

How to Effectively Calculate Utility Allowances

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What are the two largest expenditures for anyone who lives in a home?

- ▶ Payment for the living space (Mortgage or Rent payment)
- ▶ Taxes? Insurance? Transportation?
- ▶ Energy! Cost of utilities used in the living space.
- ▶ US Households spend approximately \$230 Billion annually on energy ... NOT including transportation
- ▶ Energy costs make up approximately 15% of the household budget
- ▶ Any home that does not use energy wisely is NOT an affordable home - no matter what the rent or mortgage

Today's Presentation

- ▶ Utility Allowance Calculations - What is changing and why?
- ▶ WIIFM? Why you should care about how the calculation is completed and what is in it for you!
- ▶ Residential Energy Modeling as a calculation tool
- ▶ HERS Raters as part of your team
- ▶ SDHDA use of the calculations

Utility Allowance Calculations

► Just use the spreadsheet!

	A	D	C	D	E	F	G
1	FMR_Area_Name	County_or_Town	fmr_br_0	fmr_br_1	fmr_br_2	fmr_br_3	fmr_br_4
2	Aurora County, SD	Aurora County	511	517	700	956	960
3	Beadle County, SD	Beadle County	468	473	640	859	863
4	Bennett County, SD	Bennett County	468	540	640	948	1047
5	Bon Homme County, SD	Bon Homme County	468	516	640	898	979
6	Brookings County, SD	Brookings County	450	523	708	1043	1254
7	Brown County, SD	Brown County	438	497	672	855	1190
8	Brule County, SD	Brule County	468	540	640	883	886
9	Buffalo County, SD	Buffalo County	563	570	771	960	1030
10	Butte County, SD	Butte County	468	523	640	843	946
11	Campbell County, SD	Campbell County	468	500	640	883	886
12	Charles Mix County, SD	Charles Mix County	468	540	640	830	855
13	Clark County, SD	Clark County	468	473	640	797	855
14	Clay County, SD	Clay County	522	556	715	1054	1266
15	Codington County, SD	Codington County	439	532	691	891	923
16	Corson County, SD	Corson County	468	474	640	911	914
17	Custer County, SD	Custer County	541	547	740	922	1226
18	Davison County, SD	Davison County	466	500	677	891	905

Utility Allowance Calculations

- ▶ Two methods for calculation
 - ▶ Engineering-Based Methodology
 - ▶ Heat Loss Calculations
 - ▶ Heating Degree Days for the Region
 - ▶ Heating System efficiency
 - ▶ Water Heating Efficiency
 - ▶ Lights, appliances, A/C, etc.
 - ▶ Consumption-Based Methodology
 - ▶ Three-Year Rolling Base

Utility Allowance Calculations

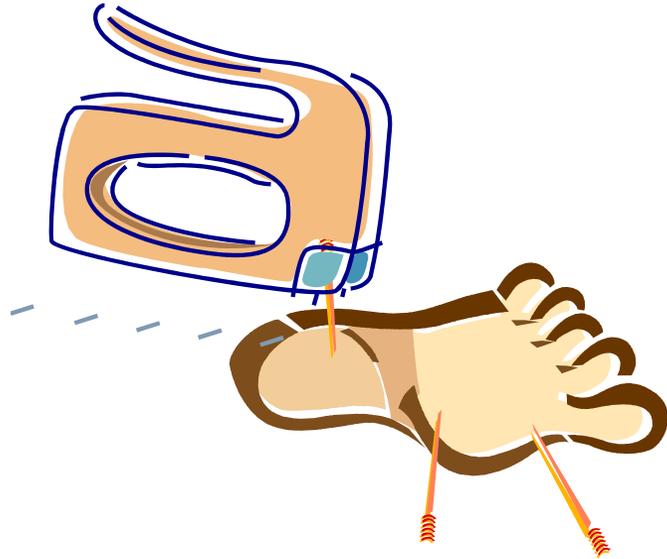
- ▶ Engineering-Based Methodology
 - ▶ Btus per fuel unit
 - ▶ Indoor temperature
 - ▶ Outdoor Design Temperatures in Winter
 - ▶ Include distribution system efficiencies
 - ▶ Multiply wattage of each light bulb by the number of hours the bulb will be turned on
 - ▶ Include the wattage of air conditioners and how often they are used
- ▶ Home Energy Raters do this in their sleep!

