

# **The Effective Return on Investment for the Contractor Building a High Performance Versus Code Compliant Single Family Dwelling**

**Shima N. Clarke, Ph.D., PE, AIC and Edward Gregory, MCSM, CCE**  
Clemson University  
Clemson, SC

This study investigated the investment potential of capital for the builder in the form of return on investment when deciding whether to build a high performance or code compliant single-family dwellings. In addition, a secondary understanding of the additional cost associated with such sustainment construction practices of a high performance dwelling may be illustrated and, thus, may help in the competitive pricing models used by many homebuilders. The results were inconclusive; however, an analysis of the literature showed that green building is costlier compared to that of standard construction means and methods. Additionally, based on narrow margins and increased green building costs, it was deduced that it is a risky investment for the builder.

**Keywords:** Construction, Sustainability, Green Building, Return on Investment (ROI)

## **I. Introduction**

The construction industry along with society has recognized the need for sustainable construction and the associated benefits from it. The United States Green Building Council (2015) has developed certification programs specific to residential builders as well as developed new construction techniques and standards for this area of the market. A number of studies prepared for the NAHB (Quint, 2014) has demonstrated, unfortunately, that the cost associated with a high performance home for the builder is greater when compared to a code compliant home. Ultimately, these additional costs are passed on to the consumers and the issue is whether the consumers are willing to pay more for a comparable home that is built with renewable materials and sustainable techniques versus one that is built with conventional materials and techniques.

Since the return on investment (ROI) is directly related to the financial risk the builder will encounter, a keen understanding of whether there is increased risk of return is examined. The comparison in this research is the return on investment of a high performance home versus that of a code compliant home. For this research study, the following definition of high performance and code compliant homes as shown in Table 1 will be used.

Table 1

***Definition of homes***

	<b>High Performance Home</b>	<b>Code Compliant Home</b>
Heat Pump System SEER Rating	16	14
Ductwork	Conditioned Space	Unconditioned Space
Roof Insulation	R-50	R-30
Wall Insulation	R-20	R-13
Windows	Double Insulated	Insulated
Water Heater	Tankless	Tanked

The objective of this research is to investigate the risk of capital to the builder in the form of return on investment when employing construction of a high performance versus a code compliant single family dwellings. Also, a secondary understanding of the additional cost associated with such sustainable construction practices may be illustrated and thus may help in the competitive pricing models used by many homebuilders.

A literature search revealed that while there was limited information on financial information such as revenues, cost of goods sold, gross profits, and net profits, there was no information available, specifically from the homebuilder's perspective, related to the returns on investments tied directly to the use of sustainable construction practices or materials. Therefore, calculations for a set of conditions comparing a builder's ROI for high performance home versus a code compliance home were performed as shown in the Appendix.

## II. Findings

The literature search findings support the research objectives for this study. There is a plethora of factors which are clearly documented and easily obtained which support why there should be an increased incentive to capitalize a high performance home construction. The increased demand for the green building is illustrated in Figure 1 entitled "Reasons Why Customers Request Green Homes" (Russo, 2014). Seventy-three percent of the demand for green building by the consumer is derived from lower energy cost followed by saving money at seventy-two percent. Better health, better comfort, better for the environment, and better investment decision round out the chart (Russo, 2014). Interestingly, the better investment decision, from the customer's perspective, was last. This would lead one to question if customers are more concerned about their investment or the cost of energy and what triggers are

