

Action Report

Property

Joanne Keys/Rusty Schweickart
2861 North Lakeridge Trail
Boulder, CO 80302

Organization

Lightly Treading, Inc.
303-733-3078
Paul Kriescher

HERS

Confirmed
7/20/15
Rater ID:3379026

Weather:Boulder, CO

Keys Residence
2861nLakeridgeTr80302_C.blg

Builder

Fuentes Design

The following table identifies and ranks energy use and cost by building component. A maximum of six components are shown. Current mechanical equipment is assumed for this analysis. To determine the impact of varying the equipment efficiency, change the equipment specified in the building file and perform the energy calculations again.

ANNUAL ENERGY PROFILE

Energy End-Use	Component	Consumption(MMBtu/yr)	Cost(\$/yr)
HEATING	Slab Floors	2.8	105
	Windows/Skylights	1.7	62
	Ceilings/Roofs	1.6	58
	Infiltration	1.5	55
	Above Grade Walls	1.4	51
	Foundation Walls	1.0	36
	Other	-1.5	-55
	Total	8.4	311
COOLING	Windows/Skylights	12.8	567
	Internal Gains	1.8	79
	Ceilings/Roofs	0.1	5
	Crawl Space/Unht Bsmt	0.0	0
	Other	-3.9	-172
	Total	10.9	479
WATER HEATING	Water Heater	2.5	95
LIGHTS & APPLIANCES	Lights & Appliances	26.8	1057
PHOTOVOLTAICS	Photovoltaics	-53.0	-2091