Why the change?

- ▶ Changes in building practices and building codes
 - ▶ End of the 1% to 3% improvements
 - ▶ 15% to 30% to 50%
- ▶ Improvements in Energy Efficiency of buildings
 - ▶ Trends toward zero energy building
- ▶ HUD Template is outdated and inaccurate

WIIFM?

- ▶ Spreadsheet was easy, but...



- ▶ Let's make some comparisons

1500 SF 3 BR Home on Basement here in Hughes County

- ▶ Spreadsheet Utility Allowance: \$986.00
- ▶ Engineered Utility Allowance: \$726.00

- ▶ Allowable Rent Charge = 60% AMI
 - ▶ Utility Costs must be included in this charge
 - ▶ Every dollar decrease in utility allowance equals a dollar increase allowed in rent fee
 - ▶ That is money in your pocket! \$260.00, \$21.67/month, every month, year after year.

WIIFM?

- ▶ Financial Analysis - dollars invested in Energy Efficiency vs. Savings account, money market fund, CDs?
 - ▶ National Avg: 0.07%
 - ▶ Best Rate: 0.78%
- ▶ You are building efficiently already! Get credit for it!
- ▶ However:
 - ▶ \$2,500.00 Investment = 10.4%
 - ▶ \$5,000.00 Investment = 5.2%
 - ▶ \$30,000.00 Investment = 0.87%

WIIFM?

- ▶ Energy Retrofits as part of your portfolio?
 - ▶ Study completed in CZ4
 - ▶ Average deep retrofit cost: \$16,000 (min: \$2,400, max: \$38,000)
 - ▶ Average energy savings: 50% - 70%
 - ▶ Average Simple Payback Period: 0 to 15 years
 - ▶ Retrofits were designed to pay back from day 1, cost of improvements paid by energy savings with extra cash back of \$20 - \$50 per month!

WIIFM?

- ▶ What about the renter?
 - ▶ More Comfortable
 - ▶ Cleaner Indoor Air, less dust, less pollution
 - ▶ Quieter
 - ▶ Affordable
- ▶ Less Turn-Over?



Energy Modeling

- ▶ REM/Rate: Residential Energy Modeling for HERS Rating
- ▶ REM/Design: Same energy usage calculations - no HERS Index

Analysis	
Updated: 04:40:59 PM	
Design Loads (kBtu/hr)	
Heating	8.8
Cooling	7.4
Annual Loads (MMBtu/yr)	
Heating	7.5
Cooling	13.6
Water Heating	8.2
Annual Consumption (MMBtu/yr)	
Heating	5.2
Cooling	2.5
Water Heating	3.2
Lights and App...	17.5
Photovoltaics	-0.0
Total	28.4
Annual Energy Costs (\$/yr)	
Heating	122
Cooling	58
Water Heating	75
Lights and App...	410
Photovoltaics	-0
Service Charge	60
Total	726

General House Characteristics

REM/Rate v 14.5.1 - gov house fini

File Building View Extras Libraries Reports Tools Help

General Building Information

Area of Conditioned Space (sq ft): 2016

Volume of Conditioned Space (cu ft): 16128

Year Built: 2012

Housing Type: Single-family detached

Level Type [Apartments Only]: None

Number of Units: 1

Floors on or Above Grade: 1

Number of Bedrooms: 2

Foundation Type: Conditioned basement

Enclosed Crawl Space Type: N/A

Thermal Boundary Location: N/A

Utility Rates Library

Utility	Fuel	State
Default Electric Provider	Electric	
Default Propane Provider	Propane	
Default Oil Provider	Fuel oil	
Default Gas Provider	Natural gas	
Default Gas Provider3*	Natural gas	