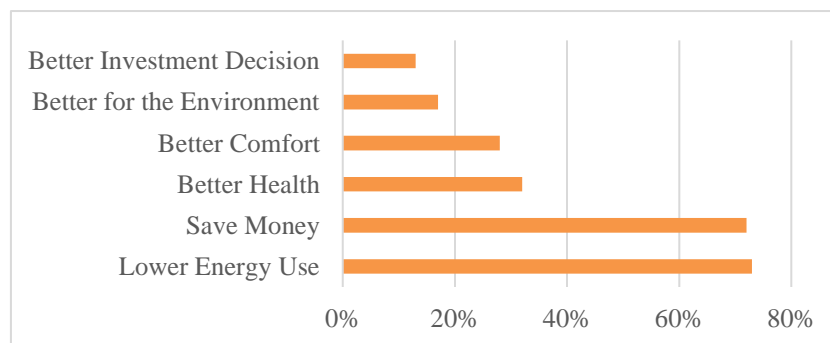


Figure 1: Reasons why customers request green homes.

prompting this desire for these key green building items. There are many triggers which increase the demand for the greater use of sustainable building techniques and materials. According to homebuilders using sustainable techniques and materials and as illustrated in Figure 2 entitled “Triggers for Green Builders of New Single Family Homes,” the leading trigger is the increased cost of energy at seventy-three percent (Russo, 2014). This is followed by the perception of higher quality and code, ordinance, and regulation change at seventy-one percent. The last trigger is lender’s recognition of greater value in green homes at fifty-two percent. With the desire for increased use of green building in the residential market by customers and verified by the homebuilders, what are the obstacles to building more green homes?

According to the study conducted by McGraw Hill for the National Association of Homebuilders (Russo, 2014), the level of ease in marketing green homes according to single family firms showed that 47% of those surveyed felt it was difficult to discuss green building with their clients, whereas 33% felt at ease discussing the use of green building. This may be overcome by better educating the builders in sustainable construction emphasizing the key characteristics sought by the customers. With all this desire to purchase sustainable homes from the customer’s perspective and construct these products from the builders’ perspective, why is the growth in this market sector not accelerating?

There are a number of obstacles preventing the rapid use of these techniques and materials. As illustrated in the Table 2 entitled “Top Obstacles to Green Residential Building Over Time” (Russo, 2014), the number one obstacle

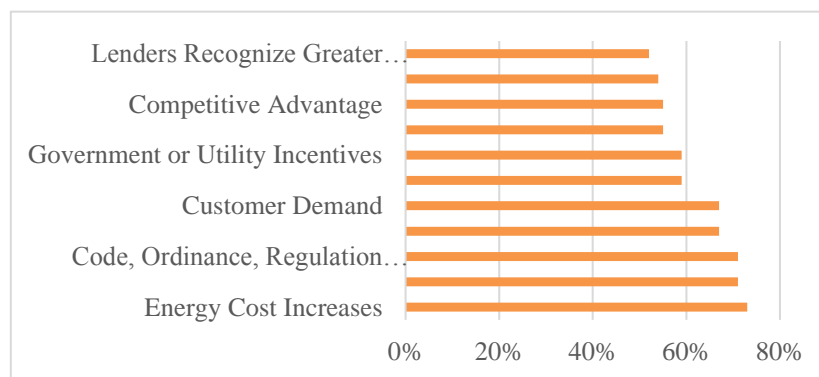


Figure 2: Triggers for green builders of new single family homes.

is the unwillingness for consumer to pay for the green building. This was originally eighty percent in 2011 and reduced to seventy-one percent in 2013. In the study entitled, “Green and Healthier Homes: Engaging Consumers of all Ages in Sustainable Living” (Jones, 2015), this was further substantiated. However, the demand for these high performance homes is increasing by all age groups, but primarily with consumers in their fifties. One can only assume that increased marketing and a better understanding by the consumer of the green built homes may have impacted this. However, the category of lack of consumer education was reduced from sixty-three percent in 2011 to fifty-seven percent in 2013. Otherwise, the realization that higher energy cost is abound and, generally speaking, are not going to subside.

