RESNET
RESIDENTIAL ENERGY SERVICES NETWORK

Setting the Standards for Home Energy Efficiency

IMPACT OF ENERGY EFFICIENCY ON VA HOME LOANS

Abstract

A look at the potential additional buying power for VA mortgage borrowers of energy efficient HERS rated homes.

Introduction

Introduction to Home Energy Ratings

Each year more than 240,000 homes built in the U.S. are rated for their energy efficiency using the Residential Energy Services Network's (RESNET) Home Energy Rating System (HERS®) Index. The HERS Index is equivalent to a miles-per-gallon rating for homes where a lower score means less energy use. A score of 100 on the index represents a home built using standard construction practices from 2006, while a score of zero represents a home that produces as much energy as it uses on an annual basis. A HERS Index Score is calculated to represent a home built in the 1970s.

All HERS ratings are governed by the *Mortgage Industry National Home Energy Rating System Standrds* (MINHERS). MINHERS provides the requirements for conducting HERS ratings, the certification of HERS raters and the quality assurance oversight of all ratings. The calculation of HERS Index scores are in accordance with an American National Standards Institute (ANSI) standard: ANSI/RESNET/ICC 301. Only certified RESNET Home Energy Raters (HERS raters) can conduct HERS ratings after successfully completing a 40-hour course, passing a national exam and completing an apprentice-style probationary period of five ratings under the supervision of a Quality Assurance Designee. All HERS raters must work under the auspices of a RESNET accredited Quality Assurance Provider. These requirements are what make HERS ratings the gold standard for rating the energy efficiency of homes.

Mortgage Implications of Energy Efficiency

RESNET commissioned the University of Central Florida's Solar Energy Center (FSEC) and mortgage finance industry veteran and expert, Robert Sahadi to determine the potential impact of energy efficiency on Veterans Administration (VA) mortgages,.

FSEC analyzed the energy savings homes in five diverse metro areas in the U.S. The analysis looked at the following cities:

- Dallas, Texas
- Denver, Colorado
- Detroit, Michigan
- Miami, Florida

- San Diego, California

The study looked at the calculated savings of taking a home that was built in the 1970's (HERS Index Score of 130), a home built to the 2009 International Energy Conservation Code (the standard which more than 30 state energy codes are based on) and compared them to a home that achieves a HERS Index Score of 61 (the average HERS Index Score of the 236,000 homes that were HERS rated in 2018) and a home calculated to have a HERS Index score of 130 (home built in the 1970s). See Appendix A for the results of the FSEC analysis.

Mr. Sahadi took the results of the FSEC analysis and looked at the potential mortgage impact implications of a new HERS rated, energy efficient home versus an older non-energy efficient home. The results of this analysis found that a home with a HERS index score of 61 generated significant "additional buying power" from $13,000 to over $24,000. This additional buying power allows a VA borrower to gain the energy savings and health benefits of a new home for the same monthly payments as an older, less efficient home. Mr. Sahadi's full report can be found below.

For Additional Information on Mortgage Implications of Energy Efficiency – 2019 Freddie Mac Study

In 2019 Freddie Mac published the report "Energy Efficiency: Value Added to Properties & Loan Performance". The report was based on the Freddie Mac analysis that used data provided by RESNET on HERS rated homes from 2013 to 2017 to select a random sampling of about 70,000 HERS rated homes. Working with a major credit bureau, Freddie Mac obtained data on each of these homes plus five comparable unrated homes for each rated home for a total of about 450,000 properties.

The analysis of this data concluded:

- **From the property value analysis, HERS rated homes are sold for, on average, 2.7% more than comparable unrated homes. **
- **Homes with lower HERS Index Scores are sold for 3-5% more than homes with higher HERS Index Scores.**
- **From an underwriting perspective, there are notable differences between HERS rated and unrated homes.**
    - RESNET-rated homes have lower delinquency rates than unrated homes, both in terms of becoming ever 60 days and over 90 days delinquent.
    - Homes with lower HERS Index Scores had even lower delinquency rates. º Homes with lower HERS Index Scores also had better mortgage profiles
    - In general: owners with higher average credit scores (FICO), lower Loan To Values (LTV) ratios at origination, higher origination unpaid principal balances (UPB), higher owner incomes, and higher neighborhood incomes at the census tract level.

