

Donald Bren School of Environmental Science and Management  
UNIVERSITY OF CALIFORNIA, Santa Barbara



# BUSINESS PLAN FOR GREEN MODULAR HOUSING

A Group Project submitted in partial satisfaction  
of the requirements for the degree

*of*

Master's in Environmental Science and  
Management

*for the*

Donald Bren School of Environmental Science &  
Management

*by*

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**workshop/apd**





# **BUSINESS PLAN FOR GREEN MODULAR HOUSING**

As authors of this Group Project report, we are proud to archive it on the Bren School's web site such that the results of our research are available for all to read. Our signatures on the document signify our joint responsibility to fulfill the archiving standards set by the Donald Bren School of Environmental Science & Management.

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The mission of the Donald Bren School of Environmental Science & Management is to produce professionals with unrivaled training in environmental science and management who will devote their unique skills to the diagnosis, assessment, mitigation, prevention, and remedy of the environmental problems of today and the future. A guiding principal of the School is that the analysis of environmental problems requires quantitative training in more than one discipline and an awareness of the physical, biological, social, political, and economic consequences that arise from scientific or technological decisions. The Group Project is required of all students in the Master's of Environmental Science and Management (MESM) Program. It is a four quarter activity in which small groups of students conduct focused, interdisciplinary research on the scientific, management, and policy dimensions of a specific environmental issue. This Final Group Project Report is authored by MESM students and has been reviewed and approved by:

**Matthew Kotchen, Faculty Advisor**

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**Ernst von Weizsäcker, Dean**

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**Date**

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# TABLE OF CONTENTS

<b>PROJECT DESCRIPTION .....</b>	<b>IX</b>
<b>BUSINESS PLAN .....</b>	<b>11</b>
<b>SUMMARY .....</b>	<b>12</b>
<b>PRODUCT DESCRIPTION .....</b>	<b>13</b>
<b>MANUFACTURING AND OPERATIONS PLAN .....</b>	<b>17</b>
<b>MARKET ANALYSIS AND SALES PLAN .....</b>	<b>19</b>
<b>RISKS .....</b>	<b>25</b>
<b>TIMELINE AND GROWTH PLAN .....</b>	<b>27</b>
<b>FINANCIAL PLAN .....</b>	<b>29</b>
<b>INVESTMENT PROPOSAL .....</b>	<b>32</b>
<b>MANAGEMENT TEAM AND ORGANIZATIONAL STRUCTURE .....</b>	<b>33</b>
<b>SUPPORTING RESEARCH .....</b>	<b>39</b>
<b>1 BACKGROUND .....</b>	<b>39</b>
<i>1.1 Growing Awareness of Environmental Problems .....</i>	<i>39</i>
<i>1.2 Rising Energy Costs .....</i>	<i>42</i>
<i>1.3 Health Concerns Associated with Buildings .....</i>	<i>44</i>
<i>1.4 Environmental Impacts of Homes and Construction .....</i>	<i>47</i>
<b>2 OPPORTUNITY .....</b>	<b>49</b>
<i>2.1 Market Analysis .....</i>	<i>49</i>
<i>2.2 Customer Analysis .....</i>	<i>52</i>
<i>2.3 National Industry Trends .....</i>	<i>56</i>
<i>2.4 Location .....</i>	<i>60</i>
<b>3 SOLUTION .....</b>	<b>73</b>
<i>3.1 Explanation of Green Pieces .....</i>	<i>73</i>
<i>3.2 Product Description .....</i>	<i>77</i>
<i>3.3 Manufacturing and Operations .....</i>	<i>83</i>
<i>3.4 Marketing Plan .....</i>	<i>89</i>
<i>3.5 Financial Plan .....</i>	<i>98</i>
<i>3.6 Execution Plan .....</i>	<i>114</i>
<i>3.7 Management Team and Organizational Structure .....</i>	<i>116</i>
<i>3.8 Risks .....</i>	<i>122</i>
<b>4 APPENDICES .....</b>	<b>124</b>
<i>APPENDIX 1: Types of Construction .....</i>	<i>124</i>
<i>APPENDIX 2: Connecticut Prototype Designs (workshop/apd) .....</i>	<i>126</i>
<b>REFERENCES CITED .....</b>	<b>129</b>





## **PROJECT DESCRIPTION**

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This project is the result of a new collaboration, dubbed Eco-Entrepreneurship, between the Bren School and the Technology Management Program in the Engineering Department at UCSB. By taking classes in both programs, students are given training in both environmental management and new venture creation, giving them the tools to create new businesses that can achieve a triple bottom line (environmental, social and financial).

The proposal for this project came from our clients, the design firm of workshop/apd. Principal designers Andrew Kotchen and Matthew Berman were interested in developing the idea of green modular housing into a viable business that could stand apart from their existing architecture and design company. This idea came from their experience in entering, and winning, a design competition sponsored by Global Green USA and Brad Pitt, the focus of which was to sustainably rebuild a city block in the hurricane-ravaged Ninth Ward of New Orleans. Construction on this project should be completed during 2008.

### **Organization of the document**

There are two main deliverables of this project, which have been combined to form this final report: the first is a concise business plan that can be sent to investors, and the second is a compilation of the analytical research that was carried out in support of the business plan. Since the conclusions and information in the business plan are directly formed from the supporting research, there will be repetition. The two sections are meant to be read as separate entities.

A business plan is inherently a living document, evolving as the business develops and new decisions are made, so this document represents a snapshot in time of the business plan. As the company is formed and work begins, the shape of the business will likely change from what is represented here.



**BUSINESS PLAN**



*“Green living for the rest of us”*

[www.greenpieceshomes.com](http://www.greenpieceshomes.com)

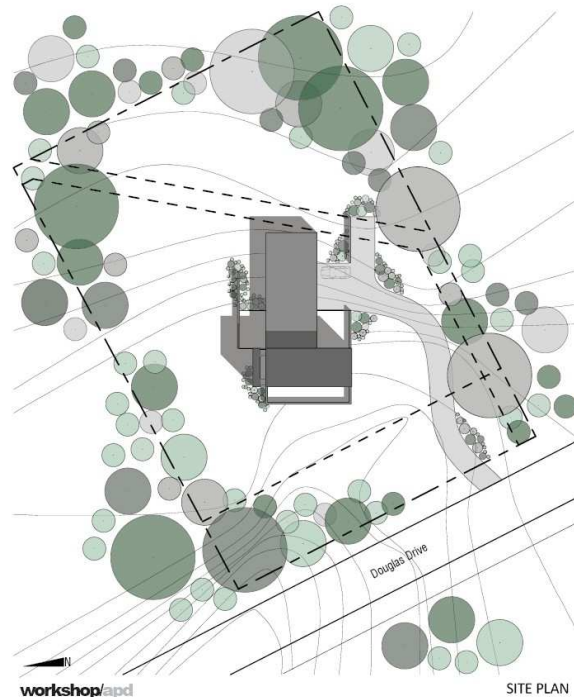
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## SUMMARY

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Green Pieces is a designer and builder of green homes in the southeastern United States, addressing a growing demand for affordable living with a reduced environmental impact. Increased consumer awareness of environmental issues has driven demand for green buildings, creating a new market segment within the housing industry. This trend has been available only for higher-priced homes; however, using the efficiencies of modular construction, our company makes green features available without a high price tag. Traditional green homes can cost \$200-400/ft<sup>2</sup>; our approach costs \$170/ft<sup>2</sup> and offers a higher level of sustainability, speed, and continual savings on utility bills. Green Pieces redefines the modular industry, offering a home that is not only affordable, but also offers a healthier indoor environment and a lower environmental impact when compared to traditional modular homes. Specifically, Green Pieces' homes will reduce natural resource use and construction waste, increase energy and water efficiency, and improve indoor air quality. As compared to a site-built home, our homes exhibit a lower environmental impact in both the production phase (through factory efficiencies), as well as the use phase (through operating efficiencies). Green Pieces recognizes that different customers have varying desires and value customizability; hence, we offer a spectrum of "shades of green" home options.



Other companies offer a similar product (quite successfully), but there are very few based in the Southeast. Location in relation to the customer base is an important detail as transportation costs and the carbon footprint of the project increase when shipping farther from the factory. Both factors can prohibit firms from capturing more than a regional market. The Southeast is currently underserved, cost of labor is low, modular factories are present, and our targeted customers are in high concentration.

The business model is highly scalable because more factories can be added to produce more homes as the business grows. The model is replicable, but the building industry, especially in the Southern United States, is traditionally slow to change. This will give us a first-mover advantage in this region. In Phase One of our business, we will contract homes through other builders, keeping startup costs low and allowing us to fund the business through angel investment (we are seeking \$400,000). Once we start earning revenue and the process is fully streamlined, we will seek to purchase a factory using bank funding in Phase Two (estimated at \$4,000,000), thus negating the need to seek venture capital.