Table 2

*Top obstacles to green residential building over time*

Reasons	2013	2011
Consumers Unwilling to Pay Additional Cost	71%	80%

Higher First Cost	68%	66%
Lenders Don't Understand Long-Term Value	65%	75%
Appraisers Don't Understand Long-Term Value	63%	75%
Overall Economic Conditions	62%	77%
Code/Ordinance/Regulation Changes	60%	55%
Lack of Consumer Education	57%	63%

Two areas that have an enormous impact on the implementation of green building in the residential market are lenders as well as appraisers not having an understanding of the long term value of using sustainable building materials and techniques. Many people in the residential construction industry feel the increased cost of using green materials and techniques limit the ability to enter in this field. This is substantiated in a study entitled “A Methodology for Operationalizing Sustainable Residential Development” (Grosskopf, 1998); the builders indicated there was substantial cost associated with the implementation of sustainable building techniques and 38% perceived the additional cost to range from five to ten percent and 30% of the builders felt the range was one to four percent.

Though the demand for sustainable green homes appears to be real, so does the capital risk associated with building such homes. Russo's study (2014), showed that 40% are willing to pay an increase of one to four percent, as of the 2013 study, whereas, in the same study, 30% will not pay more. In comparison to the same study conducted in 2011, 44% were willing to pay an increase in the range of one to four percent and 16% refused to pay anymore. This indicates a substantial trend of customers, highly desiring to have green construction, willing to pay very little for the increase, or not pay for it all. This is a substantial capital risk to those builders wishing to move to more high performance home building, but are very weary of leveraging their capital for such a risky venture. Furthermore, there are a few other barriers to growth in the sustainable residential market related to the valuation of green home building.

The research also found that there were quite a few new mortgage products on the market available to consumers of sustainably built homes. These new mortgage items were a result of new guidelines in valuing green homes implemented by the Federal Housing Administration and developed by the Environmental Protection Agency. These mortgage instruments were developed by the Federal Housing Administration, the United States Department of Veteran's Affairs, Fannie Mae, and Freddie Mac. These instruments are referred to as an Energy Efficiency Mortgages (EEM) and each of the aforementioned regulatory or lending underwriting agencies have their own specific qualifications which must be complied with. The common criteria are for the residences to be rated by a third party and have the appropriate LEED certification, have an Energy Star rating performed and the accompanying certification, and have Home Energy Rating System (HERS) performed. The latter test leads to a scorecard regarding the heating of the residence. This type of mortgage is very desirable since it allows the borrower to put less money down, the lender to lend up to 150% of the value of the home, and the monthly cost of energy to be realized. To illustrate how this works, refer to the Table 3 entitled “Comparison of Standard and Energy-Efficient Mortgages” (Adomatis, 2014). In the model one will note the increased cost of green building. The borrower contribution is a bit more for the high performance home in comparison to the standard code compliant home. The loan amount is a bit higher for the energy efficient home, as well. As anticipated, the monthly payment is greater for the energy-efficient home. However, the average monthly electric bill is substantially less. Also, the total expenses are less. Because of this, the lenders allow a lower qualifying income for the energy-efficient home. If one were to look at leverage of qualifying income to home price, they will note a greater ratio for the energy-efficient home. Though very appealing to the consumer and the builder as well, there is one key issue regarding this type of mortgage: valuation of the home.

Table 3

***Comparison of Standard and Energy-Efficient Mortgages***

	<b>Standard Home</b>	<b>Energy-Efficient Home</b>
Purchase Price	\$200,000	\$203,000
Borrower Contribution	\$ 6,000	\$ 6,090
Loan Amount	\$160,000	\$162,400
Interest	5.85%	5.85%
Monthly Principal, interest, Taxes, and Insurance	\$ 1,673	\$ 1,698
Average Electric Bill	\$ 186	\$ 93
Total Expenses	\$ 1,859	\$ 1,791
Qualifying Income	\$ 49,000	\$ 48,584
Monthly Savings		\$ 68