- The lower delinquency rates remain for HERS rated versus unrated homes even for homeowners with higher debt-to-income ratios of 45% or more.

Questions about this report should be directed to RESNET's Executive Director, Steve Baden: sbaden@resnet.us.

Mortgage Implications of Energy Efficiency

May 11, 2020

The energy savings cited in the Florida Solar Energy Center study illustrate the significance of energy savings on a household budget in diverse U.S. housing markets. This is of even greater significance as a 2018 U.S. Department of Energy study reported that one in three households in the U.S. face a challenge meeting their energy needs. Recent events have also highlighted the critical health benefits of energy efficiency.

The study demonstrates that the amount of savings is much greater for HERS rated and newer versus older homes. Generally new homes sell for more than existing homes. In 2019, the median sales price for a new home was $320,000 and existing home at $280,000. The VA borrower's average mortgage amount in FY 2019 was $277,835, which is very close to that of existing homes. The question is: "How can America's veterans afford these newer homes and benefit from the cost savings and health benefits of energy efficiency"?

The recognition of energy costs in mortgage underwriting has been discussed for many years, but the mortgage market has been slow to respond. A handful of small pilots have been authorized by the Federal Housing Administration and Fannie Mae. They permitted the borrower to buy a newer home if the projected energy savings were greater than the additional mortgage and related costs for buying the higher priced home.

Underwriting standards had to be adjusted to accomplish this. The Debt-to-Income (DTI) ratio is a measure of the borrower's ability to pay. The numerator of the ratio consists of the monthly mortgage costs of principal, interest, property taxes and home insurance (PITI) as well as monthly payments for auto loans, credit cards, consumer debt, alimony, etc. The denominator of the ratio is monthly income from salary and other verifiable sources. The DTI should generally not exceed 43%. Monthly energy costs are not included in this ratio, which is a glaring omission as the energy costs in many cases exceed insurance and local taxes. The approach utilized in the above pilots was to add the energy savings as "Other Income" in the denominator, but then subtract the additional mortgage and related costs for the increased loan amount.

In order to calculate the additional amount of mortgage that a borrower could qualify for, the energy savings must be greater than or equal to the additional costs. The additional borrowing power for buying a HERS 61 versus a HERS 130 which is a home built in the 1970's was calculated utilizing the energy savings over the life of a 30-year mortgage. It then subtracted the additional mortgage payment, property taxes and insurance costs as well as the 1.5% VA premium to arrive at an estimate for "additional borrowing power". The data below shows a borrower that bought a new HERS61 rated home in Denver for $14,282 more, would save $979 annually and their mortgage payment would rise $68 per month or $816 annually at a 4.0% rate. Property taxes, insurance and the VA premium would bring the savings and costs to equality. It also calculated the

"Relative increase in buying power" for each market, which is the "additional buying power" divided by the "median cost of a home" in each market. In Denver for example, a borrower would have an additional 3.5% in relative buying power. This is important as HERS rated homes may cost 2 to 3% more than another comparable new homes according to the Leading Builders of America.

Dallas, Texas
Energy savings $1,418
Additional buying power $24,329
Median home sales price $225,000
Relative 10.8% (Increase in purchasing power)

Denver, Colorado
Energy savings $979
Additional buying power $14,282
Median home sales price $400,000
Relative 3.5%

Detroit, Michigan
Energy savings $1310
Additional buying power $15,070
Median home sales price $164,000
Relative 9.1%

Miami, Florida
Energy savings $1094
Additional buying power $15,267
Median home sales price $269,000
Relative 5.6%

San Diego, California
Energy Savings $944
Additional buying power $13,494
Median home sales price $568,000
Relative 2.4%

Summary

In summary, the HERS rated homes achieving a HERS Index score of 61 in all the housing markets covered in this analysis generated significant "additional buying power" from $13,000 to over $24,000.

The differences were a function of the actual energy savings and related costs, particularly different property tax rates. The "relative additional buying power" varied from 2.4% to over 10%, the differences were a function of the additional buying power and local median sales price.

This market-based buying power will allow many households to move up to better and more energy efficient homes. The borrower gets the advantages of the energy and health benefits as well as a newer home for an equal amount of payment. They also are better protected from the financial shock if a major utility unexpectedly breaks.