New Delete Cut Copy Paste Up Down

Utility Name: Default Electric Provider

Fuel Type: Electric kWh

Seasons

Start	Through
JAN	DEC

Add Delete

Rates for Selected Season

Service Charge (\$/Month): 5.00

Min	Max	Rate
0	1000000	0.0800

Add Delete

Start Month: JAN End Month: DEC

Block Range: 0 to 1000000

Rate (\$/kWh): 0.0800

OK Cancel Help

Modeling of Building Components

Foundation Wall Properties Summary

#	Name	Type	Length	Height	Depth	Hgt AG
1	north wall	Uninsulated8*	24.0	8.0	7.0	1.0
2	south wall	Uninsulated8*	24.0	8.0	7.0	1.0
3	east wall	Uninsulated8*	40.0	8.0	7.0	1.0
4	west wall	Uninsulated8*	40.0	8.0	7.0	1.0

New Delete Copy

Foundation Wall Properties

Name: north wall

Type: Uninsulated8* R=0.00

Length (ft): 24.0 Height Above Grade (ft): 1.0

Height (ft): 8.0 Depth Below Grade (ft): 7.0

Location: Between conditioned space and ambient/ground

Heating Type Library

Component	State
Oil Boil 1975-1983	
Oil Boil 1984 - Pres	
Grnd Wat HP Pre 1974	
Grnd Wat HP1975-1983	
Grnd Wat HP1984-1987	
Grnd Wat HP1988-1991	
Grnd Wat HP1992-Pres	
94AFUE Gas Furn 64k*	

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Name: 94AFUE Gas Furn 64k* Desuperheater

System Type: Fuel-fired air distribution

Fuel Type: Natural gas

Rated Output Capacity (kBtuh): 64.0

Seasonal Equipment Efficiency: 94.0 AFUE

Auxiliary Electric Use: 560 Eae Use Default

Heat Pump - Auxiliary Inputs

Fan Power (Watts): 0 Use Default

Pump Energy: 0 Watts

Note:

OK Cancel Help

Infiltration & Duct Leakage

Whole House Infiltration

Measurement Type:

Heating Season Infiltration Value:

Cooling Season Infiltration Value:

Shelter Class:

2009 IECC Verification:

Mechanical Ventilation System for IAQ

Type:

Sensible Recovery Efficiency (%):

Total Recovery Efficiency (%):

Rate (cfm):

Hours/Day:

Fan watts:

Usage of Operable Windows

Cooling Season Strategy:



Duct System Selector

#	Name
1	

Name:

Sq. Feet Served: # Return Grilles:

Htg Equip:

Clg Equip:

Duct Surface Area (sqft):

Supply:

Return:

Duct Leakage

Use Default Leakage:

Use Measured Leakage

Leakage to Outside

Exemption - No Test Required

Total CFM @ 25 Pascals

Supply

Return

Total Duct Leakage

Duct Test Conditions:

Total: CFM @ 25 Pascals

Ducts

Location:	Supply		Return		
	% Area:	R-Value:	% Area:	R-Value:	
1 Attic, under insulation	<input type="text" value="0"/>	<input type="text" value="0.0"/>	<input type="text" value="100"/>	<input type="text" value="5.0"/>	<input type="button" value="..."/>
2 Conditioned basement	<input type="text" value="100"/>	<input type="text" value="5.0"/>	<input type="text" value="0"/>	<input type="text" value="0.0"/>	



Lights and Appliances & Everything Else!