REM/Rate - Residential Energy Analysis and Rating Software v14.6.1

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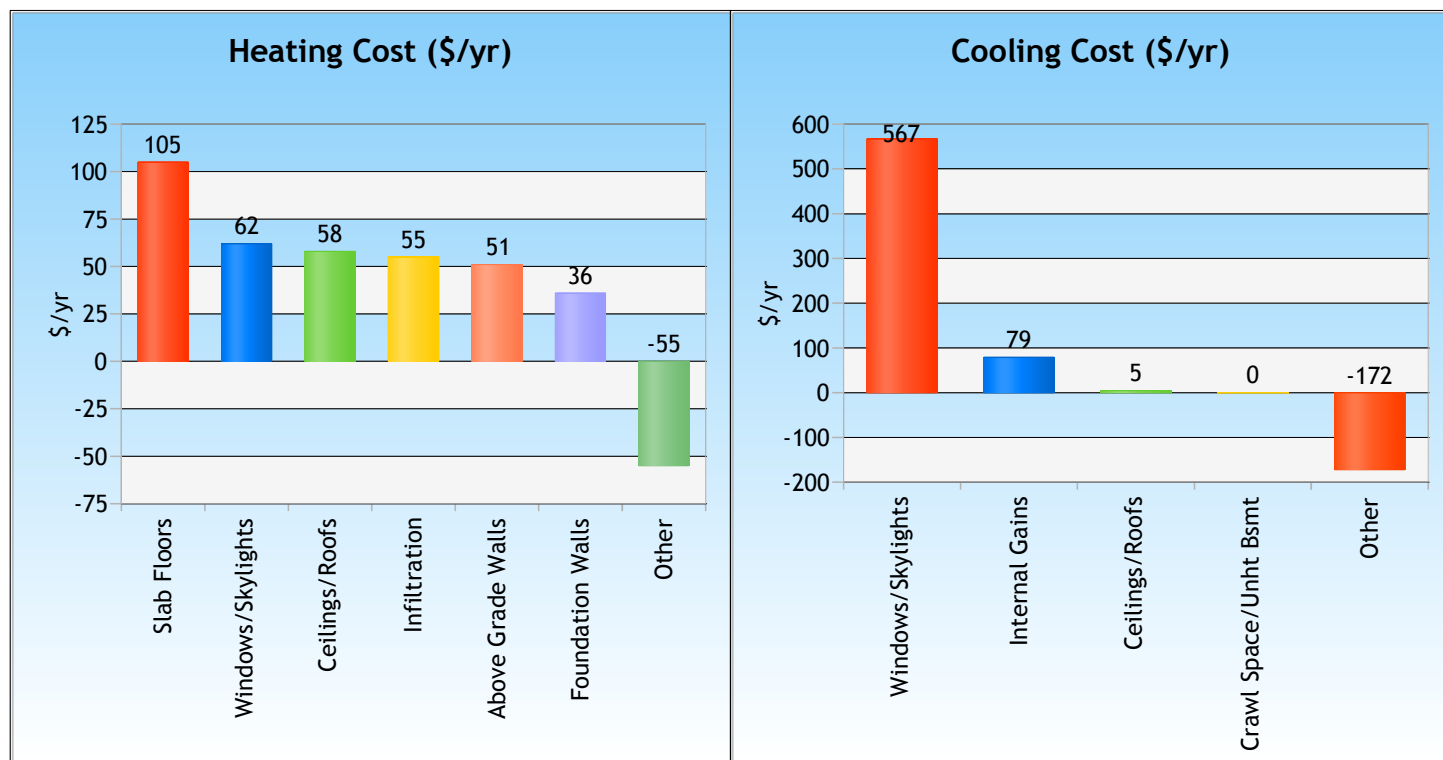
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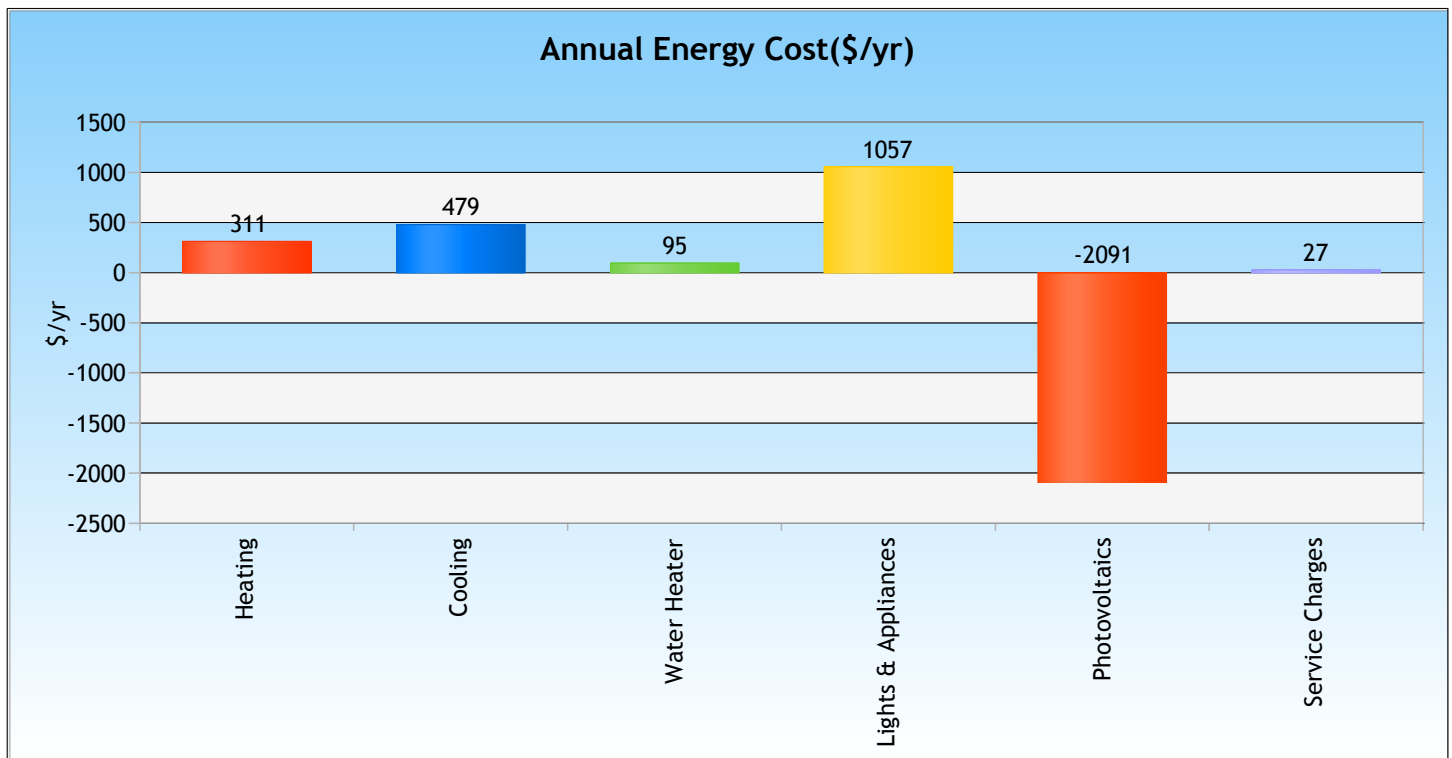
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Air Leakage

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Whole House Infiltration

Blower Door Test

Heating

Cooling

Natural ACH	0.07	0.05
ACH @ 50 Pascals	0.99	0.99
CFM @ 25 Pascals	347	347
CFM @ 50 Pascals	545	545
Eff. Leakage Area (sq.in)	29.9	29.9
Specific Leakage Area	0.00006	0.00006
ELA/100 sf shell (sq.in)	0.33	0.33

Duct Leakage

Leakage to Outside Units

Solo

CFM @ 25 Pascals	15
CFM25 / CFMfan	0.0094
CFM25 / CFA	0.0041
CFM per Std 152	N/A
CFM per Std 152 / CFA	N/A
CFM @ 50 Pascals	24
Eff. Leakage Area (sq.in)	1.29
Thermal Efficiency	N/A
Total Duct Leakage Units	CFM25/CFA
Total Duct Leakage	0.1032

