



## Technical Bulletin

### Evergreen House Cost Comparison: Industry-Provided Data

20 July 2023

**How Much and How Much Better?** Is a research project conducted by Just Housing SBC and the University of Minnesota Duluth, with assistance from industry professionals. The project compared the projected cost and modeled performance of two versions of the **Evergreen House**. (See chart on page 2 for detailed comparison elements)

ZNE (Zero Net Energy):

- Optimized energy efficient enclosure and systems for zero-net energy operation
- All-electric operation
- 9.6 kW roof-mounted PV system

CODE:

- Built to current MN code standards, and with typical equipment for a code home
- Natural gas for space heating and cooking
- Electric appliances for air conditioning and water heating

### Summary of Industry-Provided Data (see endnote on page 2)

1. Floor Slab Insulation R-24
  - a. Additional material costs: \$3,600.00
  - b. Additional labor to install insulation: 24 person-hours (2 people, 1.5 days)
2. Continuous Insulation: R-15 nailbase panels
  - a. Material costs (panels plus fasteners and sealant): \$8600.00
  - b. Freight: \$1,900.00
  - c. Additional labor: 144 person-hours (3 people, 6 days)
3. Tri-pane Windows
  - a. Additional material cost for windows: \$5,000.00
  - b. Additional material cost for 2 x 12 R.O. bucks: \$500.00
  - c. Additional labor for extended R.O. bucks: 8 person-hours
4. Attic insulation - \$1,000.00 increased cost for insulation and taller energy heel truss
5. Electrical subcontractor – essentially the labor same cost as a code-built home.
6. Mechanical subcontractor – lower installation costs because no natural gas equipment, no separate air conditioning system, smaller ductwork, simpler duct runs, and fewer soffits.
7. Mechanical equipment – about \$1700 more for higher performance equipment
8. Sealed plywood sheathing as the wall air barrier – no cost difference, because of the following reasons:
  - a. No interior poly necessary
  - b. No flanged electrical boxes in the walls, no sealing poly to the interior electrical boxes, or taping joints, using acoustical sealant, etc.
  - c. Caulk at the plates of the sheathing and taping all the joints (Evergreen House details) was considered “equivalent” in material and labor costs.
9. Sealed polyethylene as the ceiling air barrier and vapor retarder in ZNE home: identical system to a code-built home, so no change in cost.



### Evergreen House Features: Comparison Chart of Differences

ELEMENT	CODE	ZNE
Design	Evergreen House	Evergreen House
Slab Edge Insulation	R-10	R-11 (using an ICF foundation wall)
Slab Insulation	none	R-24
Framed Walls	2 x 6 studs w/R-21 batts	2 x 6 studs w/R-21 cellulose
Wall air sealing	Interior poly, sealed	Sealed plywood wall sheathing
Continuous insulation	none	R-15 nailbase panels
Windows	U-0.3, dual pane	U-0.2, tri-pane w/insulated frame
Attic Insulation	R-49 cellulose	R-72 cellulose
Air Tightness	3 ACH50	0.9 ACH50
Ventilation	Standard HRV, ducted	High efficiency ERV, ducted
Heating	Gas-fired furnace	Cold Climate ASHP + 5kW duct heater
Cooling	Standard A/C SEER 13	Same as heating system above
Distribution ducts	Larger ducts	Entirely within planned soffits
	Additional soffits added	
Domestic hot water	50 gal electric tank	50 gal heat pump water heater
Appliances	Gas range	Electric induction range
	Standard Refrigerator	Energy Star Refrigerator
	Standard clothes washer	Energy Star clothes washer
Lighting	standard	More LED/Energy Star fixtures
Energy Monitor	no	yes
PV Array	none	9.6 kW roof-mounted array
Certifications	none	HERS and ZERH

#### Endnote

The industry-provided data provided in this bulletin includes material quotes from suppliers and vendors, and estimated labor numbers from subcontractors and general contractors familiar with these methods and materials. Industry professionals who provided estimated cost of labor numbers reviewed the actual building plans and specifications for the ZNE house, and were given the “code option” differences in list form. The material cost and labor data were gathered in the winter and spring of 2022, in Duluth, Minnesota. This information should be used for reference, and not as a substitute for actual material and labor quotes required for the bid of a project.