Though this is a key selling point and the example above is illustrative only, the real area of determination for the builder is the ROI they may be able to obtain. Table 4 entitled “Historic Cost Data for the Average New Single Family Residence Constructed in the United States” was extracted from a report entitled “Cost of Constructing a Home: Special Study for Housing Economics” (Taylor, 2015):

Table 4

***Historic Cost Data for the Average New Single Family Residence Constructed in the US***

	<b>2011</b>	<b>2013</b>	<b>2015</b>
Finished Lot Cost	21.7%	18.6%	18.2%
Total Construction Cost	59.3%	61.7%	61.8%
Financing Cost	2.1%	1.4%	1.3%
Overhead & General Expense	5.2%	4.3%	5.6%
Marketing Cost	1.5%	1.1%	0.8%
Sales Commission	3.3%	3.6%	3.2%
Total Sales Price	\$310,619	\$399,532	\$468,318

The average price of a newly constructed home in the United States for 2015 was \$468, 318. The cost as a percentage of the price is also shown for such items as Finished Lot Cost and Total Construction Cost.

The 2015 Total Sales Price was used as the basis for further financial exploration. This price represents the typical code compliant new home constructed within the United States (Taylor, 2015). Using this selling price coupled with the accompanying percentage markups, a comparison table was developed illustrating the Code Compliant Home compared to the High Performance Home. See Table 5 below.

Table 5

***Home Comparison Cost Table***

	<b>Code Compliant Home</b>		<b>High Performance Home</b>	
	<b>% of Cost</b>	<b>Cost</b>	<b>% of Cost</b>	<b>Cost</b>
Finished Lot Cost	18.2%	\$ 85,233.88	17.33%	\$ 85,233.88
Total Construction Cost	61.8%	\$289,420.52	64.74%	\$318,362.58

Financing Cost	1.3%	\$ 6,088.13	1.3%	\$ 6,392.54
Overhead & General Expense	5.6%	\$ 26,225.81	5.6%	\$ 27,537.10
Marketing Cost	0.8%	\$ 3,746.54	0.8%	\$ 3,933.87
Total Sales Price		\$410,714.89		\$441,459.96

It should be noted that the selling price stated above was distributed as per the percentages stated in the “Cost of Constructing a Home: Special Study for Housing Economics” (Taylor, 2015) and further substantiated in a report prepared by the US Census Bureau entitled “New Residential Sales in February 2016” (Mayo & Cooper, 2016). The Code Compliant Home column was developed using the percentages established in the “Cost of Constructing a Home: Special Study for Housing Economics” (Taylor, 2015) study. The High Performance Home costs were based on a home selling price of \$491,733, which is the average home price with the additional five percent premium added to it. The Finished Land Cost remained the same in both cases. The Total Construction Cost for the High Performance Home was established by increasing the Code Compliant Home Total Construction Cost by ten percent to reflect the additional cost of those items defined in the High Performance Home definition. The remaining figures in the High Performance Home were obtained by simply applying the accompanying percentage to them. As one will note, the percentages for the Financing Cost, Overhead, and General Expenses as well as the Marketing Cost remained the same. For the code compliant home, the total cost of the project was \$410,714.89 and the selling price was \$468,318. For the high performance home, the total cost of the project was \$441,459.96 and the selling price was \$491,733.90.

According to such lenders as PNC, Wells Fargo, Bank of America, and VCB, as well as Brankrate.com (Unknown, 2016), the loan to value (LTV) ratio for the builder to construct the home using a construction loan and leveraging (Levered) is 25:75, which the contractor would have use for the Total Cost of Project illustrated above. The analysis of the amount to be financed; the IRR calculations, the difference in loan amount and monthly payment, monthly payment calculations, and the IRR with and without fees (levered) for the code compliant and high performance home are shown in the Appendix. The results indicate that the builder would have to make an ROI of at least 16.49% more on the high performance home selling price in order to compensate for the incremental funds borrowed. The more probable ROI the builder would need to make over the code compliant home is 17.56% since most lenders charge a fee.