Ventilation

Mechanical	Balanced	ASHRAE
Sensible Recovery Eff. (%)	70.0	62.2-2010
Total Recovery Eff. (%)	53.0	
Rate (cfm)	67	67
Hours/Day	24.0	24.0
Fan Watts	51.0	
Cooling Ventilation	Natural Ventilation	

ASHRAE 62.2 - Ventilation Requirements

The ASHRAE 62.2 flow rates shown above are the CONTINUOUS mechanical fresh air ventilation which will meet the 'whole-building' requirement under that version of the standard. Both values incorporate any appropriate 'infiltration credit'. Intermittent mechanical ventilation may be used if the flow rate is adjusted accordingly. For example, the runtime can be reduced to 12 hours per day using a doubled flow rate, as long as the system provides ventilation at least once every 3 hours. For more detail, refer to the appropriate standard.

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Component Loads

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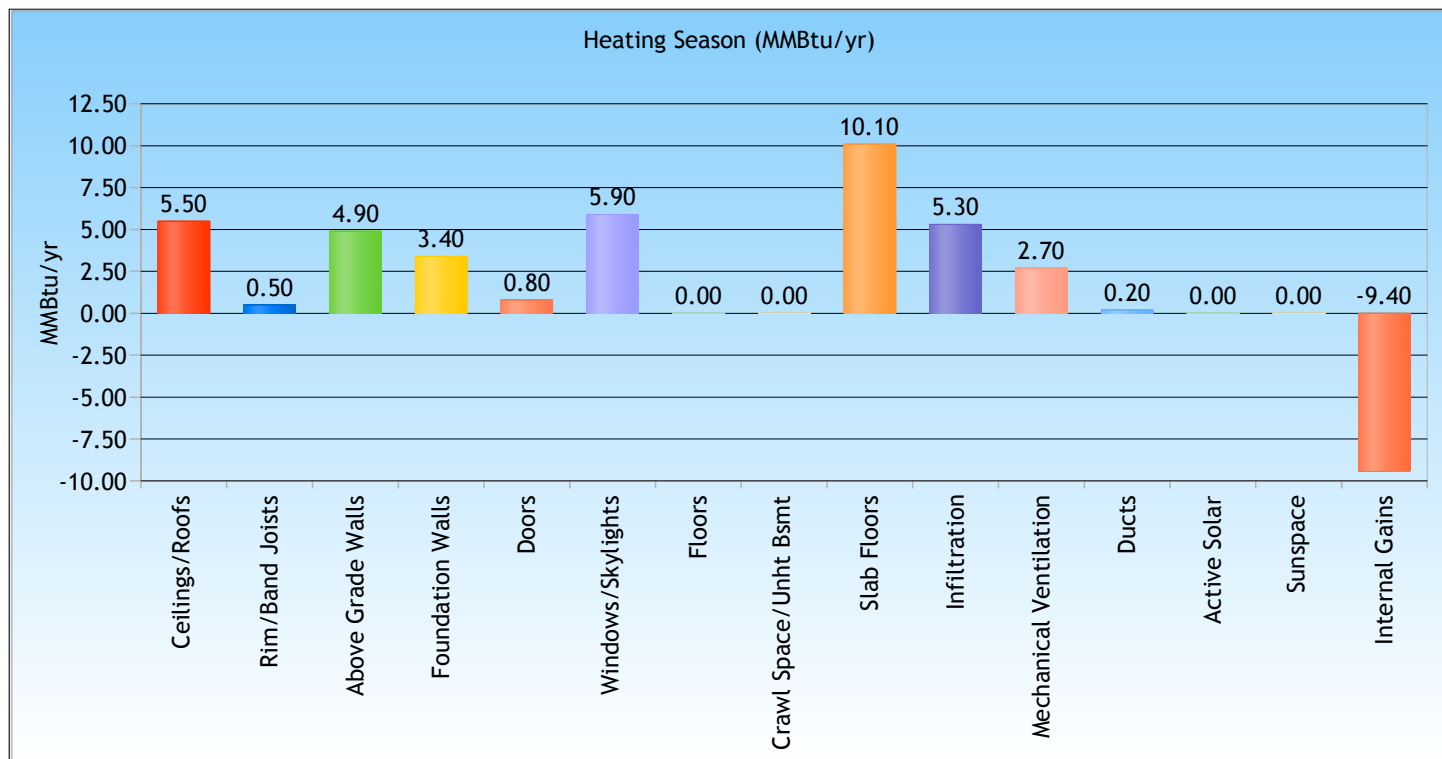
Builder

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Heating Season

MMBtu/yr

Ceilings/Roofs	5.5
Rim/Band Joists	0.5
Above Grade Walls	4.9
Foundation Walls	3.4
Doors	0.8
Windows/Skylights	5.9
Floors	0.0
Crawl Space/Unht Bsmt	0.0
Slab Floors	10.1
Infiltration	5.3
Mechanical Ventilation	2.7
Ducts	0.2
Active Solar	0.0
Sunspace	0.0
Internal Gains	-9.4
Total	29.9