Rating Audit

Refrigerator
Total Consumption: 691 kWh/yr Location: Conditioned

Dishwasher
Energy Factor: 0.46 or kWh/yr: 0 Place Setting Capacity: 12

Range/Oven
Fuel: Electric Induction Range Convection Oven

Clothes Washer and Dryer
Location: Conditioned Washer Presets: RESNET Default

Dryer Fuel: Electric Washer MEF: 0.817 Elec Rate: 0.0803
Dryer Eff. Factor: 3.01 Washer LER: 704 kWh/yr Gas Rate: 0.58
Moisture Sensing Capacity Cu.Ft.: 2.874 Annual Gas Cost: 23.00

Lighting
CFL (%): 0.0 Interior Fixtures Exterior Fixtures(%): 0.0
Pin-Based FL (%): 10.0 Garage Fixtures(%): 0.0

Ceiling Fan(s)
CFM / Watt: 0.0 (at Med. speed) Restore RESNET Defaults



Building View Extras Libraries Reports Tools Help

- Property/Builder Information
- Organization/Rating Information
- Site Information
- Building Information
- Foundation Walls
- Slab Floors
- Floors
- Rim/Band Joists
- Above-Grade Walls
- Windows and Glass Doors
- Doors
- Ceilings
- Skylights
- Mechanical Equipment
- GSHP Well
- Duct Systems
- Infiltration/Ventilation
- Lights and Appliances
- Mandatory Requirements
- DOE Zero Energy Ready Home
- Interior Mass
- Active Solar
- Photovoltaics
- Synspace

	Gross Area
	192.0
	192.0
	320.0
	320.0

Copy

U=0.046 ...

Exterior Color: Medium

and ambient



Reports and Information

Energy Cost and Features

Property SDHDA mittchell, SD 57501	Organization SDHDA 605-390-4009 mike_harsma	HERS Rater ID:probabtionary
Weather: Huron, SD Gov's House PassivHaus gov.house.passive.big	Builder SDHDA	

Annual Energy Costs	\$/yr
Heating	122
Cooling	58
Water Heating	75
Lights & Appliances	410
Photovoltaics	-0
Service Charges	60
Total	726
Average Monthly(\$/Month)	60

Energy Features

Ceiling w/Attic	passive U=0.007
Sealed Attic	None
Vaulted Ceiling	None
Above Grade Wall	passive* U=0.014
Foundation Walls (Cond)	ICF R=39.8
Foundation Walls (Uncond)	None
Doors	Steel-polyurethane U=0.283
Windows	Alpen U=0.140
Floors	None
Slab Floors	THIS HOUSE 0 U=0.014
Infiltration	Htg: 28 Clg: 28 CFM50
Infiltration Measure	Blower door test
Mechanical Ventilation	Balanced: ERV, 45 cfm, 15.0 watts.
Interior Mass	None
Mechanical Equipment 1	ASHP: Htg: 30.7 kBtu/h, 10.6 HSPF, Clg: 12.0 kBtu/h, 23.0 SEER, with Desuperheater.
Mechanical Equipment 2	Water Heating: Heat pump, Elec, 2.34 EF.
Programmable Thermostat	Heat=Yes; Cool=Yes
Ducts	R=72.8Conditioned space
Duct Leakage to Outside	RESNET/HERS default
Total Duct Leakage	Not Applicable
Lights/Appliances	Defaults
Active Solar	None

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

REM/Rate - Residential Energy Analysis and Rating Software v14.5.1
This information does not constitute any warranty of energy cost or savings.
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Equipment Sizing

Property SDHDA mittchell, SD 57501	Organization SDHDA 605-390-4009 mike_harsma	HERS Rater ID:probabtionary
Weather: Huron, SD Gov's House PassivHaus gov.house.passive.big	Builder SDHDA	

Heating

Calculated Peak Load (kBtu/hr)	8.8
Infiltration	0.1
Envelope	8.7
Sizing Factor (%)	100.0
Heating Equipment Capacity(kBtu/hr)	
Required	8.8
Specified	30.7