About the Author:

Robert Sahadi is managing principal of GreenSpace Investment, a green residential financial advisory service. He has held senior positions at Fannie Mae, where he was vice president of product development and vice president of *mortgage-backed securities. While at Fannie Mae, he oversaw the development of the corporation's energy-efficient mortgages and green innovations. He has held multiple positions in the federal government, at the U.S. Department of Housing and Urban Development, in the Executive Office of the President, and at the Federal Home Loan Bank Board, where he was chief economist. He has an MBA in finance and an M.A. in economics from the University of Cincinnati.*

Modeled Energy Savings for Home Energy Performance

Philip Fairey
Florida Solar Energy Center

The following general information is provided on the configuration of the 1-story and 2-story prototype homes used in the study.

Table 1: Prototype Home Characteristics

Component	1-story	2-Story
1st floor area (ft^2)	2,000	1,200
2nd floor area (ft^2)	0	1,200
Total floor area (ft^2)	2,000	2,400
Total volume (ft^3)	18,000	20,400
N-S wall length (ft)	50	40
E-W wall length (ft)	40	30
1st floor wall height (ft)	9	8
2nd floor wall height (ft)	0	9
Door area (ft^2)	40	40
Window/floor area (%)	15%	15%
Total window area (ft^2)	300	360
N & S window fraction (%)	35%	35%
E & W window fraction (%)	15%	15%

Table 2: 2009 IECC SRD Component Insulation Values

LOCATION	**IECC CZ**	Ceiling R-value	Wall R-value	Found. type	Slab R-value	Floor R-value	Fen U-Factor	Fen SHGC
Miami, FL	1A	30	13	SOG	none	n/a	1.20	0.30
San Diego, CA	3C	30	13	SOG	none	n/a	0.50	0.30
Dallas, TX	4A	38	13	Crawl	none	19	0.35	0.40
Denver, CO	5B	38	13+5	Crawl	n/a	30	0.35	0.40
Detroit, MI	5A	38	13+5	Crawl	n/a	30	0.35	0.40

Simulation and analysis results are provided on the following pages.

Miami Results

Miami 1-story Home		$0.1189	/kWh	$1.809	/thrm		
Simulation Case	HERS Index	Electricity (kWh/y)	Nat. Gas (thrm/y)	Total Cost ($/y)	CO2 (tons/y)	SO2 (lbs/y)	NOx (lbs/y)
HERS-130	130	18,788		$2,234	11.20	41.22	19.22
HERS Ref	100	15,626		$1,858	9.31	34.28	15.98
Saved	**30**	**3,162**		**$376**	**1.89**	**6.94**	**3.24**
2009 IECC	70	11,939		$1,420	7.12	26.19	12.21
HERS-61	61	10,850		$1,290	6.47	23.80	11.10
Saved	**9**	**1,089**		**$129**	**0.65**	**2.39**	**1.11**
HERS-130	130	18,788		$2,234	11.20	41.22	19.22
HERS-61	61	10,850		$1,290	6.47	23.80	11.10
Saved	**69**	**7,938**		**$944**	**4.73**	**17.42**	**8.12**

Miami 2-story Home							
Simulation Case	HERS Index	Electricity (kWh/y)	Nat. Gas (thrm/y)	Total Cost ($/y)	CO2 (tons/y)	SO2 (lbs/y)	NOx (lbs/y)
HERS-130	130	21,026		$2,500	12.53	46.13	21.51
HERS Ref	100	17,411		$2,070	10.39	38.25	17.84
Saved	**30**	**3,615**		**$430**	**2.14**	**7.88**	**3.67**
2009 IECC	73	13,475		$1,602	8.03	29.56	13.78
HERS-61	61	11,829		$1,406	7.05	25.95	12.10
Saved	**12**	**1,646**		**$196**	**0.98**	**3.61**	**1.68**
HERS-130	130	21,026		$2,500	12.53	46.13	21.51
HERS-61	61	11,829		$1,406	7.05	25.95	12.10
Saved	**69**	**9,197**		**$1,094**	**5.48**	**20.18**	**9.41**