Green Pieces is uniquely positioned to take advantage of a highly profitable market segment while also adhering to a company philosophy of sustainability. We have researched and identified our target customer segment as the LOHAS (lifestyles of health and sustainability) consumer segment, which includes approximately 35 million adult Americans and a \$209 billion marketplace, \$50 billion of which is accounted for by green building. According to the Natural Marketing Institute, the LOHAS segment has seen its greatest growth in the green building market. We estimate the annual size of our regional market to be 26,260 green home buyers. The LOHAS market segment includes all income levels; we are targeting consumers who want green homes but cannot afford them.

Our designs are created by the award-winning designers at workshop/apd. The designers have experience with green building and are currently designing and selling individual green modular homes. Their experience with residential green design will be paired with a strong management and advisory team in order to grow this venture as a completely separate business entity that builds and sells homes directly to customers. In addition, this startup is being supported by collaborative work with the Donald Bren School of Environmental Science and Management at the University of California, Santa Barbara. This collaboration ensures that Green Pieces is making a quantifiable contribution towards reducing the environmental impact of new home construction. Our company is committed to the idea of sustainability realized through implementation of a triple bottom line: achieving financial, social, and environmental goals.

## PRODUCT DESCRIPTION

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Green Pieces is a green builder. We compete with other green builders, marketing to homebuyers who are interested in green homes. Customers will prefer our homes over those of other builders because of our excellent designs, lower prices, shorter construction time, and lower environmental impact over the entire building life-cycle.

Green Pieces' homes are constructed in a factory in modules. Modules of a standard size can be combined in different ways to produce different floor plans in a wide array of sizes, allowing the customer the opportunity to customize their home. Workers at each station are highly skilled to complete their portion of the house, and multiple tasks are completed at each station, increasing the efficiency of the building process. The house is 95% complete when transported to the site. The result is a beautiful, high performing, healthy, green home at the price of a traditional, on-site-built home.

Cost comparison of various construction and sustainability features including Green Pieces.

	Traditional Modular	Traditional Site-Built	Green Site-Built	GREEN PIECES
Cost/sq ft	\$125	\$150-400+	\$200-400+	\$170
Level of Green	None	None	Low - Med	Med - High

### Creating value for our customer

As recognition of the detrimental impacts of human activities on environmental and personal health grows, people are demanding innovative products that respond to these challenges without sacrificing fundamental lifestyle choices. Green Pieces offers a solution to the homebuyer looking for a beautiful home that also reflects their desire to lessen their environmental impact and protect their health without having to go beyond their financial means.

Advantages of Green Pieces homes over traditional, non-green homes.

Environmental	Financial
40% less construction waste	15% lower price
55% more energy efficient	57% faster construction
30% more water efficient	55% savings on electricity bills

### *High design*

The designs for Green Pieces project a stylish, progressive aesthetic, making a statement as a beautiful place to live as well as an environmentally conscious lifestyle. Our homes are designed by award-winning designers from the New York City-based design firm, workshop/apd, who are experienced in designing various styles and construction types.



### *Affordability*

Affordability is one of the core values of Green Pieces. We believe that in today's market, with rising fuel costs and the cyclical (and current) state of our economy, our product will be in high demand. Modular construction will lower production costs and green design will lower life-cycle operating costs. The result is a quality product that is available at a reasonable price to a large market.

### *Sustainability*

Sustainability is the key value of Green Pieces. Intelligent design and landscape work can optimize the efficiency of a home to use natural energy and cooling sources, and is the least expensive way to capitalize on savings from energy use. Our homes will be designed to meet the standards of third-party certification programs such as LEED for Homes, U.S. EPA Energy Star, and NC HealthyBuilt Homes.

By building in a factory, Green Pieces completely avoids weather issues, preventing potential health and structural problems that are caused by water infiltration during construction. Modular homes also have a tighter building envelope due to mass-scale replication and the anticipation of the rigors of transportation, resulting in higher performing, energy-efficient buildings. Additionally, the modular construction process is less resource intensive.

Material and product choice can have a major impact on the environment and the health of the occupants. We will offer Green Pieces homes in different “shades of

green” which will represent a different compilation of green features at different prices.

**Shades of Green:** A select list of features in our homes. The checked options are included in the base models and other options may be added a la carte.

\$	<input checked="" type="checkbox"/> Intelligent design and site orientation
	<input checked="" type="checkbox"/> Ultra-tight building envelope incorporating precision joints, sealed ducts, sealed openings, high-performance insulation, high-performance doors and windows
	<input checked="" type="checkbox"/> Low-VOC and non-toxic paints, finishes and adhesives
	<input checked="" type="checkbox"/> Minimal carpeting
	<input checked="" type="checkbox"/> Formaldehyde-free cabinets and adhesives
	<input checked="" type="checkbox"/> Low-flow fixtures and appliances
	<input checked="" type="checkbox"/> Energy-efficient appliances
	<input type="checkbox"/> Intelligent thermostats
	<input type="checkbox"/> Sunroofs and light tubes
	<input type="checkbox"/> Recycled glass countertops
	<input type="checkbox"/> Bamboo flooring
	<input type="checkbox"/> Solar water heating
	<input type="checkbox"/> Tankless water heating
	<input type="checkbox"/> High-efficiency air conditioning
	<input type="checkbox"/> Radiant floor heating
	<input type="checkbox"/> Solar photovoltaic power
	<input type="checkbox"/> Green roof
	<input type="checkbox"/> FSC-certified lumber
\$\$\$	<input type="checkbox"/> Geothermal heat pump

#### *Rapid construction*

Green Pieces homes will be constructed dramatically faster than traditionally built homes. Modularly manufactured homes take about a week to build in a factory. Even considering on-site work such as placement of the modules, landscaping, and foundation, modular homes can be totally completed in a matter of 3-4 months.

#### *Cost savings*

Modular construction and green features combine into great cost savings potential for the homeowner. Modular construction reduces the upfront cost of our homes by about 15% due to the economies of scale, and lower costs associated with labor, materials and waste disposal. In addition, the orientation, tight building envelope and green features of Green Pieces’ homes translate into savings on utility bills.



## **Prototype**

Workshop/apd is currently working with multiple customers in their design business who are interested in green modular homes. These projects will serve as prototypes for the product that will be offered by Green Pieces. Though these are completely custom projects, they allow the designers to work out the technological aspects of the designs so that Green Pieces will be able to quickly develop a product for mass production. Refer to the Research Document (Appendix 2) for example drawings from the Connecticut prototype.

## **Intellectual property**

Intellectual property protection is not a concern for this enterprise. Designs are copyrighted once stamped by a licensed architect. This does open up the possibility of licensing our designs to other builders in order to build brand recognition and expand the business in the future. The construction methods used in the factory are not protected in any way and are already in widespread use. We are simply adapting them to produce a different product than a typical modular builder.

## **MANUFACTURING AND OPERATIONS PLAN**

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### **Business model**

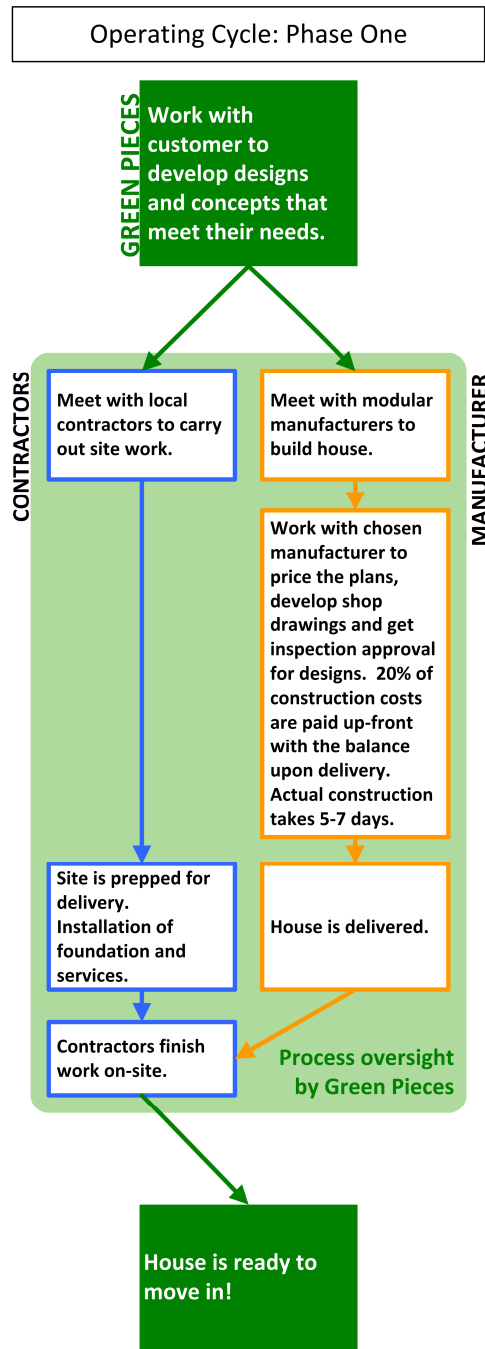
*Phase one:* To get a foothold in the Southeast while not exposing the company to excessive risk, Green Pieces will contract with an existing modular builder to produce homes for the first phase. The experience gained from partnering with an existing builder will help Green Pieces establish relationships with key players, such as contractors, landscape architects, local inspectors and boards, developers, and customers. We plan to be closely involved in the process, including design, material choice, module manufacturing, transportation, on-site contracting, module placement, and landscaping. Our involvement will ensure initial quality control and help the process move more smoothly when we begin to operate out of our own facility.

