

## **Earth-craft Homes: Capital versus Recurring Costs**

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### **Abstract**

Earthcraft is a blueprint for sustainable construction which can be applied to new and existing homes. A joint venture between Southface Energy Institute and the Atlanta Home Builders Association designed Earthcraft building standards to promote sustainable planning and construction throughout the Southeast.

The objective of this study is to present the initial cost and potential cost savings to homeowners and builders who wish to implement Earthcraft standards in their new home. The data was collected through interviews with certified Earthcraft builders. The cost data from the interviews represent the cost per square foot for an Earthcraft home versus a standard home of equal size and amenities. The additional construction cost ranged from 1-3% of the home price while potential cost savings ranged from \$400-\$750 per year in utility bills.

### **Keywords**

Green building, Capital Cost, life cycle costs, sustainable construction, Earthcraft homes

### **1. Introduction**

In 1999, a joint venture between Southface Energy Institute and Atlanta Home Builders Association revealed the Earthcraft house program (Earthcraft house website). Earthcraft is a blueprint for sustainable construction which can be applied to new and existing single and multi family homes (Earthcraft house website).

The Earthcraft program is a voluntary program that encourages Home Builders and Owners to attain sustainable planning and construction in the homebuilding process.

Energy efficient and sustainable homes have been popularized by increasing energy prices, awareness of air quality, and efforts to conserve resources and improve quality of the environment.

The benefits of Earthcraft certified homes are indisputable when compared to standard building practices especially while looking at the higher quality, greater comfort; however, the increased quality of green building comes obviously at an increased initial cost to consumers.

The objective of this study was to compare the increased initial cost and the life cycle cost of Earthcraft

certified homes with conventional homes of similar size and specifications.

The Earthcraft program is one of few national programs that serve as a blueprint for builders' and Homeowners' to implement sustainable construction in their new or renovated home. The program has endured success due to a user friendly point system and the ability to be incorporated in typical suburban homes. Earthcraft standards are satisfied by accumulating points through certain green features incorporated in the design or construction of a home. Some areas where points may be accumulated include: site planning, building envelope systems, heating and cooling equipment, recycled and natural materials and waste management. The Earthcraft standard achieves a higher level of code requirements such as certified EnergyStar home and exceeds the Georgia Energy Code. Before certification, homes must pass a final inspection by certified Earthcraft inspectors trained and employed through the Earthcraft house program. The Earthcraft house program encourages better air quality, waste and energy reduction and sustainable material selection to ensure safe and healthy homes for future generations.

In today's movement toward green, sustainable design practices, a lot of research has been carried out on the qualities of the material used, long term impact on the environment over the building's life-cycle and the various benefits of building green. Surveys can be of tremendous benefit to green developers (Johnston, 2000). Eighty-nine percent of ED&C respondents who were owners or building contractors and others predicted that green building would increase (Wiley, 1998). Seventy-five percent of AIA COTE respondents who were architects expected the demand for green building to increase in the near future (Wiley 1998). By simultaneously creating both economic and environmental value, green buildings begin to bridge the long existing gap between development and the environment (Stretch 1997). Different studies were carried out related to the expected demand for green buildings in near future. Establishing a framework for green development will require a public that understands what is different about green development and asks for it (Johnston 2000).

## **2. Methodology**

The survey was conducted through an online survey directed towards certified Earthcraft builders. The selected Builders were chosen for their building and pricing experience in dealing with both Earthcraft certified homes and homes built using standard local practices.

### *Cost*

The survey relied upon the knowledge and experience of Earthcraft builders to give the construction cost for a particular size home with and without Earthcraft standards. Also, Earthcraft builders were surveyed to identify price differences between homes with minimum or substantial Earthcraft features. Minimum was defined as being the minimum amount of points needed in order for a house to get Earthcraft certification. Substantial was defined as exceeding the minimum amount of features and was dependent on the builders' experience.

### *Size of the home*

The costs of Earthcraft standards are dependent on the heated area or gross square footage of the structure. The survey used three different sized homes that included: 2500sqft, 4500sqft and 6500sqft. A range of home sizes was chosen to determine whether the size of the home affected the cost of Earthcraft certification.

### 3. Analysis

The survey was conducted between March 18 and April 18, 2005 through [www.Questionpro.com](http://www.Questionpro.com). The number of respondents was 24 out of 91 applicants for a 26% response rate. A series of questions proposed that Earthcraft Certified builders give a construction cost for a particular size home and then give the expected added cost for that same size home with minimum and substantial Earthcraft features. Information was collected for the three proposed home sizes: 2500, 4500, and 6500sqft. Each home size was linked to a construction cost for conventional construction, added cost for Earthcraft home with minimum features and substantial features. The outcome will generate a percentage increase from the bid price for conventional construction to the cost for Earthcraft standards.

