



## Building America Best Practices Series

Builders Challenge Guide to 40% Whole-House  
Energy Savings in the Marine Climate

# Case Study: Tom Walsh & Co.

New Columbia | Portland, OR

TWC achieved HERS scores of 59 to 66 on 22 homes in Portland, Oregon, with technical assistance from the Building Industry Research Alliance (BIRA), a research team leader in the U.S. Department of Energy's Building America program.

### BUILDER PROFILE

**Builder's Name:** Tom Walsh & Co. (TWC)

**Where:** Portland, OR

**Founded:** 1962, incorporated 1999

**Employees:** 5 in 2007

**Size:** 40 single-family houses a year in 2007

**Development:** 20 homes in New Columbia (beginning in October 2006)

**Square Footage:** average 1,884 square-foot two-story, three-bedroom, 2.5 bath homes

**Price Range:** \$229,000 - \$278,000

**Energy Efficient Commitment:**  
Federal tax credit level

## Tom Walsh & Co. Reaches 50% Energy Savings in 20 Homes in New Columbia, Portland, OR

In 2007, Tom Walsh & Co. (TWC) became one of the first production builders in Oregon to earn the \$2,000 federal tax credit for new energy-efficient homes. Under the direction of Ben Walsh, TWC earned the tax credit on 20 new homes built in the New Columbia neighborhood in Portland, Oregon. These homes earned Home Energy Rating Scores (HERS) that represent greater than 50% energy savings in heating and cooling over the 2004 International Energy Conservation Code (IECC).

TWC achieved HERS scores of 59 to 66 on each of the 20 federal tax credit homes with technical assistance from Earth Advantage, the Energy Trust of Oregon, and the Oregon Department of Energy. These homes meet the Building America 40% goal for the marine climate. Before becoming aware of the federal tax credit, TWC had completed 24 homes in 2006 that qualified for Northwest Energy Star and Earth Advantage certification.

In total, TWC built 46 speculative, detached, single-family houses in New Columbia for first-time and middle-income families. The homes were priced at sale between \$199,000 and 278,000. All of the homes had sold by March 2008.

“We were half way into sheet rocking of phase I in New Columbia with 24 ENERGY STAR and Earth Advantage certified homes when I heard about the federal tax credit,” said Ben Walsh, project manager, owner,



(top) TWC became the first builder in Oregon to earn the \$2,000 federal energy-efficient new homes tax credit on a production-scale project. The 20 homes in Portland, Oregon, achieved greater than 50% energy savings in heating and cooling over the 2004 International Conservation Code (IECC) standard.

(bottom) To encourage community, garages are located behind houses, and off-street parking is located on alleys behind houses.

“Ben has been on the phone countless times with ‘what ifs,’ so we have gone back to our Building America partners to answer these questions.”

Brady Peeks, energy analyst for the Oregon Department of Energy

and son of the company founder. “I asked our ENERGY STAR/Earth Advantage verifier what it would take to for us to hit this standard. He said, ‘You guys are pretty close.’ It is remarkable what you can accomplish when you simply ask the question: Is there anything that we can do better?”

However, for Ben Walsh, reaching 50% energy savings compared to code was only important if it could be achieved cost effectively for subcontractors. “If people are working on slim margins and if you ask them to up-end their processes, they see this as one thing, and they are absolutely right—loss. They can’t do it,” says Walsh. “Every one of my subcontractors has to know that their profitability is of paramount importance to me.”

“They were able to really improve energy efficiency, quite frankly, without spending much more money,” said Chris Bonner, a broker with Hasson Company, who listed all 46 homes in phase I and II. “It really came down to creating opportunities for their subs to learn a new system. I remember one thing clearly that Ben told me, ‘In the end, getting all that extra energy efficiency didn’t really cost as much as we thought. It was really about communicating with people a new way of doing things.’”

## Energy Efficiency

Walsh credits two improvements with providing most of the energy-efficiency gains that moved his homes from 15% savings in phase I to 50% energy savings over code in phase II: improving air sealing and moving ducts out of the crawlspace and into conditioned space.

In phase I, some of the blower door tests showed infiltration rates of 7.0 ACH<sub>50</sub>. To meet ENERGY STAR requirements in Oregon the infiltration rates need to be at 7.0 ACH<sub>50</sub> or lower. For phase II, Walsh’s team reached infiltration rates between 4.2 and 4.6 ACH<sub>50</sub>.

“We put a lot more attention into gasketing the crawl and attic access hatches,” said Walsh. “We took care to instruct our insulators to foam the bottom plates of the walls and foam the top plates of the top floor walls. Then, we caulked around all the penetrations—the wires, pipes, ducts.” According to the Building Industry Research Alliance (BIRA), the Building America research team that provided analysis of the houses, the estimated incremental time to implement this extra sealing was only 1.5 hours per house.

The construction team identified two challenges for moving the ductwork into conditioned space: allocating space for the ducts and addressing a potential added cost from the mechanical contractors. Through discussions with his subcontractors and research information from BIRA, Walsh implemented a cost-effective method for placing the ducts in conditioned space, which saved \$275 per house.

TWC located the ductwork between the first and second stories of the home. The 9-foot first-floor ceilings allow a trunk duct to be run perpendicular to the floor joist in a soffit beside the support beam for the joists. In some cases, the soffit was enlarged well beyond the size required by the ducts so it would function as part of an architectural entry vault for the houses.

The branch ducts run within the joist space eliminating the need for additional soffits or dropped ceilings. Air is supplied to the first story through ceiling registers and to the second story through floor registers. The furnace is located in an interior closet, making the ducts and furnace considerably more accessible than a crawlspace for installation, sealing, and inspection.