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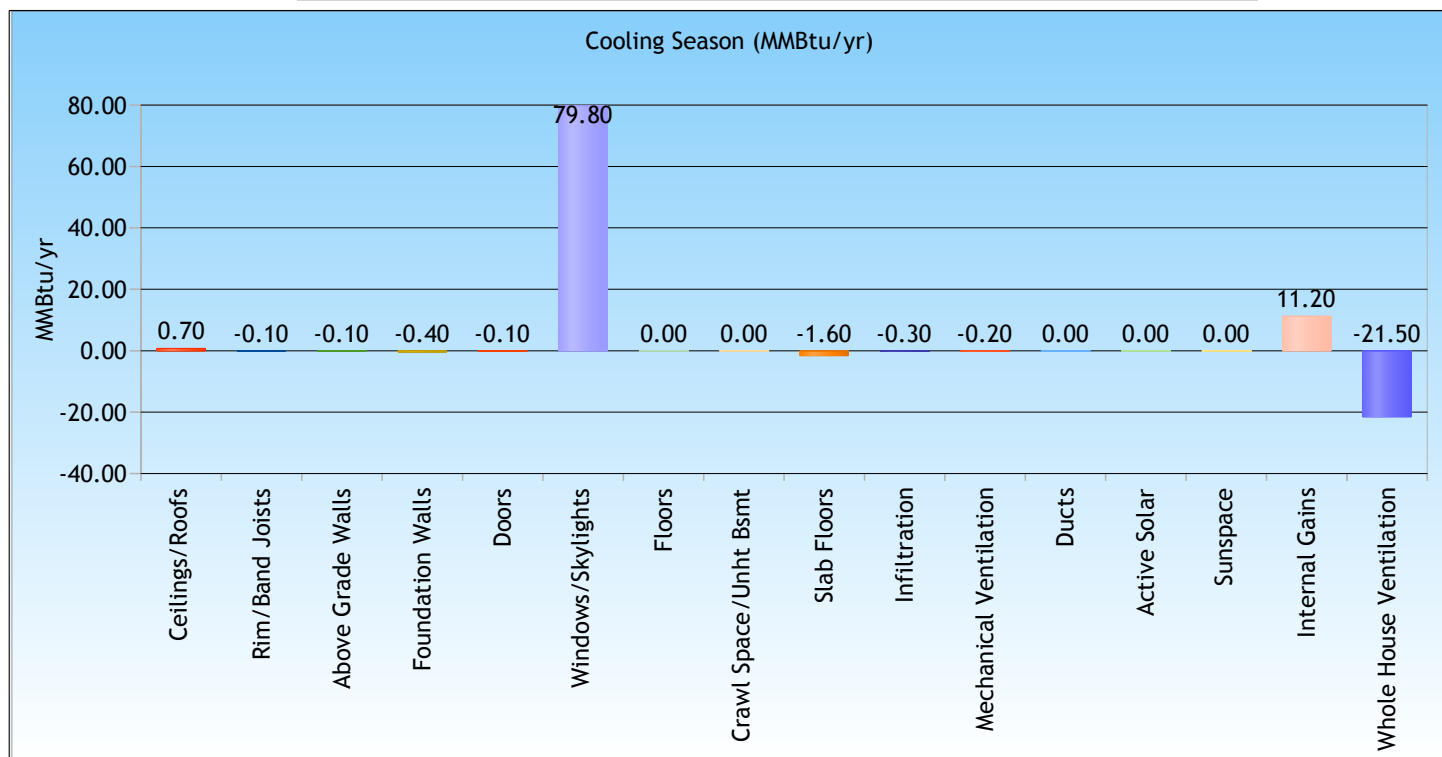
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Fuentes Design

Cooling Season

MMBtu/yr

Ceilings/Roofs	0.7
Rim/Band Joists	-0.1
Above Grade Walls	-0.1
Foundation Walls	-0.4
Doors	-0.1
Windows/Skylights	79.8
Floors	0.0
Crawl Space/Unht Bsmt	0.0
Slab Floors	-1.6
Infiltration	-0.3
Mechanical Ventilation	-0.2
Ducts	0.0
Active Solar	0.0
Sunspace	0.0
Internal Gains	11.2
Whole House Ventilation	-21.5
Total	67.4



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Energy Cost and Features

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Annual Energy Costs

\$/yr

Heating	311
Cooling	479
Water Heating	95
Lights & Appliances	1057
Photovoltaics	-2091
Service Charges	27
Total	-122
Average Monthly(\$/Month)	-10