*Phase two:* Once Green Pieces gains a foothold in the regional market, we will look to purchase or build a factory. Purchasing an existing factory is the preferable option, as it requires a smaller capital outlay and is associated with less risk. During the first year of operation through other modular manufacturers, we will be researching a pre-existing factory in North Carolina, South Carolina, or Georgia for purchase. There are several modular manufacturers located in our focus area and during our first year of operation we will look to procure one of these factories.

If a suitable factory is not available for purchase, we will purchase land and build a modular factory. This process will take much longer and be more expensive than the prior option. Building a factory will also require procurement of equipment. However, it will also allow for freedom to design the factory for our specific purposes, possibly including dual assembly lines so that we may frame the modules out of either wood or steel.

*Criteria for choosing a manufacturing partner*

When looking to partner with a modular manufacturer, we will evaluate them on environmental criteria and flexibility to work with the Green Pieces vision. An ideal manufacturing partner will have a recycling and waste reduction policy. In addition, we would like our manufacturing partner to evaluate its supply chain on environmental merits and be open to using more environmentally-friendly materials. While we understand the complexity of prior supply chain arrangements, we would like to find a manufacturer open to using materials that would make our homes healthier and more environmentally friendly.



### *Factory and equipment requirements*

In general, the facility acquired will be a large warehouse-like structure with dimensions at least 200 feet by 300 feet. The height of the factory can vary, but ideally has space for a mezzanine and crane that feed the main assembly line or span the central bay of the factory. Factories also usually include space for inventory and offices. The property should be large enough to store module units not ready for transport. A modular factory usually requires some heavy equipment in the form of one to three cranes either fixed or mobile to move large wall or floor sections and forklifts to move additional inventory throughout the factory.

The materials for our homes will be heavily researched regarding their sustainability features and our suppliers will be chosen on experience, reputation, location, and environmental commitment.

### *Preferred supplier attributes*

<b>Material Attributes</b>	<b>Systems Attributes</b>
➔ Contains recycled content	➔ Energy efficient
➔ Recyclable	➔ Water efficient
➔ No or few toxins	➔ Certified by a credited source
➔ More durable	➔ Locally made
➔ Less resource intensive	
➔ Certified by a credible source	
➔ Locally made	
➔ Sustainable	
➔ Energy efficient	

As production progresses, we will continue to assess material quality through LCA (life cycle analysis) and recycling policies that look to maximize the use of materials and scrap.

### *Technology status*

Green Pieces is not in an industry where technology has a regulatory or legal advantage. Competitive advantages in the construction industry rest in creating value for the customer through better service, product differentiation, or lower prices. Green Pieces is breaking down the traditional production process in an existing industry to offer green homes at a lower price.

## **MARKET ANALYSIS AND SALES PLAN**

Growth in the green building materials market, the large customer segment tapping into the market, and growth in the homes being certified by the EPA and LEED

translate into growth of green building construction. In 2005 residential and commercial construction accounted for 6.2% of the \$12.5 trillion GDP. Specifically, the value of residential construction amounted to \$490 billion. As of 2005, green homes represented 2% of homes being built and a \$7.4 billion marketplace. The marketplace is estimated to grow in value to \$19-36 billion, an increase of 5-10% by 2010.

While higher initial costs represent the primary barrier for green building to enter the mainstream, this can also be perceived as a great opportunity. Evidence shows that many consumers want green homes but are not willing to pay a very large premium for the green features. The potential of this underserved market could be huge. Considering that the size of the United States' LOHAS marketplace is 16% of 225 million adults, it can be argued that 36 million of these consumers are potential buyers of green homes if the price is not prohibitive. If green buildings could be made without the price premium or close to the cost of a custom-built, non-green home, a large portion of the market could be captured. Green Pieces looks to capitalize on this underserved market by providing high-quality, high-design green homes that are cost comparable with traditionally-built, non-green homes.

We estimate the annual size of our market to be 26,260 green home buyers. Housing starts for 2007 in NC, SC and GA (our focus states) were estimated to total 228,063. Assuming 16% of the population to be green consumers yields a figure of 36,450 housing starts each year that could be attributed to LOHAS consumers. Taking into account the number of married customers (using U.S. Census estimates) brings this figure to 26,260 possible LOHAS home buyers per year. Undoubtedly, only a small percentage of these consumers are actually buying green homes, due to the high price and uneven distribution of current options.

If each of these 26,260 LOHAS homebuyers were to purchase a Green Pieces home at \$255,000, the overall size of the market would be \$6.7 billion per year.

### **Direct competition**

As a green builder, our direct competition is other green builders who offer single-family homes, regardless of construction methods. Being that Green Pieces uses modular construction, our most similar competitors are those companies that are using the same methods to bring green homes to their customers. However, we will still be in direct competition with traditional green builders. Because of the customized nature of traditional construction work, the addition of green practices and materials adds a cost premium.

There are a number of small firms successfully offering green modular homes, proving that our concept will be successful in the marketplace. As stated earlier, modular manufacturers are limited regionally. Thus, well served regional markets can be competitive. Inversely, there are many areas nationwide, such as the Southeast that are currently underserved. As the business develops, Green Pieces will seek out other markets in which to license our home designs, a method that very few green modular builders are employing at this time.

#### *Local green building competition*

<b>Company</b>	<b>About</b>	<b>Cost</b>	<b>Highlight</b>
<b>Innova Homes</b> Green modular builder <i>Asheville, NC</i> Founded 2003	Build about 6 homes a year, only within 60 minute radius of Asheville	\$150,000- \$400,000	First-mover in Asheville market, Healthy Built Homes Certified
<b>EcoBuilders</b> Green, custom, site built homes <i>Asheville, NC</i> Founded 2003	Focused on new infill development, promote integrity, honesty and punctuality	\$200-300/ sq ft	Certified in HealthyBuilt Homes program and Energy Star
<b>Oxide Architects</b> Sustainable, modern Architects <i>Raleigh, NC</i>	Employs a unique, dynamic design-build approach.		Affiliated with Healthy Built Homes program and the US Green building Council
<b>Greenbridge Developments</b> Multi-family Unit Development <i>Chapel Hill, NC</i>	Goal to be a national model of sustainable design and green building- aspiring to LEED Gold Certification	\$300,000-\$1 million	Offers 84 market rate residential units. Located near mass transit and urban infrastructure
<b>R-Anell</b> Modular Builder <i>Cherryville, NC</i> Since 1972	Builds single family homes, multifamily and commercial buildings. Service area reaches from WV to FL.		Offers LEED Certified Homes.

#### **Indirect competition**

Green homes are being utilized in multifamily developments, urban infill projects and even vacation homes. Based on the customer needs, these can be seen as competitive threats, especially for urban customers. Residents of downtown Chapel Hill, NC, Los Angeles, CA, and St. Louis, MO now have the option to purchase versions of healthy, sustainable, townhomes or condominiums. These developments create a much simpler option as a way to achieve an affordable, sustainable home rather than needing to secure the land that a single-family home requires. As Green Pieces grows and gains traction in the industry, we plan to address this segment of the housing market.

## Customer demographics and psychographics

Green consumers are a relatively new market category that is increasingly being profiled, understood and sought after. As laid out by the Natural Marketing Institute, “LOHAS describes an integrated, rapidly growing market for goods and services that appeal to consumers who have a meaningful sense of environmental and social responsibility and incorporate those values into their purchase decisions.” LOHAS consumers are seen as market drivers – forces for social, political and economic change. Moreover, LOHAS consumers have been classified as middle to upper income, particularly present in the baby boomer and young urban professional segments. They are also very well educated with 16% likely to have graduate degrees as compared to 10% for the national average.

According to market research compiled by Robert Charles Lesser & Co., the major motivations for customers to purchase a green home include environmental responsibility, lower energy use and electricity bills, and benefits to personal health.<sup>1</sup> Their survey was targeted at existing homeowners with incomes of over \$50,000, or an estimated net worth of at least \$250,000 for retirees. Their results divided green home-buying consumers into three buyer profiles: Forest Greens, Healthy Greens, and Greenback Greens, all of which could be considered subsets of the larger LOHAS umbrella and potential customers for green, modular homes.

- ➔ *Forest Greens*, or 6.1% of the population, are the least homogenous of the groups. Their motivation is derived by doing the right thing, and expecting nothing in return. They tend to be younger with less spending capacity than the other groups.
- ➔ *Healthy Greens*, or 8.5% of the population, are motivated by the health benefits that derive from improved indoor air quality, natural ventilation and abundant light. Though the appeal of health benefits is attractive across many age groups, the 65+ range displayed the highest interest level. This segment is characterized by high incomes and high levels of education with 37% having a college degree and 40% having earned graduate degrees.
- ➔ *Greenback Greens*, or 21.3% of the population, are motivated by the personal return a green home affords them, such as reduced electricity bills. They believe their actions can make a difference and want to make choices in favor of the environment, yet will not pay the price premium for a green home unless the money spent on green features will pay them back. They are characterized by older populations with price and value sensitivity.