With these incremental cost in consideration, a review of the possible ROI for the builder would be for both the Code Complaint and High Performance Homes. This was done in both an unleveraged (Unlevered) and levered perspective. As shown in the Appendix, the ROI was determined by subtracting the cost from the price of both homes to determine the profit and then dividing this by the cost. As one will note, the ROI in both the Unlevered and Levered for the High Performance Home is less than that of a comparable Code Compliant Home. Since the ROI is less in both cases, the incremental cost of borrowing for the High Performance Home, either without fees at 16.49% or with fees at 17.56%, is much greater than the variance in returns making it less attractive to borrow the extra funds for the High Performance Home.

Since the homes must be valued by an independent appraiser, the valuing of green homes is a signification problem. The issue related to this, as indicated in “Top Obstacles to Green Building Over Time” (Russo, 2014), is that many appraisers as well as lenders are unfamiliar with how to value and lend for this type home. The Appraisal Institute has made a very robust effort to try to educate the appraisers on the methodology used to value these types of homes; however, the data that is used to value this type of structure and sales comparison or cost approach paid data sets is either limited or held by private real estate data management companies. This forces the appraisers to use homes built via standard construction for their comparable homes. This results in a lower valued home, which we have previously discussed, cost more. This is a substantial ROI risk to the builder in that the structure will be valued

significantly less than needed and dramatically reduce their profitability and the builder must fight for the correct valuation.

With much less of a profit margin coupled with an increased cost of using sustainable building techniques and materials, the trend of the customer reluctance to pay a substantial premium for the additional cost, the improper home valuations by the appraisers and the lender's unfamiliarity with the techniques, it is clearly understandable that the prudent builder would not risk their capital on building using such methods.

## Conclusions

Since the number of green built projects are on the rise. As such, those in the residential market must take a different path as it relates to their existing methods of building their projects, but more importantly in marketing, valuing, and selling their homes. It is anticipated that by the year 2018, the homebuilders will have over ninety percent of their revenues derived from green projects. The findings in this research indicate that the market is becoming increasingly demanding of High Performance Homes, coupled with a growing reluctance to pay little or nothing additional for this type of home. From a practical standpoint, this is simply not as profitable as the Code Compliant Home and thus the ROI, as illustrated, is not as fruitful.

The greatest features sought by the homebuyer of green construction are a decrease in energy consumption due to a highly efficient home inclusive of better performing heating and cooling system and well insulated homes which in turn save money, a healthier home, a more comfortable home, and a home more environmentally friendly. The triggers to these demands were also discovered, with increased energy cost leading the way. The obstacles associated with building green include higher cost for construction and incorrect valuations by both appraisers and lenders. Most importantly, it was shown that the ROI for the High Performance Home is less than that of the Code Compliant Home. Both homes have rather healthy ROI's; however, the Code Compliant Home is much better. Also, it was discovered that the premium gained in a High Performance Home does not exceed the incremental cost of capital which is necessary for the High Performance Home choice to be more attractive.

Accordingly, the homebuilder wishing to enter into the construction of High Performance Homes needs to be acutely aware of the ROI risk. Additionally, the homebuilder needs to understand that the optimum ROI is on the Levered financing of Code Compliant Homes. Whereas, the risk to ROI and Capital is greatest with the Unlevered High Performance Home. Though demand for High Performance Homes may be increasing, the ROI, as indicated, is not.

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## Appendix

### Calculations and Analysis

Since this is a construction loan, for the analysis, the payments were based on a period of 30 years, with a present value matching the Bank Financed Amount above, and a construction interest rate of 4.50% for the Code Compliant Home and 5.50% for the High Performance Home. The extra percentage point is for the lenders to gain the yield on the high performance home since the amount the homeowner would be placing in a down payment is less. The resultant payment (PMT) is illustrated in the following two examples:

Code Compliant Home		High Performance Home	
n =	360 months	n =	360 months
PV = \$	308,036.16	PV = \$	331,094.97
PMT = \$	1,560.77	PMT =	\$1,879.92
FV = \$	-	FV = \$	-
I =	4.50%	I =	5.50%

*Figure 7 - IRR Calculations for Code Compliant and High Performance Home*

Note the future value is zero in this calculation.