Energy Features

Ceiling w/Attic	None
Sealed Attic	None
Vaulted Ceiling	R75,BCE+CCF,18-24***** U=0.016
Above Grade Wall	R19.8,BCE,6-16,+22***** U=0.025
Foundation Walls (Cond)	4" Substrate CCSF0** R=26.0
Foundation Walls (Uncond)	None
Doors	Zolla 3080 3.5"0** U=0.101
Windows	U:0.125, SHGC:0.48***** U=0.125
Floors	Uninsulated U=0.257
Slab Floors	Uninsulated U=0.365
Infiltration	Htg: 545 Clg: 545 CFM50
Infiltration Measure	Blower door test
Mechanical Ventilation	Balanced: ERV, 67 cfm, 51.0 watts.
Interior Mass	None
Mechanical Equipment 1	GSHP: Htg: 94.1 kBtuh, 3.3 COP. Clg: 48.0 kBtuh, 21.6 EER, with Desuperheater.
Mechanical Equipment 2	Water Heating: Ground source heat pump, Elec, 3.00 EF, R-16 wrap.
Programmable Thermostat	Heat=Yes; Cool=Yes
Ducts	UninsulatedConditioned space
Duct Leakage to Outside	15.00 CFM @ 25 Pascals
Total Duct Leakage	380.00 CFM @ 25 Pascals
Lights/Appliances	Defaults

Note: Where feature level varies in home, the dominate value is shown.

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Energy Cost and Features

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Energy Features

Active Solar	None
Photovoltaics	10000.00
Sunspace	No

Note: Where feature level varies in home, the dominate value is shown.

Fuel Summary

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Fuentes Design

Annual End-Use Cost	\$/yr
Heating	311
Cooling	479
Water Heating	95
Lights & Appliances	1057
Photovoltaics	-2091
Service Charge	27
Total	-122

Annual End-Use Consumption	
Heating (kWh)	2466
Cooling (kWh)	3180
Water Heating (kWh)	747
Lights & Appliances (kWh)	7843
Photovoltaics (kWh)	-15518

Annual Energy Demands	kW
Heating	6.5
Cooling	3.0
Water Heating (Winter Peak)	0.2
Water Heating (Summer Peak)	0.0
Lights & Appliances (Winter Peak)	0.6
Lights & Appliances (Summer Peak)	1.5
Total Winter Peak	7.4
Total Summer Peak	4.6

Utility Rates

Electricity	Xcel Elec 2015*****
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Performance Report

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Fuentes Design

Annual Load

MMBtu/yr

Heating	29.9
Cooling	67.4
Water Heating	8.2

Annual Consumption

MMBtu/yr

Heating	8.4
Cooling	10.9
Water Heating	2.5
Lights & Appliances	26.8
Photovoltaics	-53.0
Total	-4.4

Annual Energy Cost

\$/yr

Heating	311
Cooling	479
Water Heating	95
Lights & Appliances	1057
Photovoltaics	-2091
Service Charges	27
Total	-122