## **Positioning**

Green Pieces will position itself as a green builder that can offer a lower environmental impact over the entire building life-cycle with superior quality and lower costs as compared to other green builders. Environmentally conscious customers will be very persuaded by the life-cycle approach Green Pieces is uniquely positioned to offer. In southeastern markets, Green Pieces will be a first mover looking to aggressively enter the ripe green housing market. Green Pieces will use the following methods to position ourselves effectively.

## **Promotional events**

Green Pieces will seek out opportunities to participate and sponsor local green home building tours, educational seminars, modular factory tours, and other related events as they emerge. Examples for NC include:

- ➔ Solar and Green Building Tours hosted by North Carolina Sustainable Energy Association. The event is held in Charlotte, Raleigh, Asheville, Durham, and Greenville.
- ➔ North Carolina Sustainable Energy Association hosts a Speaker's Bureau which will operate statewide to educate citizens and businesses about business opportunities, technology, sustainable energy alternatives, and policy options.

## **Public relations**

Green Pieces will capitalize on all opportunities for public relations. Leveraging all of our memberships in green building organizations, Green Pieces will strive to be a community leader and voice for green building in the local communities. All company milestones will be celebrated with press releases.

## **Website**

The website will be an enormous channel of information and communication. Ease of use and aesthetic website design will be areas in which we will heavily invest. Brochures will also be printed that highlight the major pieces of educational material that will be most compelling. Website content will include:

- ➔ Explanations of how and why green design, modular construction, and smart materials are beneficial for the environment, personal health, and cost savings
- ➔ An explanation of life-cycle analysis and how it plays into our product and material choice

- ➔ Virtual tours of floor plans
- ➔ Local, state and federal tax incentives as they apply to the project
- ➔ An explanation about the various green building certification programs available
- ➔ Questions regarding financing modular vs. stick-built homes
- ➔ The timeline they can expect the project to follow
- ➔ FAQ and links to green building resources
- ➔ Links to our member organizations and partners' web pages

## **Outreach**

To reach out to our target market, we will attend trade shows, Earth Day Fairs, local festivals that attract the LOHAS crowd, and local farmer's markets in the towns and cities with the highest concentrations of our targeted group. Taking our message to our customer will be done through sophisticated and informative displays and brochures.

We will also provide educational programs to local schools. The Green Pieces Marketing Director will develop and deliver lessons that are supported by the public school curriculum, and teach students about the environment and homes through an engaging and innovative curriculum. Green Pieces will build and work with a network of local teachers and schools. Through this program, young people will go home and educate their parents, and Green Pieces will be educating the next generation of home buyers in the process.

## **Word-of-mouth marketing**

All of our marketing efforts are also an attempt to encourage and facilitate word of mouth communication. Green Pieces recognizes the significance of this channel for generating buzz, interest and sales. Providing Green Pieces' customers with a positive experience, one worthy enough to tell their friends and family about is our end goal. This is a very successful marketing channel in the architectural industry.

## **Pricing**

Our base model, as described in the Financial Section of this document, will be sold for \$170/ sq foot. The options for upgradable features are available for additional costs. Over time, more options and designs will be available.



## **Sales**

Our sales strategy, much like our competitors', will be through developers and direct to customers which will primarily be facilitated through industry relationships, our very detailed and informative website, participation in events, speaking engagements, literature, promotions, public relations opportunities, and, eventually, advertising. We will make samples available in our office for all of the different options for materials and fixtures that customers can choose from.

## **RISKS**

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### **Current housing market slump**

A recent article by MarketWatch claimed that 2007 capped off the worst performing housing market in 25 years; 2007's 13% decline was the largest decrease since 1982. They stated that borrowers asking for large mortgages or those with poor credit are still facing a tighter lending environment. The bright news is that though sales in all four regions of the country fell, the South experienced the smallest decline of just 1% as compared to the Northeast which experienced a 4.6% decline. As Green Pieces will be located in the South, it recognizes it might be facing a more competitive housing market oftentimes considered a buyer's market due to depressed sales overall. However, Green Pieces is well positioned to survive this market downturn since the product offering is value-oriented and offers insulation to overall lower housing prices. Additionally, green modular homes cater to a somewhat niche market that might be less affected by the overall downturn due to their higher income demographic. A tight market can also favor a startup that is agile, flexible and has little overhead, as compared to larger companies with greater liabilities.

### **Environmental trendiness**

The current consumer trend towards environmentally-friendly products could be just that, a finite trend. However, we believe the contrary, that Green Pieces is poised to take advantage of a paradigm shift in product markets. Local and state building regulations are continuing to incorporate environmental considerations (such as California's program for all new homes to be carbon neutral by 2020), and will only become more stringent with time, making it more likely that this movement represents a lasting change to the construction industry. We also believe that the green features of our homes are based on such sensible, rational ideas (such as health and lower utility bills) that they will be sought out by buyers even if the wave of green consumerism subsides. Though the current fervor over green products may

lessen with time, consumers will continue to operate with a certain level of environmentalism ingrained into their behavior.

### **Lack of experience**

Green Pieces' current management team is a visionary, skilled, award-winning group. However, there is specific industry experience lacking from the core team. To counter this dilemma, Green Pieces is actively recruiting experienced, connected, successful team players to guide Green Pieces to the next level. In the meantime, outside resources and experts will be relied upon for guidance.

### **Price uncertainty**

Our price and market projections reflect our best estimates but are based on a fair amount of uncertainty. Our profit margin will allow for some flexibility as we approach the milestones in our execution plan. As our projections become more concrete, all figures, financial projections and milestones will be updated accordingly. It can be expected that as first time green home builders, our cost estimates can run 10% higher. However, as materials and subcontractors get sorted out the second house is expected to be only 3% over and the third home is usually not more than 1% higher.

## TIMELINE AND GROWTH PLAN

### Milestones

Milestones	Description	Time required	Funding required
<b>Phase One</b>			
<b>Fill in gaps of Management Team</b>	Our major efforts will concentrate on finding a Project Manager with proven experience in the building industry.	5 months	\$5,000 for time and travel
<b>Incorporate</b>	LLC	days	Legal fees
<b>Design and develop prototype</b>	Prototype to meet green building criteria and local regulations	3 months	\$0*
<b>Contract with existing modular manufacturer</b>	Find NC modular manufacturers to work with our design, materials and vision.	4 months	minimal
<b>Build a network of green suppliers, distributors, and marketers</b>	Suppliers will preferably be local. Attempt to coordinate these networks into initial homes as soon as possible.	6 months	moderate
<b>Secure customers</b>	Direct sales	2-6 months	\$15,000
<b>Join green building programs/councils</b>	Western North Carolina's Green Building Council, North Carolina's HealthyBuilt Homes Program, USGBC	1 month	\$1650-4250
<b>Phase Two</b>			
<b>Purchase an existing modular home factory in the Southeast</b>	Green Pieces will move from contracting our homes through other suppliers to building them ourselves, leading to increased profit capture.	months	\$3,500,000
<b>Hire factory staff</b>	Search for well-qualified construction laborers in various trades. Train employees in green construction techniques and company policies.	2 months	TBD
<b>Double first-year sales</b>	With the lower costs and increased efficiency of our own factory, we will enter a growth phase by increasing sales efforts and expanding our customer base.	1 year	9.5% of sales

## Growth strategies

As Green Pieces advances through Phase One and Phase Two, we will take these additional steps to grow the company.

- ➔ *Expand services*: Include module transportation, general contracting and landscaping into our service portfolio. Expanding services will enable Green Pieces to fully integrate the building process under one roof, thus reducing costs and increasing quality control. Ultimately, Green Pieces strives to become a developer so that we can influence the growth of communities in an intelligent manner.
- ➔ *Open another factory*: Once our initial factory is operating at full capacity, we will seek to open another facility in another location.
- ➔ *Enter additional markets*: Texas and Florida are experiencing population increases and also demonstrating characteristics that would encourage green building. Green Pieces may look to open a factory in these regions or expand transportation to include Florida. In addition, we plan to move from offering only single-family homes to developing multi-family buildings and integrated green communities.
- ➔ *Expand the product line*: Grow the current customer base by offering new models with the same architectural style or expanding the product line to include a line with different architectural styles. We would also like to offer both wood and steel framing options.
- ➔ *License designs*: Licensing designs out to modular manufacturers outside our serviceable area or within our area during a time of high demand will increase growth and penetration into other regional markets.