San Diego Results

San Diego 1-story Home		$0.1625	/kWh	$0.986	/thrm		
Simulation Case	HERS Index	Electricity (kWh/y)	Nat. Gas (thrm/y)	Total Cost ($/y)	CO2 (tons/y)	SO2 (lbs/y)	NOx (lbs/y)
HERS-130	130	12,734		$2,069	3.54	1.79	2.55
HERS Ref	100	11,115		$1,806	3.09	1.57	2.23
Saved	**30**	**1,619**		**$263**	**0.45**	**0.22**	**0.32**
2009 IEC(	72	8,855		$1,439	2.46	1.25	1.77
HERS-61	61	7,734		$1,257	2.15	1.09	1.55
Saved	**11**	**1,121**		**$182**	**0.31**	**0.16**	**0.22**
HERS-130	130	12,734		$2,069	3.54	1.79	2.55
HERS-61	61	7,734		$1,257	2.15	1.09	1.55
Saved	**69**	**5,000**		**$813**	**1.39**	**0.70**	**1.00**

San Diego 2-story Home							
Simulation Case	HERS Index	Electricity (kWh/y)	Nat. Gas (thrm/y)	Total Cost ($/y)	CO2 (tons/y)	SO2 (lbs/y)	NOx (lbs/y)
HERS-130	130	14,102		$2,292	3.92	1.99	2.82
HERS Ref	100	12,345		$2,006	3.43	1.74	2.47
Saved	**30**	**1,757**		**$286**	**0.49**	**0.25**	**0.35**
2009 IECC	72	9,738		$1,582	2.71	1.37	1.95
HERS-61	61	8,294		$1,348	2.31	1.17	1.66
Saved	**11**	**1,444**		**$235**	**0.40**	**0.20**	**0.29**
HERS-130	130	14,102		$2,292	3.92	1.99	2.82
HERS-61	61	8,294		$1,348	2.31	1.17	1.66
Saved	**69**	**5,808**		**$944**	**1.61**	**0.82**	**1.16**

Dallas Results

Dallas 1-story Home		$0.1186	/kWh	$1.024	/thrm		
Simulation Case	HERS Index	Electricity (kWh/y)	Nat. Gas (thrm/y)	Total Cost ($/y)	CO2 (tons/y)	SO2 (lbs/y)	NOx (lbs/y)
HERS-130	130	21,920		$2,600	13.63	50.18	18.01
HERS Ref	100	17,548		$2,081	10.91	40.17	14.42
Saved	**30**	**4,372**		**$519**	**2.72**	**10.01**	**3.59**
2009 IECC	74	13,828		$1,640	8.60	31.65	11.36
HERS-61	61	12,056		$1,430	7.49	27.60	9.90
Saved	**13**	**1,772**		**$210**	**1.11**	**4.05**	**1.46**
HERS-130	130	21,920		$2,600	13.63	50.18	18.01
HERS-61	61	12,056		$1,430	7.49	27.60	9.90
Saved	**69**	**9,864**		**$1,170**	**6.14**	**22.58**	**8.11**
Dallas 2-story Home							
Simulation Case	HERS Index	Electricity (kWh/y)	Nat. Gas (thrm/y)	Total Cost ($/y)	CO2 (tons/y)	SO2 (lbs/y)	NOx (lbs/y)
HERS-130	130	24,710		$2,931	15.36	56.56	20.30
HERS Ref	100	19,694		$2,336	12.24	45.08	16.18
Saved	**30**	**5,016**		**$595**	**3.12**	**11.48**	**4.12**
2009 IECC	75	15,211		$1,804	9.45	34.82	12.50
HERS-61	61	12,754		$1,513	7.93	29.20	10.48
Saved	**14**	**2,457**		**$291**	**1.52**	**5.62**	**2.02**
HERS-130	130	24,710		$2,931	15.36	56.56	20.30
HERS-61	61	12,754		$1,513	7.93	29.20	10.48
Saved	**69**	**11,956**		**$1,418**	**7.43**	**27.36**	**9.82**