Cooling

Calculated Peak Load (kBtu/hr)	7.4
Sensible	6.4
Latent	0.9
SHF	0.9
Sizing Factor(%)	100.0
Cooling Equipment Capacity (kBtu/hr)	
Required Total	7.4
Specified Total	12.0
Specified SHF	0.7
Required Sensible	6.44
Specified Sensible	8.40
Required Latent	0.94
Specified Latent	3.60

Fuel Summary

Property SDHDA mittchell, SD 57501	Organization SDHDA 605-390-4009 mike_harsma	HERS Rater ID:probabtionary
Weather: Huron, SD Gov's House PassivHaus gov.house.passive.big	Builder SDHDA	

Annual Energy Cost	\$/yr
Electric	666

Annual End-Use Cost	\$/yr
Heating	122
Cooling	58
Water Heating	75
Lights & Appliances	410
Photovoltaics	-0
Service Charge	60
Total	726

Annual End-Use Consumption	
Heating (kWh)	1531
Cooling (kWh)	723
Water Heating (kWh)	940
Lights & Appliances (kWh)	5131
Total (kWh)	8326

Annual Energy Demands	kW
Heating	2.3
Cooling	0.4
Water Heating (Winter Peak)	0.2
Water Heating (Summer Peak)	0.1
Lights & Appliances (Winter Peak)	0.4
Lights & Appliances (Summer Peak)	1.0
Total Winter Peak	2.9
Total Summer Peak	1.5

Utility Rates

Electricity	Default Electric Provider
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Reports and Information

Lights and Appliances

Property
SDHDA
mitchell, SD 57501

Organization
SDHDA
605-390-4009
mike.harsma

HERS
Rater ID:probabtonary

Weather:Huron, SD
Gov's House PassivHaus
gov.house.passive.big

Builder
SDHDA

Electric Consumption	kwh/yr
Interior Lighting	860.7
Exterior Lighting	50.2
Garage Lighting	100.0
Refrigerator	673.0
Freezer	0.0
Dishwasher	139.8
Oven/Range	409.0
Clothes Washer	62.8
Clothes Dryer	318.7
Mechanical Ventilation Fan	131.4
Ceiling Fan	0.0
Plug Loads	2385.6
Total	5131.2

Annual Energy Cost	\$/yr
Interior Lighting	69
Exterior Lighting	4
Garage Lighting	8
Refrigerator	54
Freezer	0
Dishwasher	11
Oven/Range	33
Clothes Washer	5
Clothes Dryer	25
Mechanical Ventilation Fan	11
Ceiling Fan	0
Plug Loads	191
Total	410

Performance Report

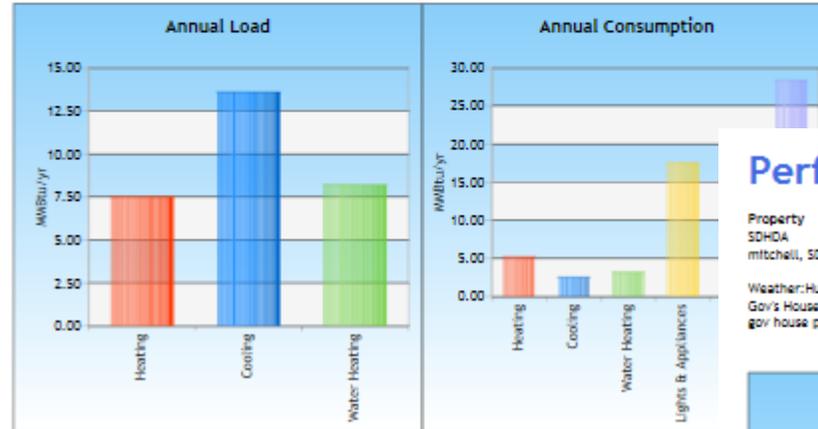
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Builder
SDHDA