## FINANCIAL PLAN

Green Pieces - Cash Flow Analysis						
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
<b>Cash flows from operating activities</b>						
Cash from sales to customers	\$ 3,060,000	\$ 7,650,000	\$ 15,300,000	\$ 25,500,000	\$ 38,250,000	\$ 51,000,000
Cash paid to manufacturers	(2,340,000)	(5,850,000)	0	0	0	0
Costs of manufacturing	0	0	(10,530,000)	(17,550,000)	(26,325,000)	(35,100,000)
Cash used for general & administrative costs	(306,000)	(765,000)	(1,530,000)	(2,550,000)	(3,825,000)	(5,100,000)
Cash used for marketing costs	(76,500)	(191,250)	(382,500)	(637,500)	(956,250)	(1,275,000)
Cash generated from operations	337,500	843,750	2,857,500	4,762,500	7,143,750	9,525,000
Income taxes paid	(110,425)	0	(632,625)	(949,375)	(732,813)	(691,250)
<b>Net cash flows from operating activities</b>	<b>\$ 227,075</b>	<b>\$ 843,750</b>	<b>\$ 2,224,875</b>	<b>\$ 3,813,125</b>	<b>\$ 6,410,938</b>	<b>\$ 8,833,750</b>
<b>Cash flows from investing activities</b>						
Cash paid for capital equipment	(22,000)	(5,000,000)	(50,000)	(50,000)	(50,000)	(50,000)
Business-related investments			(1,000,000)	(2,000,000)	(5,000,000)	(7,500,000)
<b>Net cash flows from investing activities</b>	<b>\$ (22,000)</b>	<b>\$ (5,000,000)</b>	<b>\$ (1,050,000)</b>	<b>\$ (2,050,000)</b>	<b>\$ (5,050,000)</b>	<b>\$ (7,550,000)</b>
<b>Cash flows from financing activities</b>						
Infusion of capital	400,000	4,000,000	0	0	0	0
Prize money from business plan competitions	10,000	0	0	0	0	0
Loan Payments	0	0	(973,267)	(973,267)	(973,267)	(973,267)
Dividends paid to investors	0	0	0	(560,000)	0	0
<b>Net cash flows from financing activities</b>	<b>\$ 410,000</b>	<b>\$ 4,000,000</b>	<b>\$ (973,267)</b>	<b>\$ (1,533,267)</b>	<b>\$ (973,267)</b>	<b>\$ (973,267)</b>
<b>Net increase in cash and cash equivalents</b>	<b>615,075</b>	<b>(156,250)</b>	<b>201,608</b>	<b>229,858</b>	<b>387,671</b>	<b>310,483</b>
<b>Cash and cash equivalents, beginning of year</b>	<b>0</b>	<b>615,075</b>	<b>458,825</b>	<b>660,433</b>	<b>890,291</b>	<b>1,277,962</b>
<b>Cash and cash equivalents, end of year</b>	<b>\$ 615,075</b>	<b>\$ 458,825</b>	<b>\$ 660,433</b>	<b>\$ 890,291</b>	<b>\$ 1,277,962</b>	<b>\$ 1,588,445</b>

Assume that the \$4,000,000 in year 2 is a small business loan from a bank. Assume Term of 5 years at 8% interest rate  
Assume that \$50,000/year will be spent to maintain and update equipment after the purchase of the factory.

### Capital expenses

Green Pieces will initially require \$22,000 for the first year to set up the physical presence of the business. This includes securing an office, furniture, utilities, computers, web hosting, internet access, and other initial costs of getting the business running. We do not require capital to begin home construction because this cost is passed directly to the customer.

### General and administrative costs

These costs (including salaries) are estimated as a percentage of sales revenue. The average for the overall construction industry is 7% of the sales price of the house. However, as a green builder, and before gaining the full efficiency of owning a modular factory, we estimate G&A costs of 10%.

### Employee salaries

Andrew Kotchen and Matthew Berman are the CEO and Chairman of the Board of Advisors, respectively, and will play a role in the daily operations of the new

company. They currently earn salaries through their existing design firm, workshop/apd, and it is not determined what their compensation will be in the beginning of the new venture.

Green Pieces recognizes the nature of the first few years of a startup business—the start-up team works hard to follow their passion, and recognizes not all of their compensation is derived just from their earned salary. Green Pieces will strive to reward their hard-working and well-qualified employees with the highest compensation package that the company can reasonably offer. Salary figures stated below will be complemented with an equity package that we believe to be in line with similar startup salaries and equity packages.

The cost of living in NC is generally low, requiring salaries of about \$30,000 per year. The Director positions will receive a salary that will at least cover cost of living. When the Vice Presidents are hired for these departments, they will receive correspondingly higher salaries, competitive enough to attract well-qualified candidates, yet affordable for Green Pieces.

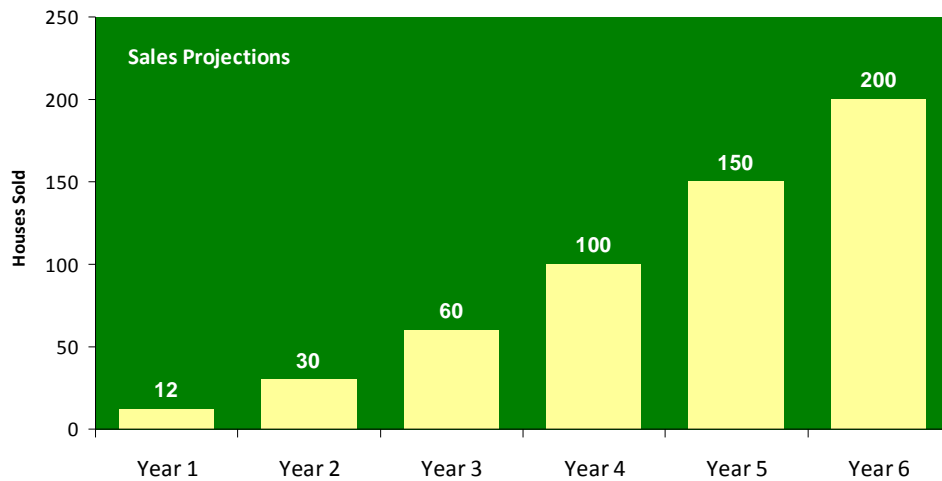
Included in Year 2 projections is construction labor within the factory. NC has a low average wage for carpenters of under \$14/hr (about \$29,000 per year).

We are also actively recruiting for a Project Manager with a background in general contracting, to oversee the daily operations of the business. At this point, Green Pieces will again offer a salary competitive enough to attract a well-qualified Project Manager, yet at a level that is affordable to Green Pieces (starting from \$60,000).

## **Sales**

The sales price of our homes depends on the size of the house (we are expecting 1,500-2,000 ft<sup>2</sup>), the materials used, the distance from the factory, the cost of contractors in the area, and variables related to the site. A pricing model of a primary prototype suggests a price per square foot (psf) of \$130, *which includes all of the costs related to on-site work* (foundation, service hook-ups and finishing work).

The sales price of our houses is directly dependent on the final costs of production and the profit margin that we add on. Taking our cost estimate of \$130/sq ft, we add on a strong profit margin of 30%, resulting in a sales price of \$170/sq ft (\$255,000 for a 1,500 sq ft home).



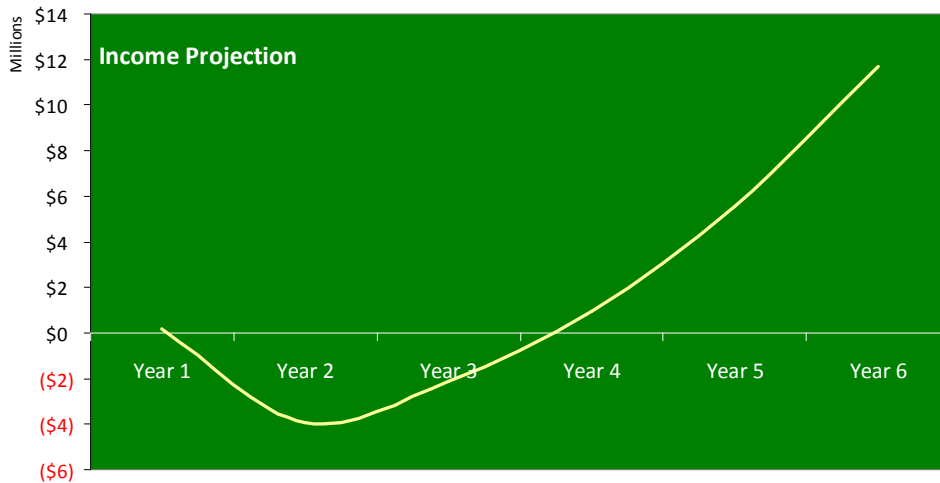
### **Capture rate**

At a maximum output of 200 houses in a year, we would be able to capture 0.8% of the regional market, so there is definitely room to grow the business in this area. It is likely that the first year's sales will not be near factory capacity, but far lower, as we work within the production schedule of our partner factory, designs are tweaked, and specifications are reworked in the factory environment. At the same time we will be expanding our marketing efforts to spread brand awareness. Again, it is unlikely that during the first couple of years in our own factory that we could push sales and construction up to full capacity. However, by the fifth year we should be well-developed and should be nearing full capacity of our factory, estimated to be at least 200 homes.

### **Breakeven point**

Before buying or building a modular factory, Green Pieces will break even when sales revenues are greater than COGS plus operating expenses, since there are no large capital expenditures. However, after expensing the amount of capital needed for a factory, it will take longer to reach the breakeven point.

The business is profitable in Year 1, but falls into the red after the purchase of a factory. We estimate that sales in the third and fourth years will be strong enough that the company will once again break even, finishing the fourth year almost \$1 million in the black.