Denver Results

Denver 1-story Home		$0.1217	/kWh	$0.763	/thrm		
Simulation Case	HERS Index	Electricity (kWh/y)	Nat. Gas (thrm/y)	Total Cost ($/y)	CO2 (tons/y)	SO2 (lbs/y)	NOx (lbs/y)
HERS-130	130	9,588	943.7	$1,887	13.87	18.25	8800.76
HERS Ref	100	8,818	681.5	$1,593	11.66	16.79	6360.28
Saved	**30**	**770**	**262.2**	**$294**	**2.21**	**1.46**	**2440.48**
2009 IECC	73	6,784	533.8	$1,233	9.02	12.92	4981.54
HERS-61	61	6,040	468.6	$1,093	8.00	11.50	4373.46
Saved	**12**	**744**	**65.2**	**$140**	**1.02**	**1.42**	**608.08**
HERS-130	130	9,588	943.7	$1,887	13.87	18.25	8800.76
HERS-61	61	6,040	468.6	$1,093	8.00	11.50	4373.46
Saved	**69**	**3,548**	**475.1**	**$794**	**5.87**	**6.75**	**4427.30**
Denver 2-story Home							
Simulation Case	HERS Index	Electricity (kWh/y)	Nat. Gas (thrm/y)	Total Cost ($/y)	CO2 (tons/y)	SO2 (lbs/y)	NOx (lbs/y)
HERS-130	130	11,003	1084.7	$2,167	15.93	20.95	10115.90
HERS Ref	100	10,046	784.0	$1,821	13.33	19.13	7316.64
Saved	**30**	**957**	**300.7**	**$346**	**2.60**	**1.82**	**2799.26**
2009 IECC	72	7,664	565.2	$1,364	9.98	14.59	5275.42
HERS-61	61	6,731	483.2	$1,188	8.69	12.82	4510.99
Saved	**11**	**933**	**82.0**	**$176**	**1.29**	**1.77**	**764.43**
HERS-130	130	11,003	1084.7	$2,167	15.93	20.95	10115.90
HERS-61	61	6,731	483.2	$1,188	8.69	12.82	4510.99
Saved	**69**	**4,272**	**601.5**	**$979**	**7.24**	**8.13**	**5604.91**

Detroit Results

Detroit 1-story Home		$0.1448	/kWh	$0.887	/thrm		
Simulation Case	HERS Index	Electricity (kWh/y)	Nat. Gas (thrm/y)	Total Cost ($/y)	CO2 (tons/y)	SO2 (lbs/y)	NOx (lbs/y)
HERS-130	130	9,441	1313.4	$2,532	14.92	52.96	12230.30
HERS Ref	100	8,927	934.5	$2,122	12.30	50.08	8706.12
Saved	**30**	**514**	**378.9**	**$411**	**2.62**	**2.88**	**3524.18**
2009 IECC	77	7,027	766.2	$1,697	9.86	39.42	7137.47
HERS-61	61	6,121	614.5	$1,431	8.28	34.34	5725.19
Saved	**16**	**906**	**151.7**	**$266**	**1.58**	**5.08**	**1412.28**
HERS-130	130	9,441	1313.4	$2,532	14.92	52.96	12230.30
HERS-61	61	6,121	614.5	$1,431	8.28	34.34	5725.19
Saved	**69**	**3,320**	**698.9**	**$1,101**	**6.64**	**18.62**	**6505.11**
Detriot 2-story Home							
Simulation Case	HERS Index	Electricity (kWh/y)	Nat. Gas (thrm/y)	Total Cost ($/y)	CO2 (tons/y)	SO2 (lbs/y)	NOx (lbs/y)
HERS-130	130	10,722	1522.8	$2,903	17.13	60.15	14180.20
HERS Ref	100	10,074	1088.6	$2,424	14.08	56.51	10141.20
Saved	**30**	**648**	**434.2**	**$479**	**3.05**	**3.64**	**4039.00**
2009 IECC	75	7,802	818.6	$1,856	10.76	43.77	7626.75
HERS-61	61	7,034	648.2	$1,593	9.17	39.46	6040.72
Saved	**14**	**768**	**170.4**	**$262**	**1.59**	**4.31**	**1586.03**
HERS-130	130	10,722	1522.8	$2,903	17.13	60.15	14180.20
HERS-61	61	7,034	648.2	$1,593	9.17	39.46	6040.72
Saved	**69**	**3,688**	**874.6**	**$1,310**	**7.96**	**20.69**	**8139.48**

About the Author:

Philip Fairey is the Deputy Director of the Florida Solar Energy Center (FSEC). Mr. Fairey has been Deputy Director of FSEC since 1990. He also served as Interim Director of the Center from 2002 to 2004. Prior to assuming the Deputy Director position, he spent ten years at FSEC conducting research in buildings and energy efficiency.

FSEC is Florida's premier energy research center. Created by the Florida Legislature in 1975, FSEC is administered by the University of Central Florida.