determined using the 2008 Oregon Residential Energy Code requirements as a baseline. The 2008 Code requires that certain prescriptive standards be met, and beyond that, builders are required to choose one of nine additional energy efficiency options. The baseline 2008 Code path for this home was the most commonly selected path in new, affordable construction for electric homes - Option 4: Zonal electric heat, or ductless furnace/heat pump and one of the high efficiency measures described; U-0.32 windows and sliding glass doors.

Gathering Data: Estimating Costs

The PEEHP grant process funded the incremental cost of energy efficiency measures over what was required by the 2008 Code. To determine the additional construction costs to be covered by the grant, each builder was required to provide cost estimates from three different subcontractors for the work to be performed. Further, each subcontractor had to provide bids for the costs associated with building the home to 2008 Code, to 15% above 2008 Code, and to 30% above 2008 Code, as appropriate based on the different energy efficient measures selected by the builder. Based on this information, it was possible to calculate incremental costs. Using the lowest bids, the grant covered the cost difference between the "code home" and the higher efficiency home (see the performance table for exact figures).

Achieving Results: Modeling and Verification

Through Energy Trust's New Homes program, Andrew Shepard, a green building consultant with Earth Advantage Institute, provided ongoing technical

assistance to Habitat for Humanity by examining building plans and building practices, and identifying opportunities for energy savings. Energy modeling software was used to calculate efficiency goals and the measures necessary to achieve those goals. The consultant estimated the energy savings from individual efficiency measures to assemble a package of measures to meet the homes energy use reduction targets. To ensure the calculated savings were achieved, third-party modeling and verification services were conducted, including:

- Home energy use modeling using the REM/Rate software tool. REM/Rate is published by Architectural Energy Corporation of Boulder, Colorado, and complies with Residential Energy Services Network (RESNET) protocols for modeling home energy ratings.
- Third-party testing, involving at least two physical inspections, a duct blast, and blower door test verified that systems and materials were correctly installed and working properly. An EPS confirmed the level at which a home is performing.

Home Energy Performance Information

Builder	Habitat for Humanity Portland/ Metro East						
Home Address	7624, 7626, 7628 N. Olin Ave. 3 units 15% more efficient than 2008 Code			7610, 7612, 7614 N. Olin Ave. 3 units 30% more efficient than 2008 Code			
Home Style	2-Story row house with a shared interior wall						
Square Feet	Approximately 1200-1500 sf per unit						
# of Occupants	Minimum of 3, maximum of 6, based on the number of bedrooms						
Heating & Hot Water Source	High Efficiency Electric Mini-Split Heat Pumps and Marathon Hot Water Heaters						
Target Efficiency Increase	Meet Code	15% Unit 1	15% Unit 2 (Middle Unit)	15% Unit 3	30% Unit 1	30% Unit 2 (Middle Unit)	30% Unit 3
Efficiency Increase**	0	25%	17%	25%	26%	21%	25%
Incremental Cost of All Measures**	0	\$5,140	\$5,140	\$5,140	\$7,510	\$7,510	\$7,510
Est. Annual Energy Cost Savings	\$3,587 (Total Cost/ Yr.)	\$272	\$176	\$277	\$332	\$195	\$302
Annual kWh Savings	0	2,696 kWh	1,744 kWh	2,743 kWh	3,289 kWh	1,939 kWh	2,995 kWh
Annual Carbon Emmissions	(Code) Actual	(6.9) 5.3	(5.3) 4.3	(6.8) 5.2	(7.2) 5.2	(5.3) 4.2	(6.9) 5.1
EPS*	(Code) Actual	(45) 34	(34) 28	(44) 33	(44) 33	(34) 27	(44) 33

*A lower EPS score reflects less energy use and lower operating costs. Energy Trust is in the process of modifying the formula for calculating EPS scores. Under this new methodology, the EPS scores for gas or electric homes constructed in the same way would be very similar. For more details visit: www.energytrust.org/library/meetings/other/EPS_HES_Proposal_CAC.pdf

**Actual construction cost and savings data may differ from that funded by the grant due to a number of factors, including
a) different equipment being installed compared to what was originally planned,
b) use of a different contractor to improve installation or warranty services, and
c) variation in the bidding approach of the contractor.