## INVESTMENT PROPOSAL

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### Investors' rate of return

We seek \$1,000,000 in seed funding to get through the first year and finance the construction of our demonstration home. In Phase 2 cash generated from sales (plus an infusion of cash through bank funding) will be used to finance the purchase of a modular home factory. We estimate that Year 4 sales will be strong enough that we will pay back investors with a 60% Return on Investment (ROI) in Year 5. The only large single capital expenditure associated with this business will be the purchase or construction of a modular home factory for around \$5 million in Phase Two of operation.

At this point, Green Pieces does not have any funding, but we are pursuing promising channels to secure funds.

### Sources of Funds

Round One (\$1,000,000)	Round Two (\$4,000,000)	Ongoing Sources
<ul style="list-style-type: none"> <li>➔ Friends and Family</li> <li>➔ Competitions (William James Foundation, UCSB New Venture Competition)</li> <li>➔ Angel Investors</li> </ul>	<ul style="list-style-type: none"> <li>➔ Banks</li> <li>➔ VC Funds (if necessary)</li> </ul>	<ul style="list-style-type: none"> <li>➔ Strategic Partnerships</li> <li>➔ Sales</li> </ul>

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## MANAGEMENT TEAM AND ORGANIZATIONAL STRUCTURE

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### **Business structure**

Green Pieces will incorporate as a Limited Liability Corporation (LLC). It is our opinion that an LLC would be the proper legal structure for Green Pieces as we are not seeking institutional funding and desire more management flexibility than C or S corporations can offer.

In the future, Green Pieces has the option to switch from the business structure of an LLC to that of a C corporation. This may be preferable in the future as the company grows and profits increase.

### **Management team**

#### *Core team members*

As is common with entrepreneurial ventures, the present team members will perform many duties, over and above those described in this section. The Green Pieces management team is energetic, hard-working, and possesses a strong personal drive to bring to market a home that is greener and more affordable than competitors'.

#### **CEO: Andrew Kotchen**

As CEO, Andrew Kotchen, will establish the strategic direction for Green Pieces while assuring the day-to-day operations are appropriately executed. Andrew will lead the organization in achieving its goals through developing and implementing strategic and operational plans, and integrating the work of all team members into a coherent, consistent and effective operating program. Andrew received his Master's in Architecture from the University of Michigan College of Architecture and Urban Planning, where he was awarded the prestigious Chairs Cup. Prior to the founding of workshop/apd, Andrew worked on the Island of Nantucket, focusing on the complexities of residential design within an historic context. This interest led to the development of a thriving practice on the Island and New York City. Andrew is an Associate member of the AIA and a member of the Architectural League of New York.

#### **CHAIRMAN OF THE BOARD OF ADVISORS: Matthew Berman**

As Chairman of the Board of Advisors, Matthew Berman will facilitate communication between the company and the advisors. He will also be actively involved in the strategic decisions and every day business operations of Green Pieces. Matthew received his Master's in Architecture from the Columbia University

Graduate School of Architecture, Planning and Preservation where he held the Publications Assistantship. He is the co-editor with Bernard Tschumi of INDEX Architecture (MIT Press, 2003), a book that examines the current state of academic and professional architectural practice at a critical moment in contemporary architectural history. Prior to graduating from Columbia, he served as Associate Editor of *ANY* magazine. Matthew is an Associate member of the AIA and a member of the Architectural League of New York.

***PRINCIPAL DESIGNERS: workshop/apd***

The design team will draw on the experience of the successful New York design firm, workshop/apd. Founded in 1999, workshop/apd have designed residences in New York City, New Orleans, Nantucket, Charlottesville, San Diego, and beyond. The firm has experience in various types of architectural styles and types of construction. workshop/apd is recognized as one of “New York’s Top 50 Designers” by *New York Home* and received national acclaim for their winning green design (Green.O.LA) in the Sustainable Design Competition for New Orleans, sponsored by Global Green as part of the effort to rebuild New Orleans after Hurricane Katrina. workshop/apd is gaining additional experience in building modular green housing beyond their Green.O.LA project – they are currently designing four green modular homes for customers in Connecticut, Nebraska, South Dakota, and Massachusetts.

***VP OF BUSINESS DEVELOPMENT: Seth Kessler***

Seth is currently Executive Vice President of Graphography. With an extensive background in procurement and strategy, Seth oversees a number of key areas at Graphography, including consulting services related to strategic sourcing, process re-design and e-procurement. Prior to Graphography, Seth was one of the founding employees and a member of the Board of Directors at one of the leading print management and reverse auction technology providers. Seth has also worked at BuyerZone, Purchasing Magazine, Marakon Consulting, and The Wharton Small Business Development Center. Seth graduated from The Wharton School at the University of Pennsylvania with an MBA in entrepreneurial management, receiving academic fellowships from both the Price Institute for Entrepreneurial Studies and the Milken Institute. He also holds a BA in economics and journalism from Brandeis University. Seth’s experience with startups is key for the successful development and implementation of Green Pieces’ growth strategy.

***DIRECTOR OF BUSINESS DEVELOPMENT: Jamie Britto***

Jamie brings to Green Pieces experience in different start up ventures ranging from biotech to communications. Experience in the environmental field includes marketing and sales of renewable energy, coordinating technical divisions at a national trade association in solid waste, and collecting and analyzing market

research of neighborhood electric vehicles at a communications firm. Her professional graduate degree from the Donald Bren School of Environmental Science and Management with a specialization in Eco-Entrepreneurship enhances her strategic understanding of managing new ventures for growth and positioning Green Pieces for long term success. She holds a BA in Environmental Studies from the University of Southern California.

***VP OF MARKETING: Peter Everett***

Peter has 13 years of new business (product) marketing. Peter's experience includes marketing for several online and development companies such as The Generations Network, Next Testing and Yahoo. He received his BA in Government at Lehigh University. As VP of Marketing, Peter will administer marketing tools such as market studies, signage, brochures, model homes, promotional events, budgets, product developments, and will actively promote word-of-mouth. His knowledge of web development, online marketing, and communications will help position Green Pieces as a leader in the Southeastern green building market.

***DIRECTOR OF MARKETING AND PUBLIC OUTREACH: Nicole DeJonghe***

Nicole will fulfill her director role through raising awareness, encouraging connections, and building an understanding of and excitement around the benefits that Green Pieces has to offer. Nicole has professional experience as a Marketing Director for an environmentally focused start-up company. She holds a Master's in Teaching, two secondary teaching credentials, and eight years of experience as an educator where she refined her skills in clearly communicating and educating others on new concepts. Further, her work experience as a LEED project manager gives her an understanding of the many aspects involved in green buildings. Nicole's work experience is complemented by her own education, giving her necessary background knowledge: she holds a BS from University of Michigan in Environmental Policy and Behavior, and is currently finishing her UCSB Master's degree in Eco-Entrepreneurship.

***DIRECTOR OF SALES: Max DuBuisson***

Max has six years of direct-to-customer sales experience, including two years of sales management, where he consistently met or exceeded sales goals. He has experience with sales that require a high level of product information and customer education as well as experience managing sales people. Max's background in biology and analytical research skills afford him the ability to break down real-world problems into more easily solvable units. His Master's degree in Environmental Science and Management, paired with a certificate from the Graduate Program in Management Practice, gives him entrepreneurial skills and knowledge. Max's expertise with website development and graphic design has proven invaluable in

producing powerful communications for Green Pieces. His experience with the local North Carolina market and his excellent communication skills are sure to benefit sales of Green Pieces homes.

***DIRECTOR OF OPERATIONS: Kelly Schmandt***

As Director of Operations, Kelly will manage production schedules, compliance, quality control, labor relations, suppliers, and inventory. Kelly is experienced in product and material life-cycle analysis (LCA), green building consulting, and green product markets. She has also researched modular factory design and operations as a part of workshop/apd. She received her Bachelor of Science in Environmental Policy from Vanderbilt University and a Master's from the Bren School of Environmental Science and Management at the University of California Santa Barbara, where she studied Eco-Entrepreneurship and Technology Management. She has written for several publications, including Erosion Control Magazine, MSW (Municipal Solid Waste) Management Magazine, and The South Coast Beacon. In addition to her experience in journalism and background in environmental analysis, Kelly has held leadership positions as a professional tennis player and college coach for several years.

*External Advisory Board*

***STEVEN BERMAN: Legal Counsel***

Steven A. Berman is a partner at a successful Connecticut law firm, practicing in the areas of business, corporate and commercial law, as well as real estate and land use. He holds over 25 years of experience in corporate finance and corporate transactions. He represents both borrowers in acquisition, working capital and construction financing, and various types of commercial lenders in all forms of commercial finance including various types of real estate related financing. Mr. Berman has extensive experience in multiple lender transactions and has broad experience in various levels of mezzanine financing and in drafting and negotiating various forms of intercreditor agreements. Mr. Berman recently published an article entitled "How to Buy a Business with Little or No Cash". Prior to joining Rogin Nassau, Mr. Berman worked as a manufacturing engineer, and earned his Master of Business Administration. After receiving his Juris Doctor degree, Mr. Berman helped found two firms in which he was a named partner practicing business and commercial law.

