

# 2008 Energy Makeover Contest Winners

## Home Improvement Associated Costs and Savings

**645 15<sup>th</sup> St., Boulder, Colorado**

\* based on REM/Rate Analysis Reports

\*\* based on ENERGY STAR

Measure Implemented	Sponsor	Prior to Makeover (Nov.2008)	Measure Improvement (Jan.2009)	Cost of Measure	Estimated Energy Savings (Annual)
<b>Air Conditioner</b>	Lennox Industries Save Home Heat	10 SEER Carrier	20 SEER Lennox XC21-036	\$6450	\$67.00 * 771 kWh 140% reduction
<b>Heating System</b>	Lennox Industries Save Home Heat	80% Efficient Carrier Furnace	Lennox G71MPP 95% Efficiency w/ Eff. Blower Motor	\$4,900	\$859.00 * 246.1 Btu, 538 kWh 127% reduction
<b>Water Heater</b>	Rinnai Save Home Heat	Standard 40 gal Water Heater 62% Efficient	Rinnai Tankless w/ sealed combustion 82% Efficient	\$3,990	\$29.00 * 42 Btu 34%reduction
<b>Windows</b>	Accent Windows, Inc.	Single pane metal frame windows R-1 Wood Doors	18 Double Pane Low-E , R-3.3 + 2 Insulated Doors	\$13,296	\$395.00 ** 34.8 Btu
<b>Insulation</b>	Bestway Insulation Service	R-6	Cellulose R-60	\$1,285	\$298.00
<b>Attic</b>					
<b>Wall</b>					
<b>Crawlspace</b>		Unconditioned Crawlspace	Air Sealing R-19 Fiberglass Blanket & Foam	\$4,439	\$122.00
<b>Duct Work</b>	Ductworks, Inc.	500 CFM @ 25 Pascal's Dirty, Unsealed and Very Leaky	150 CFM @ 25 Pascal's Clean and Sealed. Brought to conditioned crawlsp	\$400	Up to 20% ** on heating and cooling costs
<b>Window Coverings</b>	The Blind Spot	Variety of Products	Hunter Douglas Duette Architella Shades	\$6,189	Up to 30% ** savings on heat lost through windows
<b>Lighting</b>	City of Boulder	Incandescent	23 CFL's	\$100	\$155.00 ** 509 kWh 8.1% reduction
<b>Washer &amp; Dryer</b>	Appliance Factory Outlet	Traditional Top Loaders	Front Load Washer & Electric Dryer	\$1,331	\$42.00 * 582 gal
<b>TOTAL ANNUAL ENERGY SAVINGS</b>					<b>\$1,484.00 or 40%</b>
<b>HERS Rating – Residential Energy Analysis</b>	Lightly Treading, Inc.	HERS Score: 227	HERS Score: 109	\$650	—
<b>Air Leakage – Natural Air Changes Per Hour</b>		0.62 NACH	0.30 NACH	—	Up to 10%** on total annually energy bill
<b>Carbon Dioxide</b>		45,139.6 lbs/yr	26,777.3 lbs/yr	—	18,362.3 * lbs 69% reduction



March 2009

## Home Energy Makeover Home Report

To: Home Energy Makeover Team  
From: Mark Rogers, Lightly Treading  
RE: 645 15<sup>th</sup> St., Boulder CO

Congratulations on making this house significantly more energy efficient.

Through the Home Energy Rating System inspection process and software-based energy analysis, Lightly Treading performed economic modeling on all of the components of the house and prioritized improvements to ensure that the most cost-effective upgrades were considered during the remodel. Thanks to Xcel Energy, the Smart Energy Living Alliance, and the rest of the Home Energy Makeover Team, the Maybee family will be paying a lot less for their utility bills, and their home should be more comfortable as well.

Below is a comparison of the specifications for this house before and after the remodel.