Design Loads

kBtu/hr

Space Heating	24.3
Space Cooling	46.8

Utility Rates

Electricity	Xcel Elec 2015*****
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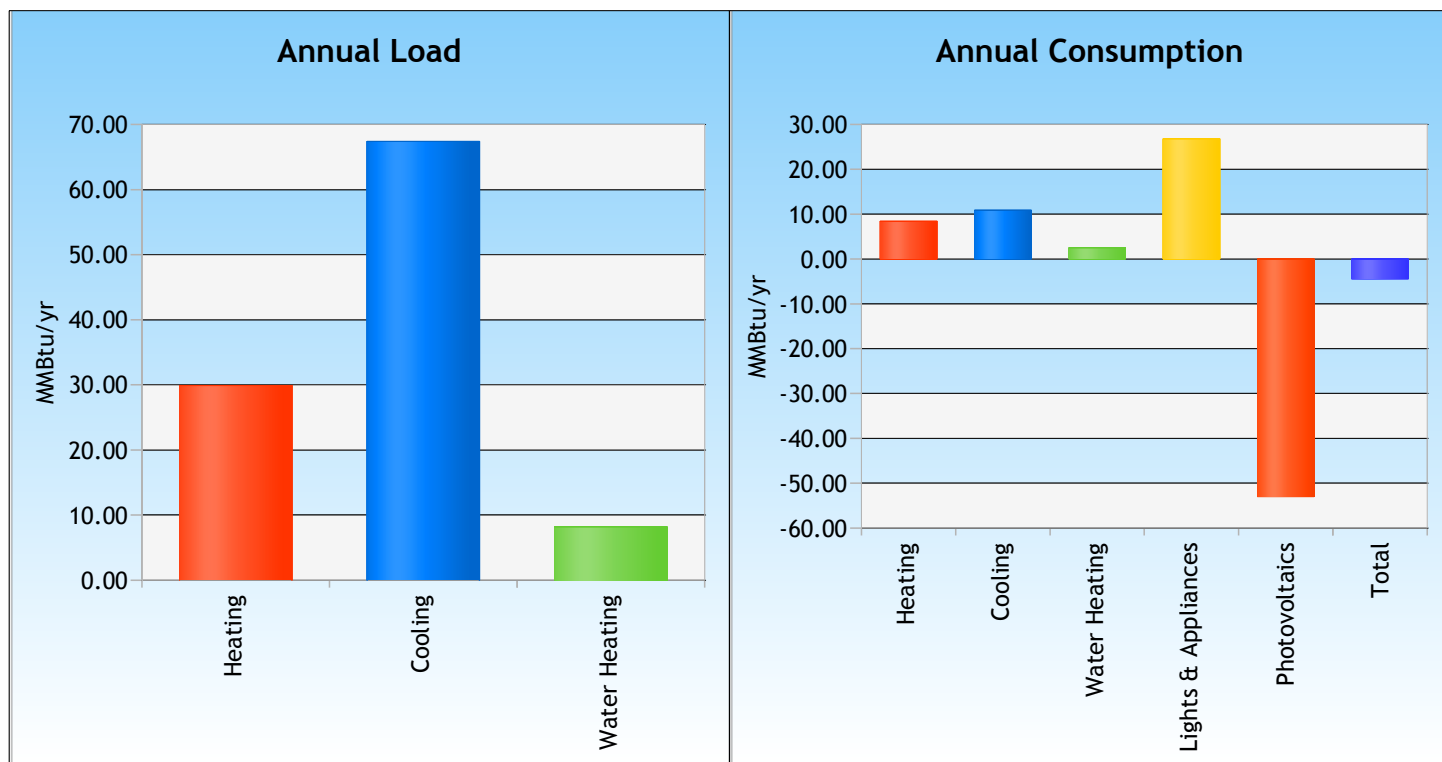
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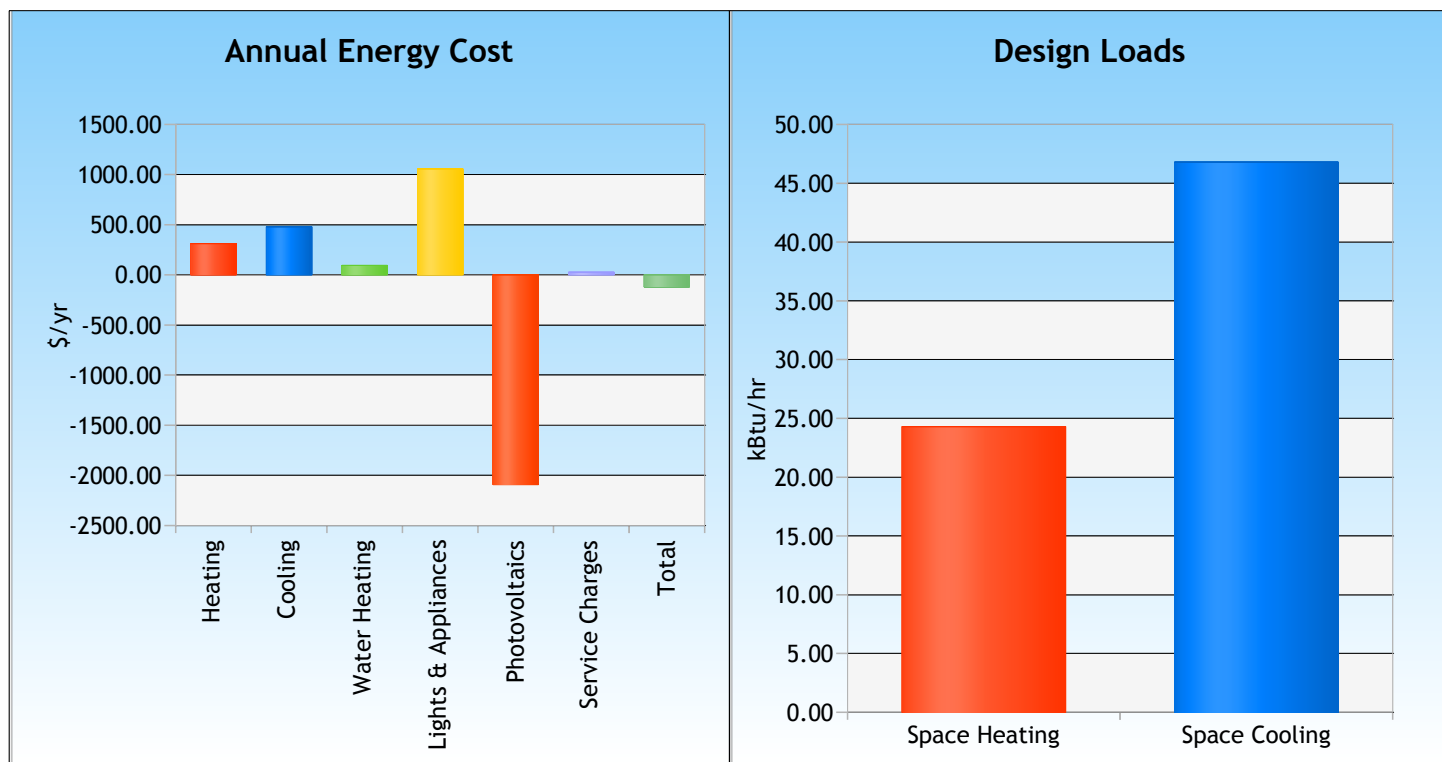
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Source Energy & Emissions

