



## Builders Challenge

Comprehensive Energy Retrofit

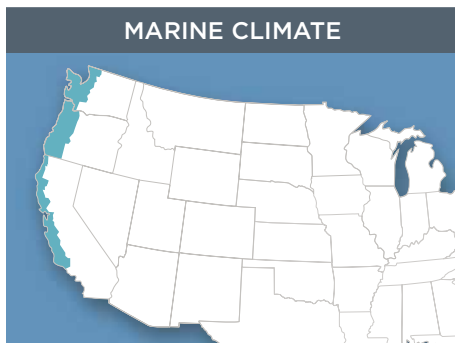
## High Performance Builder Spotlight

# Clifton View Homes

Coupeville, Washington

Clifton View Homes's remodel of a 1962 rambler cut energy costs by two-thirds.

The homeowners loved the views from their 1962 single-story home on Whidbey Island in Washington state, but they wanted a remodel to fix problems inside. What they got was a totally updated home with 300 extra square feet of living space, including a loft for the grandchildren, and a \$200 drop in monthly utility bills, thanks to the energy-efficiency know-how of their builder Clifton View Homes.



The remodeling project, which included replacing flooring and siding and changing the ceiling height, provided great opportunities to improve the air sealing and insulation levels in the now 2,908-ft<sup>2</sup> home. These and other design changes, along with choices in HVAC equipment, appliances, windows, and lighting, reduced utility bills from \$390 to \$135 per month. For the design of this remodel, Clifton View Homes used the Component Performance Worksheet software developed by Washington State University Energy Extension Office, a U.S. DOE Building America research partner. The program allows owner Ted Clifton to plug in different variables to determine which retrofit choices will yield the biggest “bang for the buck.”

### BUILDER PROFILE

**Builder:** Clifton View Homes  
Coupeville WA, cvh@whidbey.net  
Ted Clifton, President  
(360) 678-7000

**Year Founded:** 1990

**Number of Employees:** 5

**Homes Built This Year and Since Founding:**  
4 homes per year, about 80 since founding

**This Home:** 2,908 s.f., 1-story, built 1962,  
Retrofit completed March 2010, Cost per sq.  
ft. \$71.27

One option the builder has found cost effective on many of his new home and retrofit projects is the use of structural insulated panels (SIPS). On this home, 6.5-inch SIPS were used for new walls. On existing walls, old cedar siding was removed and the builder installed Insul-Lam panels, a product sometimes referred to as half-SIPS because it consists of rigid foam with OSB adhered to one side (instead of both sides). The panels extend from the bottom of the rim-joint to the soffit and each panel is sealed at the edges with beads of spray foam for an air-tight barrier. Over the Insul-Lam, Clifton installed Tyvek Drainwrap and new cement siding. Inside the wall cavities, insulation was upgraded from R-11 to R-15 fiberglass batt. Rim joists were also insulated with R-15 batts.

The homeowners wanted the ceilings raised from 7 feet 9 inches to 8 feet, so Clifton designed trusses with a 4-inch vertical leg to increase the ceiling height. The raised heel on the new trusses allowed the builder to increase attic insulation from R-19 batt to R-49 blown fiberglass with full insulation coverage.

The 48-year old furnace and patchwork of leaky ducts were replaced with a 9-HSPF ductless mini-split heat pump system consisting of two outside units (one at each end of the house) and eight inside heads for energy-efficient, zoned heating and cooling.

The subfloor over the vented crawlspace was covered with a layer of OSB that was glued, nailed, and caulked at the edges to provide an air-tight floor. Subfloor insulation was increased from R-19 to R-38. These air sealing measures reduced whole house air leakage from 14.3 air changes per hour at 50 Pascals to 5.25 ACH50. A mechanically powered HEPA filtered fresh air intake and equally powered exhaust fan were installed on the same switch for balanced ventilation.

Single-pane aluminum-frame windows were upgraded to low-emissivity, gas-filled vinyl windows with a higher SHGC on the east-side to enable morning warming. New ENERGY STAR appliances and lighting were installed.

Solar thermal water heating and photovoltaic panels were not installed, but plumbing and wiring were installed and the roof was structurally designed to make the home solar-ready when the owner has the budget to install them.



Visible here on the home's southeast side is one of the outside units for the ductless heat pump system that replaced the home's ancient furnace and leaky ducts, providing efficient, ductless, zoned heating and cooling.

### Energy Efficient Features—Before and After

|                                      | Existing Home  | Post-Renovation   |
|--------------------------------------|--|---|
| House Size                           | 2,640 s.f.   | 2,908 s.f.  |
| Foundation                           | Vented crawlspace  | Vented crawlspace + R-31 perimeter insulation; R-20 perimeter and under-slab insulation for addition  |
| Under-Floor Insulation               | R-19 Fiberglass batt   | R-38 Fiberglass batt  |
| Wall Construction                    | 2x4 16 in o.c. with some R-11 fiberglass batt insulation No housewrap, #15 asphalt paper moisture barrier, wood siding, ¾" SPF plywood | 2x4 in o.c. with R-15 fiberglass batt insulation in cavity, Insul-lam foam-insulated OSB panels, and R-15 SIPs (6.5") in addition. Cement siding, tyvek drainwrap |
| Rim Joist Insulation                 | None   | R-15 fiberglass batt  |
| Roof Construction/Ceiling Insulation | Stick-framed with R-19 fiberglass batt at ceiling plane  | Raised-heel trusses with R-49 blown fiberglass insulation   |
| Windows                              | Single-pane, aluminum  | Low-e, gas-filled vinyl windows; U-0.28 to 0.31, SHGC 0.21 to 0.43  |
| HVAC                                 | 48-year-old electric furnace, 27 yrs old electrostatic air cleaner   | 9 HSPF ductless mini-split heat pump system (2 outside units, 8 inside heads); HEPA-filtered 19 MERV fresh air supply ventilation                                 |
| Ventilation                          | none   | Laundry rm fan, 80cfm   |
| Ducts                                | In vented crawlspace   | Removed   |
| Water Heating                        | Two, 0.91 EF, 50-gallon electric tank water heater with copper distribution  | Two, 0.91 EF, 50-gallon electric tank water heater with PEX distribution; Rough-in for solar water heating  |
| Lighting                             | 12% ENERGY STAR fixtures   | 33% ENERGY STAR fixtures; 100% CFLs   |
| Appliances                           | ENERGY STAR refrigerator and dishwasher  | ENERGY STAR refrigerator, dishwasher, and clothes washer  |
| Duct Leakage                         | Not tested   | N/A   |
| Blower Door Test                     | 14.3 ACH50   | 5.25 ACH50  |
| HERS Index                           | N/A  | 74  |
| Utility Bills                        | \$390 per month<br>54,824 avg kwh/month  | \$135 per month<br>18,667 avg kwh/month   |

“Over the last twenty plus years, we have developed a reputation for providing our customers with the most energy-efficient homes they can buy in our marketplace. This reputation has allowed us to continue to stay busy in a very challenging economy,” said Ted Clifton, president of Clifton View Homes. “One of the keys to energy efficiency is the degree to which every system is dependent on every other system. Fostering an understanding and respect among our workers and sub-contractors of how important each of their contributions is to the success of the whole process is one of the most important pieces of our energy efficiency puzzle,” said Clifton, who is president of Built Green® Washington and teaches green building classes to local contractors and builders.