Performance Report

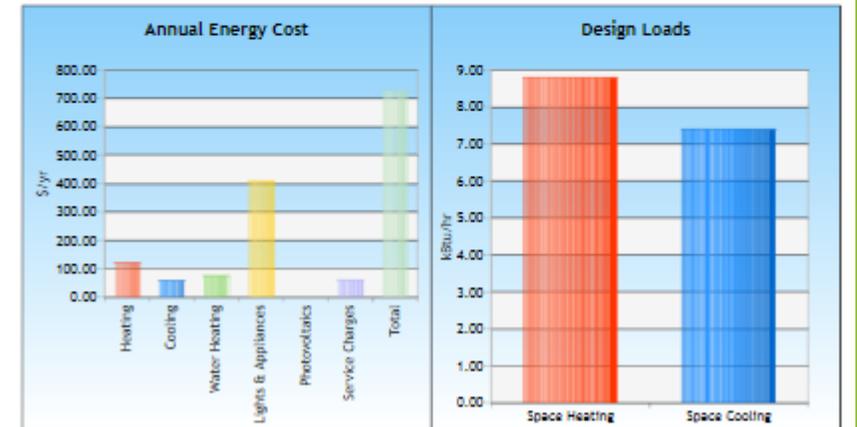
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Builder
SDHDA



The HERS Rater

- ▶ Preliminary Analysis - Model Energy Usage from Plans
 - ▶ Can model trade-offs to determine cost effectiveness
 - ▶ Can provide heads-up on potential energy, health, safety, and building durability issues
 - ▶ Can help ensure your bid request documents are clear - set expectations for trades and sub-contractors



The HERS Rater

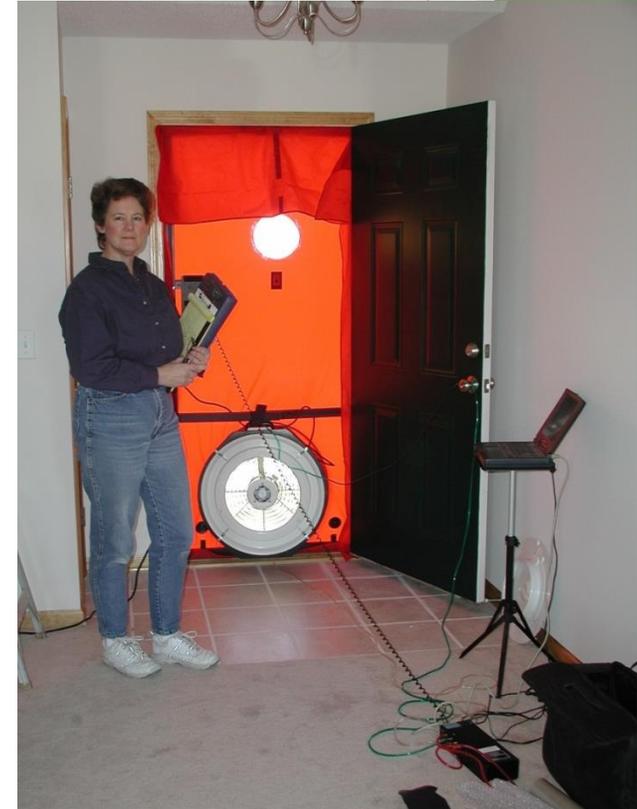


► Pre-Drywall Inspection

- Ensure thermal bypasses are sealed
- Grade the Insulation job
- Your quality assurance partner during construction using National Inspection Protocols
- Accepted as IECC inspection compliance (if approved by local code officials)
- Minimize surprises while there is still time to fix issues

The HERS Rater

- ▶ Final Testing and Inspection
 - ▶ When equipment is set, doorknobs are on, lighting and appliances are in
 - ▶ Infiltration tests with Blower Door
 - ▶ Duct Leakage testing
 - ▶ Attic insulation inspection
 - ▶ HVAC Equipment, appliances, lighting, fans, etc. verification
 - ▶ HERS Index Certification - Nationally accepted measure of energy efficiency