	Original Specs (Nov.2008)	Upgraded Specs (Jan. 2009)
<b>Air leakage (NACH)*</b>	0.62	0.30
<b>Ceiling insulation</b>	R-13 to R-26	R-50 blown cellulose
<b>Crawl space wall insulation</b>	None	R-19 fiberglass blanket
<b>Crawl space rim joist insulation</b>	None	Sealed with foam & Insulated to R-19
<b>Master bedroom wall insulation</b>	None	R-16 closed-cell foam
<b>Windows</b>	Single pane metal frame windows (R-1)	Double-pane low-E Accent windows (R-3.3)
<b>Doors</b>	Wood (R-2.1)	Insulated doors (R-5)
<b>Heating system</b>	80% efficient furnace + 60% efficient gas through-the-wall heater	95% efficient Lennox with variable speed motor
<b>Water heater</b>	62% efficient tank	82% efficient tankless Rinnai
<b>Air Conditioner</b>	10 SEER	20 SEER Lennox
<b>Ducts</b>	Inefficient attic-based duct system. Very leaky and a contributor to comfort problems.	Duct system completely redone and brought into conditioned crawl space. Much tighter and more efficient.
<b>HERS Energy Rating Score**</b>	227	109
<b>Estimated Annual Energy costs</b>	\$2,540	\$1,560
<b>Estimated Energy savings</b>	n/a	39.5%

### Air Leakage

The home's air leakage was measured and individual leaks were identified by Lightly Treading with a blower door test (a blower door is a device which depressurizes the house with a large fan). The first test in November revealed that the house had a Natural Air Change per Hour (NACH) rate of 0.62, which means that under normal conditions, 62% of the air in the house was exchanged with the air outside every hour.

Melton Construction and the rest of the Energy Makeover team were able to reduce the air leakage by more than 50%! This result was confirmed by our second blower door test in January.

### Crawl Space

The crawl space was completely un-insulated to the outside when we performed the initial energy rating. Between November and January, Melton Construction installed insulation on the crawl space walls. A vapor barrier was also added over the dirt to reduce the likelihood of moisture problems in the house.

### Insulation

Wall insulation was added to the previously un-insulated walls, making the master bedroom more comfortable. Ceiling insulation was upgraded from the low level of R13 to R26 to R-50 with blown cellulose. These improvements will save the owners a lot of money on their energy bills.

### Space Heating Systems

The upgrade to a 95% efficient Lennox furnace alone should reduce the Maybee family's space heating by more than 15%! The air conditioner is much more efficient as well, and will reduce energy bills during the summer.

### Duct System

The old duct system was very leaky, and most of it was located in the attic. As part of the remodel, a new duct system was added to the now insulated crawl space, and the furnace was moved there as well; this is a much more efficient arrangement. The redesigned system allowed the removal of the old 1940's gas heater from the master bedroom, and provides comfort benefits too.

### Water Heating

The new tankless Rinnai water heater is 20% more efficient than the old one it replaced, and takes up virtually no space compared to the old tank-style heater.

### Overall savings

Our computer modeling of the Maybee house estimates that the Energy Makeover improvements should decrease overall energy costs by about 40%. Great work on the improvements!

### HERS Energy Ratings

The HERS (Home Energy Rating System) energy rating that we performed before improvements were made allowed us to prioritize improvements based on their cost-effectiveness. The rating we did after improvements were made confirmed that the score was cut by more than half, which is excellent! The scoring system is explained below.

The following background information on Energy Ratings is excerpted from the Residential Energy Services Network's web page:

*The Home Energy Rating System (HERS) is governed by the Residential Energy Services Network (RESNET). RESNET Ratings provide a relative energy use index called the HERS Index – a HERS Index of 100 represents the [total] energy use of the "American Standard Building" [a typical new home] and an Index of zero indicates that the Proposed Building uses no net purchased energy (a Zero Energy Building).*

*RESNET's standards are officially recognized by the U.S. mortgage industry for capitalizing a building's energy performance in the mortgage loan, certification of "White Tags" for private financial investors, and by the federal government for verification of building energy performance for such programs as federal tax incentives, the Environmental Protection Agency's ENERGY STAR program and the U.S. Department of Energy's Building America Program.*