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Source Energy Consumption (MMBtu/year)

	All Electric Reference Home	As Designed	Difference	% Difference
Heating	174.1	28.6	-145.5	-83.6%
Cooling	32.2	36.9	4.7	14.4%
WaterHeating	49.6	8.7	-41.0	-82.5%
LightsAppliances	120.4	91.0	-29.4	-24.4%
Photovoltaics	0.0	-180.1	-180.1	
Total	376.4	-14.9	-391.2	-104.0%

Total Emissions

Type of Emissions	All Electric Reference Home	As Designed	Difference	% Difference
Carbon Dioxide (CO2) - tons/year	28.2	-1.1	-29.3	-104.0%
Sulfur Dioxide (SO2) - lbs/year	61.8	-2.4	-64.2	-104.0%
Nitrogen Oxides (NOx) - lbs/year	82.1	-3.2	-85.4	-104.0%

Emissions By End-Use

(All Electric Reference Home versus As Designed)

	CO2-tons/yr		SO2-lbs/yr		NOx-lbs/yr	
	Reference	Design	Reference	Design	Reference	Design
Heating	13.0	2.1	28.6	4.7	38.0	6.2
Cooling	2.4	2.8	5.3	6.1	7.0	8.1
WaterHeating	3.7	0.6	8.1	1.4	10.8	1.9
LightsAppliances	9.0	6.8	19.8	14.9	26.3	19.9
Photovoltaics	0.0	-13.5	0.0	-29.5	0.0	-39.3

The energy and emission values are calculated by comparing the Rated Home to an all-electric version of the Reference Home as defined in the 'Mortgage Industry National Home Energy Rating Systems Standards' as promulgated by the Residential Energy Services Network (RESNET). Site-to-source multipliers and air emission data were taken from the US EPA eGRID2012 database.

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Home Energy Rating Certificate

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HERS

Rating Type: Confirmed
Rating Date: 7/20/15
Registry ID: 451663277

Certified Energy Rater: Paul Kriescher
Rating Number:

HERS Index: -4

General Information

Conditioned Area	3681 sq. ft.	House Type	Single-family detached
Conditioned Volume	33129 cubic ft.	Foundation	More than one type
Bedrooms	3		

Mechanical Systems Features

Ground-source heat pump:	Electric, Htg: 3.3 COP. Clg: 21.6 EER, w/DSH.
Water Heating:	Ground source heat pump, Electric, 3.00 EF, 85.0 Gal, R-16 wrap.
Duct Leakage to Outside	15.00 CFM25.
Ventilation System	Balanced: ERV, 67 cfm, 51.0 watts.
Programmable Thermostat	Heat=Yes; Cool=Yes

Building Shell Features

Ceiling Flat	NA	Slab	R-0.0 Edge, R-0.0 Under
Sealed Attic	NA	Exposed Floor	R-0.0
Vaulted Ceiling	R-75.0	Window Type	U-Value: 0.125, SHGC: 1.000
Above Grade Walls	R-41.8	Infiltration Rate	Htg: 545 Clg: 545 CFM50
Foundation Walls	R-26.0	Method	Blower door test

Lights and Appliance Features

Percent Interior Lighting	100.00	Range/Oven Fuel	Electric
Percent Garage Lighting	100.00	Clothes Dryer Fuel	Electric
Refrigerator (kWh/yr)	479	Clothes Dryer EF	3.01
Dishwasher (kWh/yr)	259	Ceiling Fan (cfm/Watt)	0.00

Estimated Annual Energy Cost

Use	MMBtu	Cost	Percent
Heating	11.6	\$311	-255%
Cooling	30.4	\$479	-394%
Hot Water	2.4	\$95	-78%
Lights/Appliances	26.8	\$1057	-869%
Photovoltaics	-53.0	\$-2091	1719%
Service Charges		\$27	-22%
Total	18.2	\$-122	100%

Criteria

This home meets or exceeds the minimum criteria for the following:

TITLE

Company

Address

City, State, Zip

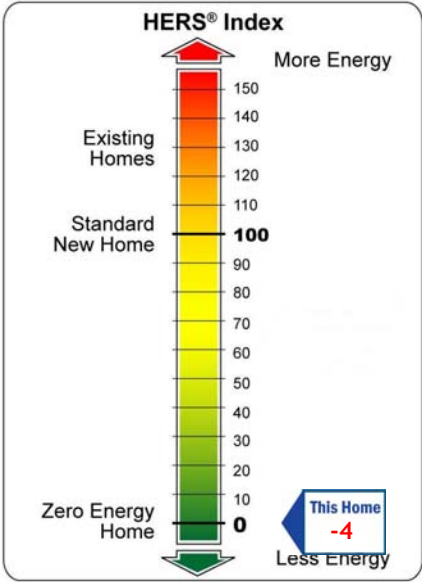
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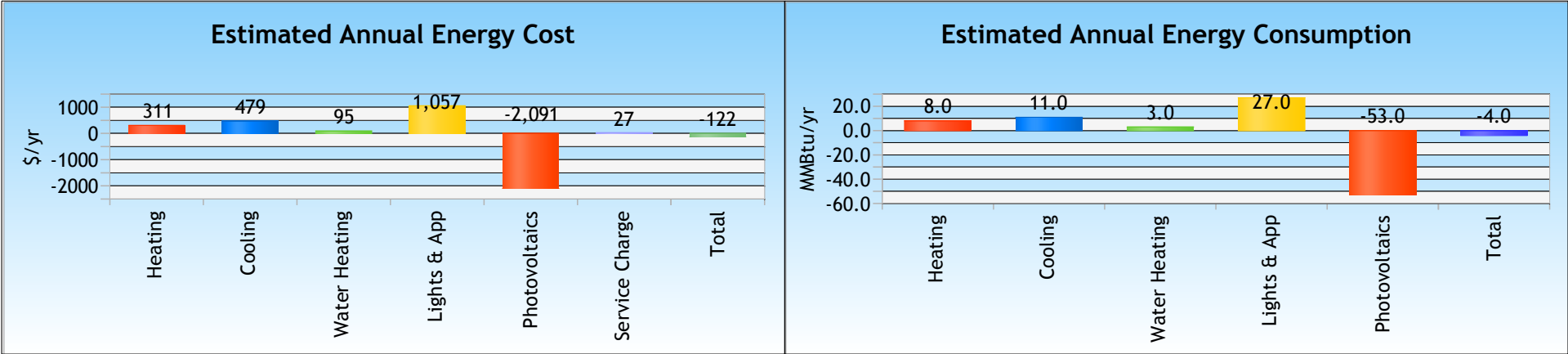
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The Home Energy Rating Standard Disclosure for this home is available from the rating provider.

HOME PERFORMANCE WITH ENERGY STAR



ENERGY RATING CERTIFICATE



Address 2861 North Lakeridge Trail
Boulder, CO 80302

House Type Single-family detached

Cond. Area 3681 sq. ft.

Rating No.

Issue Date September 17, 2015

Certification Verified

Annual Estimates*

CO2 emissions(Tons): -1

Annual Savings**: \$5764

* Based on standard operating conditions

** Based on a HERS 130 Index Home

TITLE

Company

Address

Certified Rater Paul Kriescher

Rater ID 3379026

Registry ID 451663277

Rating Date 7/20/15

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RESNET Home Energy Rating Standard Disclosure

For home located at: 2861 North Lakeridge Trail

City: Boulder

State: CO

1. ☒ The Rater or Rater's employer is receiving a fee for providing the rating on this home.
2. ☐ In addition to the rating, the Rater or Rater's employer has also provided the following consulting services for this home.

- ☐ A. Mechanical system design
- ☐ B. Moisture control or indoor air quality consulting
- ☐ C. Performance testing and/or commissioning other than required for the rating itself
- ☐ D. Training for sales or construction personnel
- ☐ E. Other (specify below)

3. ☐ The Rater or Rater's employer is:

- ☐ A. The seller of this home or their agent
- ☐ B. The mortgage for some portion of the financial payments on this home
- ☐ C. An employee, contractor or consultant of the electric and/or natural gas utility serving this home

4. ☐ The Rater or Rater's employer is a supplier or installer of products, which may include:

HVAC Systems

Thermal Insulation Systems

Air sealing of envelope or duct systems

Windows or window shading systems

Energy efficient appliances

Construction (builder, developer, construction contractor, etc.)

Other (specify below):

Installed in this home by:		OR	is in the business of:	
<input type="checkbox"/> Rater	<input type="checkbox"/> Employer		<input type="checkbox"/> Rater	<input type="checkbox"/> Employer
<input type="checkbox"/> Rater	<input type="checkbox"/> Employer		<input type="checkbox"/> Rater	<input type="checkbox"/> Employer
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I attest that the above information is true and correct to the best of my knowledge. As a Rater or Rating Provider I abide by the rating quality control provisions of the Mortgage Industry National Home Energy Rating Standard as set forth by the Residential Energy Services Network (RESNET). The national rating quality control provisions of the rating standard are contained in Chapter One 4.C.8. of the standard and are posted at http://resnet.us/standards/RESNET_Mortgage_Industry_National_HERS_Standards.pdf. The Home Energy Rating Standard Disclosure for this home is available from the rating provider.

Paul Kriescher

Rater's Printed Name

Paul Kriescher

Digitally signed by Paul Kriescher
DN: cn=Paul Kriescher, o=Lightly Treading, Inc., ou=CEO,
email=paulk@lightlytreading.com, c=US
Date: 2015.09.17 11:09:36 -06'00'

Rater's Signature

3379026

Certification #

September 17, 2015

Date

RESNET Form 0300-2