Once the payments were established, the incremental cost of borrowing for the high performance home was determined. This was initially done with no fees for the additional funds being applied and then, again, with fees being applied.

	Loan Amount	Monthly Payments
High Performance Loan	\$ 331,094.97	\$ 1,879.92
Code Compliant Loan	\$ 308,036.16	\$ 1,560.77
	<u>\$ 23,058.81</u>	<u>\$ 319.15</u>

*Figure 8 - Difference in Loan Amount and Monthly Payment for High Performance and Code Compliant Home*

As one will note, the incremental cost to the builder is the difference in the amounts financed and the monthly payments for each. As stated earlier, this calculation was also performed with fees applied to the loan amount.

	Loan Amount	-	Fees	=	Net Amount Disbursed	Monthly Payments
High Performance Loan	\$ 331,094.97	-	\$ 19,544.54	=	\$ 311,550.44	\$ 1,879.92
Code Compliant Loan	\$ 308,036.16	-	\$ 18,183.37	=	\$ 289,852.79	\$ 1,560.77
					<u>\$ 21,697.65</u>	<u>\$ 319.15</u>

*Figure 9 - Monthly Payment Calculations for High Performance and Code Compliant Home*

The amount disbursed in the calculation without fees would be \$23,058.81 and for the calculation with fees, the amount would be \$21,697.65. The difference in the loan payments would be same.

Once this amount was determined, the Interest for each of these scenarios was calculated from a Levered perspective.

Again, the period used was 30 years, the present value (PV) was the difference in the cost cited previously, the future value (FV) was zero, and the difference the payment amount was the same. The interest determined and calculated components are as follows:

Interest without Fees (Levered)		Interest Rate with Fees (Levered)	
n =	360 months	n =	360 months
PV = \$	23,058.81	PV = \$	21,697.65
PMT = \$	319.15	PMT = \$	319.15
FV = \$	-	FV = \$	-
I =	16.49% annual	I =	17.56% annual

*Figure 10 - IRR with and without Fees, Levered*

This would mean the builder would have to make an ROI of at least 16.49% more on the high performance home selling price in order to compensate for the incremental funds borrowed. The more probable ROI he would need to make over the code compliant home is 17.56% since most lenders charge a fee.

With these incremental cost in consideration, a review of the possible ROI for the builder would be for both the Code Complaint and High Performance Homes. This was done in both an unleveraged (Unlevered) and levered perspective. The ROI was determined by subtracting the cost from the price of both homes to determine the profit and then dividing this by the cost. The table below entitled “Builders ROI base on Equity Position” illustrates this:

Builders ROI based on Equity Position			
	Investment	Profit	ROT (Profit/Investment)
<b>UNLEVERED</b>			
High Performance Home	\$ 441,459.96	\$ 50,273.94	11.39%
Code Compliant Home	\$ 410,714.89	\$ 57,603.11	14.03%
			-2.64%
<b>LEVERED</b>			
High Performance Home	\$ 110,364.99	\$ 50,273.94	45.55%
Code Compliant Home	\$ 102,678.72	\$ 57,603.11	56.10%
			-10.55%

*Table 10 - Builder's ROI based on Equity Position*

As one will note, the ROI in both the Unlevered and Levered for the High Performance Home is less than that of a comparable Code Compliant Home. Since the ROI is less in both cases, the incremental cost of borrowing for the High Performance Home, either without fees at 16.49% or with fees at 17.56%, is much greater than the variance in returns making it less attractive to borrow the extra funds for the High Performance Home.