***GREG SLODITSKIE: Modular Consultant***

Gregory Sloditskie earned a BS degree in Mechanical Engineering Technology from the Pennsylvania State University in 1983. He has worked exclusively in the prefab industry since graduation. While most of his work has focused on volumetric prefab (modular), he also has experience with manufactured housing (mobile). Prior to his

involvement with Green Pieces, Greg formed Modular Building Solutions (MBS) in 1997 to provide engineering services to the prefab industry. MBS became "MBS Consulting, Inc" in the summer of 2007 with the addition of a partner. Current architectural clients include: Resolution: 4 Architecture, Marmol Radziner Architecture, LGA Architects, JKD Architects, and The University of VA School of Architecture. Current modular prefab clients include: Integrity Building Systems, Ritz-Craft of PA and MI, Avis America, Excel Homes, Apex Homes, Simplex Homes, and Marmol Radziner Prefab. Foreign modular prefab clients include: Zenkaya (South Africa) and Timberline Homes (Lisarow, NSW, AU). Before forming MBS, Greg was employed by DeLuxe Homes of PA, Ritz-Craft of PA and Penn Lyon Homes. His work is primarily in the engineering field, but additionally, Greg also possesses management, costing and sales experience.

#### *Phase one recruiting*

Our initial recruiting efforts will be focused on finding a Project Manager to lead the company as we incorporate more of the construction process into the services we offer. As Green Pieces grows, we will also hire highly qualified and experienced individuals in the positions of: CFO, VP of Marketing, VP of Sales, and VP of Operations. As new team members are added, the Directors will work to support the VP's and Officers. Green Pieces will outsource accounting needs.

#### ***Project Manager***

This person will be directly responsible for the day-to-day oversight of the development of Green Pieces. The Project Manager will have proven interpersonal skills and managerial experience, as they will work with general contractors, design team, local building officials, other consultants, and testing agencies. Additional skills and experience should include: planning, organizing, purchasing/contract administration, cost/schedule monitoring, and job documentation for assigned projects. This individual will be directly responsible for coordinating build times, quality control, and site safety. The project manager will be versed in reviewing work in process to ensure compliance with plans and specifications, building codes and company standards.

#### *Phase two recruiting*

#### ***Vice President of Sales***

Green Pieces is recruiting a VP of sales who has a proven track record of meeting sales targets. This person must be results-oriented. We are seeking someone who has experience selling homes or major purchases, and/or selling to customers who show they are willing to pay for items that consider health and sustainability issues. Ideally, this person would have experience working in Southeastern markets. This person will be energetic and possess the ability to explain modular and green

building concepts to our customer. The VP of sales will have the ability to also listen to our customer and effectively communicate customer preferences to the Green Pieces team. The VP of Sales will work closely with the marketing staff, and should have professional written and oral communication skills. This person also needs to have managerial skills and a demonstrated record of supervising and leading a successful team.

***Vice President of Operations***

Green Pieces will hire a VP of operations who is knowledgeable of and has technical experience in the modular building system. This person will have proven experience in establishing and managing building schedules to ensure on-time delivery. Our ideal candidate will have effective communication skills and experience in building and managing a work force. The VP of Operations will be knowledgeable on labor issues and well versed in meeting building codes of the Southeast. This person will be responsible for quality control, quality assurance, EPA and OSHA compliance. The ideal candidate will be able to mentor and develop construction personnel. Additionally, the VP of Operations will review and recommend improvements to both existing and proposed designs as the liaison between the designers and the factory floor.

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**END OF BUSINESS PLAN**

## SUPPORTING RESEARCH

### 1 BACKGROUND

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Global environmental issues such as climate change, natural resource depletion, and pollution are increasingly dominating media and political channels. While these issues are broad in scope, they also have personal connections to consumers, such as rising energy prices, negative health impacts, and sustainability concerns for future generations. These consequences affect everyday lives, and thus increase awareness and influence behavior.

Consumers are beginning to make choices that consider these externalities. The collective action of this behavior has created demand for green markets and products. Our company, Green Pieces homes, will be part of a small, but growing, niche in the green home market. Historically, the construction and use of residential buildings has been resource intensive, unhealthful and expensive. The following section addresses the growth of consumer concerns in regards to traditional construction and home use and its translation into a burgeoning green building sector.

#### 1.1 Growing Awareness of Environmental Problems

The growth in awareness of environmental issues is most noted by its increasing presence in popular culture, politics, corporate behavior, education, and professional conferences. The pattern of growing awareness is cyclical— as additional people are exposed to media illuminating such issues, people are demanding political and corporate action, which in turn encourages more media events on the topic.

##### ***Popular Culture***

Former Vice President Al Gore’s movie, “An Inconvenient Truth,” raised awareness of environmental concerns by highlighting the anthropogenic influence on global climate change. Screened in theaters from May until November of 2006, an estimated three million people attended the movie by August, 2006.<sup>2</sup> The film grossed nearly \$50 million in theaters worldwide, by January 2007 the DVD rental grossed \$7.27 million, and related book sales continue to be strong. The movie garnered support from many celebrities, including Oprah Winfrey who urged viewers of her daytime talk show to watch “An Inconvenient Truth” and buy the book.<sup>3</sup> Through this film millions of people have been exposed to its concepts and global warming has emerged as a visible topic for debate.<sup>4</sup>

Following the popularity of “An Inconvenient Truth,” additional celebrities are pushing awareness of global environmental issues. Leonardo DiCaprio produced and narrated “The 11th Hour,” a documentary concerning the environmental crises caused by humans and their impact on the planet.<sup>5</sup> The actor’s website informs visitors on “what’s important,” and “what you can do.”<sup>6</sup> Cameron Diaz and Gwyneth Paltrow have taken public environmental action steps publically and through “ActGreen,” a website which espouses the virtues of energy and fuel efficiency.<sup>7</sup> In addition to her promotion of “An Inconvenient Truth,” Oprah Winfrey has featured a show called “Going Green 101: What Your Family Can Do Today!”<sup>8</sup> The Discovery channel announced “as part of a more than \$50 million eco-focused initiative called “PlanetGreen,” the rebranding of Discovery Home Channel as a green living network.”<sup>9</sup>

In fact, the conception of Green Pieces is grounded in a celebrity cause sponsored by actor, Brad Pitt. Brad Pitt partnered with Global Green, a non-profit environmental advocacy group, to sponsor a sustainable, modular design competition “to act as catalyst for green, healthy design and rebuilding of New Orleans” neighborhoods after hurricane Katrina.<sup>10</sup> The winner of this competition was our partner, workshop/apd, a New York-based architecture and design firm.

### ***Politics***

Policy and judicial decisions are also beginning to reflect awareness and understanding of environmental problems. The first legal decision specifically dealing with global climate change came on April 2, 2007, when the U.S. Supreme Court ruled that carbon dioxide (CO<sub>2</sub>) is a pollutant as defined by the Clean Air Act (CAA), and that the Environmental Protection Agency (EPA) must “re-examine their refusal to limit emissions of the gases from cars and trucks”.<sup>11,12</sup>

While the United States is just recently taking action to against the causes of global warming, the international community has long recognized the pertinence of the issue. This is reflected by the awarding of the 2007 Noble Peace Prize to the Intergovernmental Panel on Climate Change (IPCC) and Al Gore “for their efforts to build up and disseminate greater knowledge about man-made climate change, and to lay the foundations for the measures that are needed to counteract such change”.<sup>13</sup>

### ***Corporate Behavior***

Increasingly, companies are choosing to minimize their environmental impact while continuing to be profitable. This is demonstrated in public and private actions and



backed by various motivations. There are many companies founded with an underlying environmental ethic such as Patagonia, Clif Bar, Seventh Generation, Stonyfield Farms, Ben & Jerry's, New Belgium Brewery, Working Assets, and Aveda. These firms have incorporated sustainability into their operating practices and differentiate their products by environmental metrics.

Patagonia is well known for its environmental practices and customer education. Patagonia raises customer awareness by running educational excerpts in their catalogs on issues such as preserving the Arctic National Wildlife Refuge, defending salmon runs, and protecting against habitat destruction. Patagonia's web site includes "Leading the Examined Life" and "Footprint Chronicles," which allows customers to track the impact of Patagonia products from design through delivery.<sup>14</sup> Patagonia's strong customer base supports the firm's mission to minimize environmental harm and is willing to pay more for environmentally-preferable products such as jackets made from recycled plastic bottles and organic cotton.