### 4. Results

The results of the survey concluded that the size of the home does affect the additional cost associated with meeting the Earthcraft certification guidelines. The survey does not pinpoint an actual cost for meeting the Earthcraft standards but gives survey participants a range of cost figures to choose from. The capital cost does increase due to the amount of Earthcraft standards included within the home. For homes with area ranging from 2500 and 4500 square feet, the capital cost for an Earthcraft home was equal while a home size of 6500 square feet included a capital cost greater than the cost associated with the 2500 and 4500 square foot home. This result was in line with the fact that Earthcraft certification standards focus typically on building envelope, proper heating and cooling system, and controlled ventilation.

#### *Category 1: 2500 square feet Home*

The construction cost was \$200,000 for a conventional home with 2500 square feet. Sixty percent (60%) of survey applicants agreed that capital cost for Earthcraft standards would be less than five thousand dollars (<\$5,000) or <2.5% more than conventional construction for a home with 2500 square foot. Seventy percent (70%) of survey applicants agreed that capital cost for Earthcraft with substantial features would range from five to ten thousand dollars (5-\$10,000) for a home with 2500 Square feet (or 5%).

#### *Category 2: 4500 square feet Home*

The construction cost was \$400,000 for a conventional home of 4500 square feet. Sixty percent (60%) of survey applicants agreed that capital cost for Earthcraft standards would be less than five thousand dollars (<\$5,000) or <1.25% more than conventional construction for a home with 4500 square foot. Fifty percent (50%) of survey applicants agreed that capital cost for Earthcraft with substantial features would range from five to ten thousand dollars (5-\$10,000) for a home with 4500 square feet. The other fifty percent (50%) answers ranged from \$15-\$40,000 for Earthcraft with substantial features.

The survey did not provide cost figures lower than five thousand dollars (\$5,000). The survey indicated capital cost for a 2500 and 4500 square foot homes to be equal. An assumption that the 2500 square foot home would be in the middle range of \$5,000 while the 4500 square foot home would be closer to \$5,000 could be assumed.

#### *Category 3: 6500 square feet Home*

The greatest capital cost for Earthcraft was linked to the largest home. The bid price was \$550,000 for a conventional home of 6500 square feet. Sixty percent (60%) of survey applicants agreed that capital cost for Earthcraft standards would range from five to ten thousand dollars (5-\$10,000) for a home of 6500 square feet. Forty two percent (42%) of survey applicants agreed that capital cost for Earthcraft with substantial features would range from ten to fifteen thousand dollars (10-\$15,000) for a home with 6500 square feet.

**Table 1: Tabulated Results**

Size of Home	Conventional Construction Cost	Earthcraft Minimum	Earthcraft Substantial
2500 SF	\$200,000	<\$5,000	\$5-10,000
4500 SF	\$400,000	<\$5,000	\$5-10,000
6500 SF	\$550,000	\$5-\$10,000	\$10-\$15,000

## **5. Life cycle cost**

In this project, life cycle cost is the utility and energy savings a homeowner could save each year. Life cycle cost is not readily available or easily calculable so potential cost savings relied on knowledge from government agencies. It was mentioned before that the Earthcraft home would also become EnergyStar certified. EnergyStar is a government backed program helping businesses and homeowners protect the environment through energy efficiency. The website for EnergyStar states “that EnergyStar can save up to 30% or \$450 each year in utility bills”. Considering average home loans last for thirty (30) years, the capital cost of \$5,000 for Earthcraft standards can be recouped within twelve (12) years. As the capital cost increases also will the time to recoup the initial investment. Forty two percent (42%) of survey applicants agreed the cost savings for an Earthcraft home would range from 250-\$500 each year while homes with substantial features could save 500-\$750. Earthcraft homes not only increase air quality and reduce energy and waste consumption but saves homeowners money over the lifetime of their home mortgage. Home mortgage companies are catering toward the energy minded consumer by offering better loans for homes conforming to EnergyStar standards.

## **6. Conclusion**

The study concluded that initial construction cost will increase by 1-3% of the home price while meeting Earthcraft Certification Standards; however, potential utility savings ranged from \$250-\$750 per year. The capital cost of homes conforming to Earthcraft standards can be justified through waste reduction, lower energy consumption and reducing impact on air quality.

As a result, consumers are seeking homes built to better standards than conventional construction. Sixty percent (60%) of survey participants said that homeowners are actively pursuing Earthcraft homes. Seventy five percent (75%) of survey participants answered yes when asked if their business has seen an increase of Earthcraft homes from 2001-2004.

The green movement in America is in full swing and consumers want a home that’s healthy and safe for their families. Earthcraft house program has simplified the process of green building by providing a point system which enables the use of different green materials and methods. The capital cost is a major factor for considering Earthcraft homes because homeowners must justify the added cost with potential savings. The survey showed the expected capital cost and life cycle savings with an Earthcraft certified home. Earthcraft house program is a win-win scenario for homeowners and developer. Homeowners can save money from reduced utility bills and more efficient HVAC System. They can protect their families by having improved air quality and do their fair share in protecting the environment.

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