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

BUILDING TECHNOLOGIES PROGRAM

Building America Best Practices Series

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

Case Study: Schneider Homes, Inc.

Village at Miller Creek | Burien, WA

Schneider Homes worked with researchers at Washington State University's Extension Energy Office, a member of Building America's BIRA (Building Industry Research Alliance) team to design 28 federal tax credit homes near Seattle.

BUILDER PROFILE

Builder's Name: Schneider Homes, Inc.

Where: Tukwila, WA (near Seattle)

Founded: 1976

Employees: 40

Development: Village at Miller Creek

Size: 37 detached townhouses

Square Footage: 2,019 square feet

Price Range: $350,000

Energy Efficient Commitment:
All homes Northwest ENERGY STAR Certified; 28 meet 50% federal tax credit standard

Building AMERICA U.S. Department of Energy

Schneider Homes Earns Federal Tax Credit on 28 Homes Near Seattle

In 2008, Schneider Homes earned federal tax credits for 28 of its 37 homes at the Village at Miller Creek, a detached townhouse development in Burien, Washington. To be eligible, these homes achieved greater than 50% energy savings in heating and cooling over the 2004 International Energy Conservation Code (IECC). These homes also meet the Building America 40% whole-house energy-savings goal for the marine climate.

"We could qualify every plan but one, which was stubborn and would have required lots of changes to qualify," said Tom Balderston, a consultant who works with builders to qualify and verify for ENERGY STAR and other state and federal programs.

"We were the first production builder in the area to be 100% ENERGY STAR," said Pat Shea, a 30-year employee with Schneider Homes and the project manager for single-family construction. "All of our homes are ENERGY STAR rated." These homes are certified 15% more energy efficient than the 2004 International Residential Code (IRC).

So when Schneider Homes decided to reach for 50% energy savings, they approached Balderston, and he contacted researchers at Washington State University's Extension Energy Office, a member of Building America's BIRA (Building Industry Research Alliance) team to determine how to achieve such savings.

"Schneider Homes is innovative. They are willing to try things, and they have always been interested in energy," said Balderston.

(top) An insulated, conditioned closet within the garage contains the forced-air 92.5% AFUE gas furnace.

(bottom) Blown-in cellulose insulation rated at R-38 to R-42 helps the townhouses meet the Building America 40% goal.

"We have made a commitment to energy efficiency. We build 100% to ENERGY STAR, and in this market, that is a big deal."

Pat Shea, *Schneider Homes project manager*

Energy Efficiency

"For this particular job, it was not hard for us to get to the federal tax level [50% energy savings in heating and cooling]," said Shea. "There was a whole perfect storm of events that came together to make this project work well."

For example, because all of its homes are built to Northwest ENERGY STAR standards, the production team was trained in proper air sealing. They caulked all mechanical penetrations, foamed the bottom and top plates of walls, and used gaskets for attic access hatches. "When we tested at Village at Miller Creek, we found a consistent pattern of 3.9 to 4.4 air changes per hour [at 50 Pascals]. Standard construction is 6 to 7 air changes per hour," said Balderston.

In addition, because the 37 homes were being built near Seattle's major airport, Sea Tac, additional sound-reduction measures were required. One of these involved using a sound-reducing insulation in the walls. Schneider chose Johns Manville Spider® Custom Insulation, a blown-in blanket insulation (BIBS). This formaldehyde-free, spray-in fiberglass with a non-hazardous adhesive filled the 2x6 wall cavities with R-23 insulation and very few gaps or voids. It is treated with a U.S. EPA-registered mold inhibitor to protect the insulation against mold.

Also, analysis from the BIRA research team showed that moving the furnace and ducts into conditioned space would result in significant energy savings. The Village at Miller Creek house designs contained open-web trusses between the first and second floor. "We put the ducts on the warm side of the insulation blanket in the floor trusses over the unheated garage," said Shea. The supply registers are in the ceiling for the first story and the floor for the upstairs. A portion of the return duct is outside conditioned space within the attic.

For some homes, the gas furnaces, rated at 92.5 AFUE (annual fuel utilization efficiency), were placed in conditioned basements. The majority of the homes were built on 2-foot concrete slabs, and insulated closets were constructed within the garage for the furnaces.

"Building on slab is not unusual for townhouses," said Balderston. "The houses have a garage and a small living area downstairs, and they just extend the slab out from the garage [to cover the living area]." The slab has R-10 foam perimeter insulation.

"The attic insulation is blown-in cellulose R-38 to R-42 depending on the unit," said Shea. "We also used sound-reduction windows, but I don't think these impacted the U value." The two-pane, low-emissivity windows with vinyl frames have a 0.34-U factor.

Other above-code energy reduction features that allowed Schneider Homes to reach the federal tax credit level include making 80% of the light fixtures hardwired for compact fluorescent lightbulbs; providing an ENERGY STAR refrigerator, dishwasher, and clothes washer; and installing an 80% energy-efficient gas tankless water heater. However, as discussed in the next section, Quality Management Solutions, some of the tankless water heaters had to be replaced with traditional tank water heaters.

Final Home Energy Rating System (HERS) scores ranged from 66 to 68. "What I see in an ENERGY STAR home, which is officially 85, is anywhere from 75 to 85," said Balderston.

"We have always tried to give our customers the most livable home we can for the price," said Joanna Colman, assistant vice president. "Energy efficiency is something that we jumped on right away; the company believes it is a huge benefit for our customers to provide increased comfort and economic savings through lower energy costs," said Colman.