Final duct blaster testing showed duct leakage of 31 to 40 CFM<sub>50</sub>. “For a new average home at 2000 square feet, you can expect 240 to 300 CFM<sub>50</sub> for a normal house. The leakage of this house is minimal” said Eli Caudill, technical director for Conservation Services Group, which supports the Energy Trust of Oregon.

Caudill states another important benefit of moving ducts into conditioned space: “If the ducts leak to inside the house, it is not that big of a deal; it is still heating the house. If the ducts are in the crawlspace or the attic and are leaking, we would be looking at a situation where we are paying to heat places we don’t want to heat.”

Ventilation for such a tightly constructed envelope is provided with a whole house fan and trickle vents in the windows, which provide small, operable, louvered vents within the window frame.

Other energy-efficient features included the following, some of which were in the phase 1 ENERGY STAR and Earth Advantage certified houses and carried through to the phase II houses: R-21 fiberglass batt insulation within 2x6 intermediate framing; R-49 blown-in cellulose attic insulation; U-0.29 windows; 62% energy-efficient gas water heater; 94% AFUE furnace; 100% compact fluorescent lighting; ENERGY STAR refrigerator, dishwasher, and clothes washer; a vented crawlspace with a 10-mil poly vapor barrier on the ground; and R-38 insulation in the floor joists.

One feature of the houses that Ben Walsh stated he will not build again is ventilated crawlspaces. “It is dark and damp in crawl spaces. We condition crawl spaces now,” said Walsh.

Brady Peeks, an energy analyst with Oregon Department of Energy, is not surprised by Walsh’s openness to change in building practice. “He is a builder who is really interested in doing more,” says Peeks. “Ben has been on the phone countless times with ‘what ifs,’ and we have gone back to our Building America partners to get answers to his questions.”

## Energy-Efficient Features

(Tom Walsh & Co. New Columbia Phase II Homes)

- **HERS:**  
56 and 59 for two homes with solar hot water heaters and 65 to 66 for the other 20 homes
- **Walls:**  
2x6 24-inch on center
- **Attic Insulation:**  
R-49 blown-in cellulose
- **Wall insulation:**  
R-21 batts
- **Roofing Material:**  
Asphalt shingle, no radiant barrier
- **Foundation:** Vented crawlspace with R-38 fiberglass batt insulation in the floor joists
- **Ducts:** In conditioned space using 40% less ductwork than when in the crawlspace; ducts insulated to R-8
- **Air Handler:** Whole-house fan and trickle vents in the windows
- **Air Sealing:** Gasketing the crawl and attic access hatches, foaming the bottom and top plates of the walls, and caulking all penetrations
- **HVAC:** High-efficiency 94% AFUE furnace. No air conditioner
- **Windows:** Window area 14.1%. U-0.29
- **Water Heating:** 62% efficient gas
- **Ventilation:** Upgraded bathroom exhaust only, trickle vents over windows
- **Green features:** Pre-finished, tongue and groove bamboo flooring; low- and no-VOC adhesives and finishes; no urea-formaldehyde
- **Lighting and Appliances:**  
100% CFLs and ENERGY STAR refrigerator, dishwashers, and clothes washer
- **Commissioning/Certification:**  
Independent, third-party certification





The arched entry adds aesthetic appeal and hides the ductwork, which is kept in conditioned space to increase energy savings.

“Typically ducts are installed in crawlspaces and attics and the garage. The decision to move the ducts and heating system inside into the conditioned space made a big gain for the HERS number for these houses and a reduction in the energy heating use.”

Eli Caudill, technical director for Conservation Services Group, which technically supports Energy Trust of Oregon

### For More Information

Contact the EERE Information Center 1-877-EERE-INF (1-877-337-3463) or visit [eere.energy.gov/informationcenter](http://eere.energy.gov/informationcenter).

U.S. DEPARTMENT OF  
**ENERGY** | Energy Efficiency & Renewable Energy

## Dollars and Sense

According to Rob Del Mar, an energy analyst with the Oregon Department of Energy, “The ducts-inside installation resulted in cost savings of \$275 per house or \$5,500 on the total bid.” The central location of the furnace inside a closet made it possible to use 40% less ductwork than would have been needed if the system had been installed conventionally. There were no additional framing costs as the soffit containing the ductwork was already required to conceal a structural beam. The soffit was enlarged beyond the needs of the ductwork as an architectural feature of the entryway. “The arched entry vault was seen as an attribute by the homebuyers,” said Del Mar.

Chris Bonner, the realtor, experienced the difference that 50% energy savings made in selling homes. “I listed all 46 homes,” said Bonner. “In phase I, when we were Earth Advantage and ENERGY STAR rated, we were competitive with the other builders at New Columbia. So, we were all out there singing the same song. Then, on the second phase, having increased energy efficiency, it let us really stand out from the competition.”

“One of those 46 homes is now owned by a friend I have known since I was 6 years old,” says Walsh. “The value that the 46 houses represent to their buyers...is that people’s equity has been preserved [in the collapsing housing market]. The homes were not overpriced. They were value minded. They were not intended to generate enormous profit. I think the people who bought those homes have, still to this day, solid investments and solid homes in a solid neighborhood within a solid community, and that is important.”

## Bottom Line

“In the end, it really wasn’t about spending a whole lot more money; it was about asking the questions to do it a little differently,” said Bonner. “I have been extremely proud to represent those homes.”

In 2007, Tom Walsh, who is Ben’s father, retired as the owner of TWC, and Ben formed Green One Construction Services. “We are constructing a new 18-unit development [of net zero-energy homes],” said Ben Walsh. He is working with the Oregon Department of Energy and Energy Trust of Oregon to test and analyze his house design for this development of hybrid (gas and electric) net-zero-energy homes.

“It is remarkable what you can accomplish when you simply ask the question, ‘Is there anything we can do better?’” Ben Walsh.