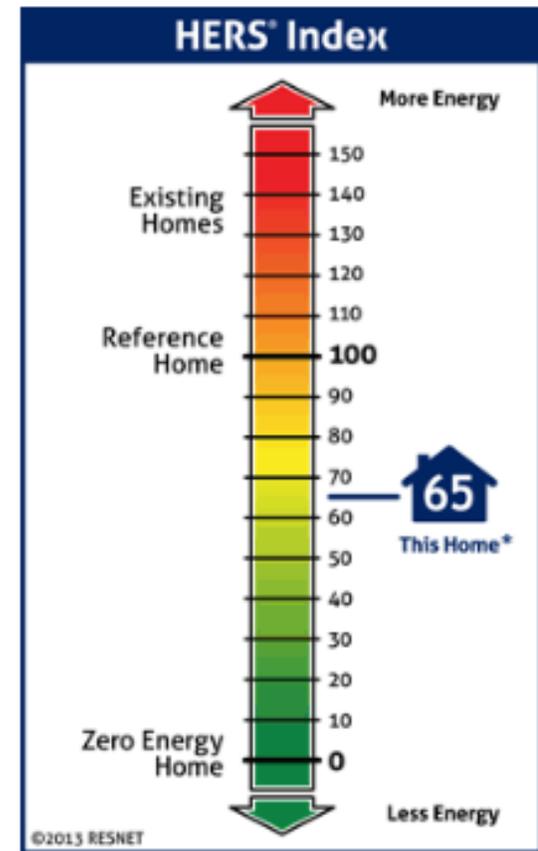


Your HERS Rater

- ▶ Consult and advise to expedite your transition and adoption of new, more stringent, codes
- ▶ Assist understanding of new technologies and applications related to building performance
- ▶ Set expectations and provide QA of sub-contractor groups
- ▶ Partner to manage construction costs while improving energy performance
- ▶ Provide an edge in Marketing and Sales

Marketing & Sales

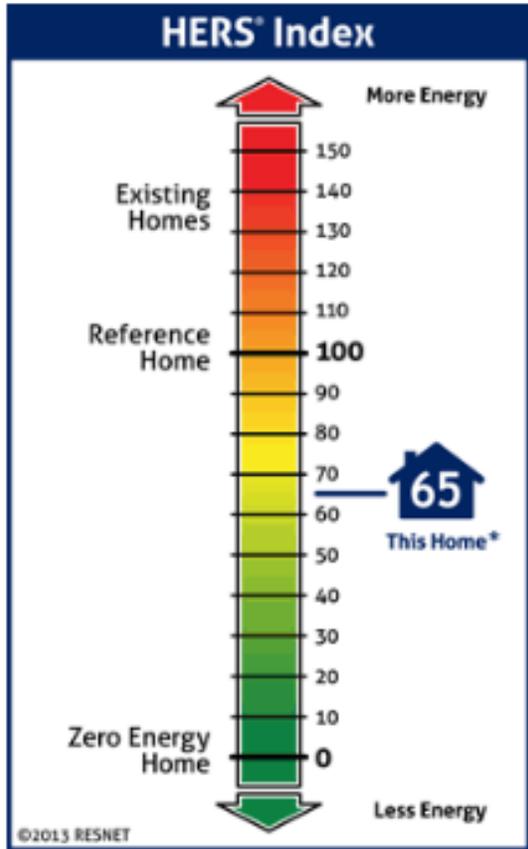
- **Confidence**
 - Deliver on energy and quality performance goals
- **Assurance**
 - For the Home Buyer
- **Manage**
 - Fewer punch list issues for new homeowners



©2013 RESNET

*Sample rating representation.

Your HERS Rater



*Sample rating representation.

The Lower
The Better
Know Your Score

LEARN MORE



Every Home is a
HERS Rated Home

SDHDA Use of the Calculations

▶ Mike Harsma