Roger Fowler, who is the president of the development's homeowner's association, speaks to this livability: "We feel comfortable in the home, and we never feel drafty, nothing like that. They [the homes] are very tight."

Quality Management Solutions

"We offer a structural extended warranty on all of our homes [6-year Washington State RWC warranty], and we back this with a one-year comprehensive warranty from the builder," said Colman. "Schneider Homes really stands behind their homes."

As part of this commitment to quality and comprehensive warranty, employees at Schneider Homes replaced about six gas tankless water heaters with 40-gallon water heaters after homeowners complained about the pressure and temperature of their water.

"Here's the problem," said Shea, "everyone in the development gets up at 6:30 in the morning and takes a shower. All of the sudden, you have 40 of these many thousand BTU hot water tanks coming on at the same time, and there is tremendous draw on the system."

"Builders have to plan for larger gas piping from the beginning," said Balderston. "A standard water heater might be 35,000 BTUs, but a tankless is 160,000 BTUs. A lot of builders have had this happen. They laid out their utilities in the ground, and then decided to put in tankless water heaters because these are efficient. It is a key problem," said Balderston. A larger infrastructure of gas piping would fix the problem. The advantage of tankless water heaters is that they burn gas only when hot water is being used, which is why the tankless heaters can burn at higher BTUs and still be more efficient than tank heaters, which burn gas on and off throughout the day to keep the tank water continuously hot.

Energy-Efficient Features

(based on a 2,019-square-foot home)

- **HERS:** 66, 67, 68
- **Walls:** 2x6 16-inch on-center
- **Attic Insulation:** R-38 to R-42 blown-in cellulose insulation
- **Wall insulation:** R-23 formaldehyde-free, blown-in fiberglass insulation (BIBs)
- **Roofing Material:** Asphalt shingles
- **Foundation:** 2-foot concrete slabs with R-10 foam perimeter
- **Ducts:** In conditioned space, mostly 3 to 4 ACH @ 50
- **Air Sealing:** Gasketing attic access hatches, foaming the bottom and top plates of the walls, and caulking all penetrations
- **HVAC:** Forced-air 92.5% AFUE gas furnace
- **Windows:** Two-pane, low-e, vinyl-framed, 0.34-U, 0.35 SHGC, 15% glazing area
- **Water Heating:** 80% gas tankless, with some replaced to 40-gallon 63% gas tanks
- **Ventilation:** Mechanical upgraded bathroom exhaust
- **Lighting and Appliances:** 80% CFLs; ENERGY STAR refrigerator, dishwasher, and clothes washer
- **Commissioning/Certification:** $2,000 federal tax credit certified and Northwest ENERGY STAR rated

(top) 28 homes at Schneider Home's Village at Miller Creek met the Building America 40% goal and qualified for the $2000 federal tax credit.

(bottom) Standard kitchen features in a Village at Miller Creek home include custom cherry cabinetry, slab granite countertops, a stainless steel double sink, a kitchen island, ENERGY STAR lighting, and stainless steel appliances, including an ENERGY STAR dishwasher.

Schneider Homes has its own real estate company (Schneider Family Homes) and one way that realtor Debra Alfieri sees this commitment to quality is that energy efficiency and other "extras" are not "upgrades" but included as standard features in their homes. "[For some builders] everything is an upgrade; you buy a stripped down house,…On all of ours, this [energy efficiency] is standard," said Alfieri, "and buyers still have the option to select additional upgrades to customize their new homes to their tastes."

All Schneider Homes are built to Northwest ENERGY STAR standards. Also, at Village at Miller Creek some of the standard features included CEM-Plank™ fiber cement siding, 30-year warranted shadow-blend roofing, insulated fiberglass entry door, small landscaped and fenced yards with sprinkler systems, 9-foot ceilings on the main floor, custom cherry cabinetry and slab granite countertops in kitchens and baths, cherry laminate flooring, quality plumbing fixtures, master bedroom ceiling fan, garbage disposal, stainless steel ENERGY STAR rated appliances, gas fireplaces with slab granite facing, and pre-wired for surround sound and other electronics.

Dollars and Sense

For the Village at Miller Creek townhouses, Schneider Homes benefitted from two incentive programs. As mentioned previously, 28 of the homes qualified for the $2,000 federal tax credit (for 50% greater heating and cooling energy savings than the 2004 IECC). In addition, Puget Sound Energy provided approximately $1,000 in rebates per house for energy-efficient building, such as air sealing and lighting. "The [Puget Sound Energy] rebate that we received through ENERGY STAR and the federal tax credit more than offset the additional construction cost [for the energy upgrades]," said Shea.

It is the homeowners who really appreciate the energy cost savings, as expressed by Colman: "We bought a new Schneider home three years ago that was ENERGY STAR rated. We moved from a smaller house, built in the 1970s, and our energy costs are significantly less for this bigger house than they were for our old home. Before we had about 2,300 square feet, and this house is 3000 square feet."

Bottom Line

Balderston says "the great thing about the project with Building America" is hearing from the construction manager how much energy savings they achieved with just a small financial investment. The homes meet the Building America 40% whole-house energy-savings goal for the marine climate, and "for a small investment, [after rebates] of about $1,000 a home, they received the tax credit on 28 homes, which amounts to $56,000," said Balderston.

For More Information

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

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