Traditional firms are also beginning to incorporate sustainable practices that save money. For example, Wal-Mart recently developed an environmental program and is working on sustainability initiatives. These initiatives promote energy and resource conservation in their facilities through better construction and operations practices.<sup>15</sup>

### ***Education***

Continued exposure through corporate, political, and media actions is further supplemented by environmental education programs in the public school curriculum. Some 61% of U.S. K-12 teachers surveyed in 1999 claimed that they include environmental topics in their curriculum, with some devoting hundreds of hours of classroom time annually to environmental issues.<sup>16</sup>

Fostered by policy and emerging resources, environmental education is becoming ubiquitous throughout the public school system. In 1990, Congress passed the National Environmental Education Act, mandating the U.S. EPA to "strengthen and expand environmental education nationwide through education and teacher training and the administration of grants to exemplary programs". State-focused programs such as the Environmental Education Initiative in California develop environmental education curriculums that meet state standards.<sup>17</sup> Additionally, Congress chartered the National Environmental Education & Training Foundation in 1990, which sponsors ClassroomEarth.org, a free website that helps "educators, after-school programs and home-schooling parents find up-to-date information on the most successful, well-tested and effective national environmental education programs available today".<sup>18</sup> There is also a growing network of environmental

education resources, such as the North American Association for Environmental Education (NAAEE). This resource is a network of volunteers that provides guidelines and resources for educators and parents who want environmental education for their K-12 students.

### ***Professional Conferences and Organizations***

Growing concern regarding these large-scale environmental problems has spawned a number of organizations and conferences. Greenfestival, a joint project between Global Exchange and Co-Op America, is the nation's largest green consumer show, referred to as the world's leading authority in green living. The Greenfestivals started in 2001 and are held annually, located throughout the United States, in Seattle, Chicago, Washington DC, and San Francisco. Impressive growth in conference attendance is also illustrated by the San Francisco Green Festival, which nearly doubled in size to 25,000 attendees, and sold out exhibit space in all of the venues from 2003 - 2004.<sup>19</sup> In 2007, the San Francisco festival drew a record-breaking attendance of over 41,000 people from all backgrounds and shades of green. Combined with the numbers from this year's Green Festival events in Washington, DC and Chicago, the San Francisco event pushed total 2007 attendance to over 100,000.<sup>20</sup>

One of the most impressive expansions in organization membership is the U.S. Green Building Council (USGBC), and its annual conference, GreenBuild. The USGBC is a non-profit organization dedicated to sustainable building design and construction. Since 2000, USGBC's membership has increased ten-fold, and the organization's annual conference, GreenBuild, grew from 13,382 in 2006 to 22,835 in 2007.<sup>21</sup> This conference brings together green builders, industry experts, and influential leaders to "share insights on the green building movement and its diverse specialties".

## **1.2 Rising Energy Costs**

As public and private minds are continually exposed to environmental issues, other aspects related to the environment are affecting the lives of everyday people through their pocketbooks. The operation of homes, which includes space heating and cooling, water heating and appliances, can be very energy intensive. This is translating into shifting consumer preferences as consumers become more sensitive to the rising and fluctuating price of energy (Figure 1). Price fluctuations and increases are most apparent in natural gas which accounted for 21% of residential fuel use in 2006.<sup>22</sup> The fluctuating price of natural gas is due to seasonal variation in demand, issues with off-season storage, and pipelines.<sup>23</sup>

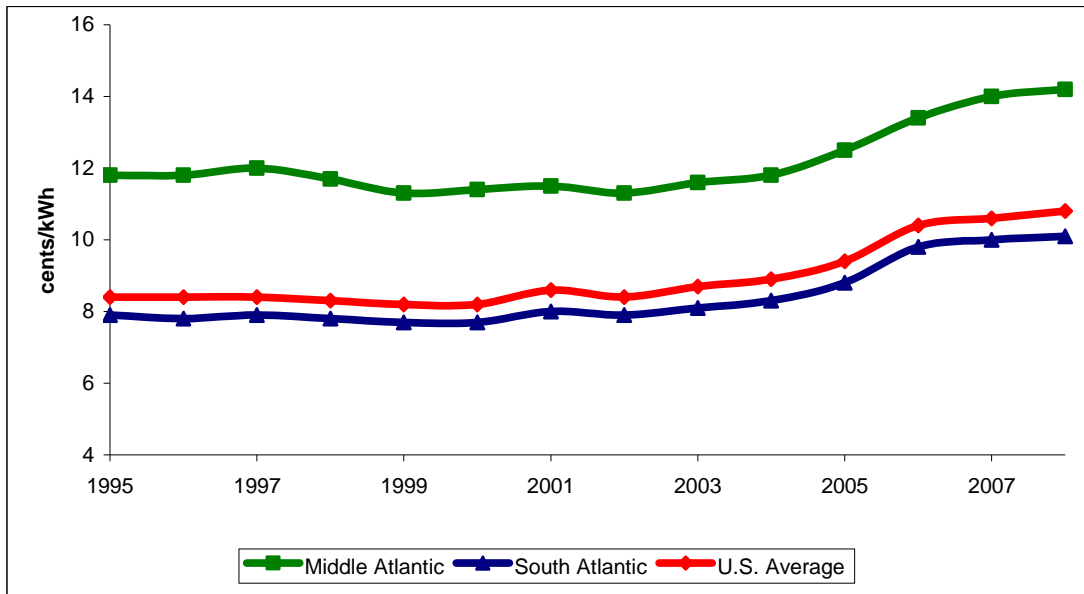


Figure 1: **The average price of electricity for residential users over time.** Note the increasing trend since 2001.

As one might expect, the price of electricity and natural gas varies by region. These variations include type of fuel, the structure of the market and demand issues. The Northeast (New England and the Middle Atlantic) and Pacific regions have the highest energy prices due in part to high peak load demand, more expensive fuel options (less coal and hydroelectric power), and a deregulated market.<sup>24</sup> Areas with a heavier dependence on hydroelectric power and coal expressed more consistent and lower electricity prices. Attempts at deregulation have generally failed in their goal to use competition to lower electricity prices. The South still has a regulated electricity market and is not exposed to the volatility experienced by deregulated regions.<sup>25</sup> However, since 2000, electricity prices have increased in all regions. Prices throughout the United States jumped considerably in 2006, partly due to large fluctuations in the price of natural gas.

The unstable and increasing trend of energy prices is worrisome to homeowners, as residents are spending more money on utility fuels. In North Carolina, the average household already spends 3% of their income on electricity.<sup>26,27</sup> In 2005 the average American household spent \$3,183 on utility fuels, representing 6.8% of expenditures (Figure 2).<sup>28</sup> As the cost of energy increases and people continue to spend more on energy, consumers are shifting their preferences toward more energy-efficient building options.

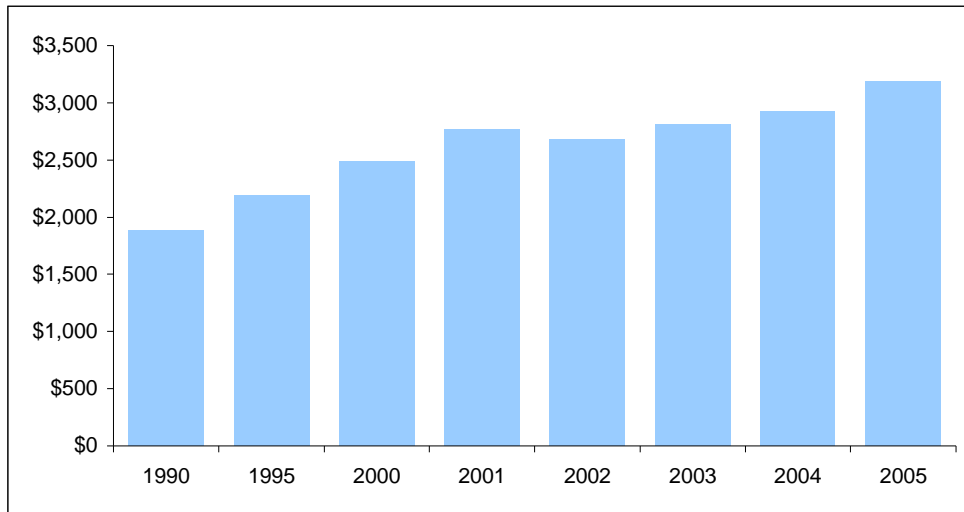


Figure 2: Average household expenditures on utility fuels, 1990-2005.<sup>29</sup>

In an October 2007 survey for the National Association of Homebuilders (NAHB) 64% of respondents cited “reduced energy costs” as the reason they would buy, remodel or build a green home, illustrating that energy efficiency is the primary driver for consumers to enter the green building market.<sup>30</sup> This driver is supported by other industry surveys. A McGraw-Hill Construction builders’ survey concluded that 88% of respondents cited rising energy costs as the primary driver behind the sector’s growth.<sup>31</sup> Additionally, a September 2007 report by the American Institute of Architects (AIA) reported that high energy costs are prompting a move toward incorporating more sustainable and energy efficient systems and products in personal residences.<sup>32</sup>

### 1.3 Health Concerns Associated with Buildings

In correspondence with increased media attention of environmental issues and rising energy costs, residents are becoming more aware of the negative health impacts of polluted indoor air. Americans spend about 90% of their time indoors and 65% of that time in their homes.<sup>33</sup> Indoor air quality (IAQ) is 2 - 5 times and occasionally more than 100 times worse than outdoor levels.<sup>33</sup> The EPA Science Advisory Board ranks indoor air pollution among the top four environmental risks facing the American people. EPA's Total Exposure Assessment Methodology (TEAM) studies found levels of about a dozen common organic pollutants to be 2 - 5 times higher inside homes than outside, regardless of whether the homes were located in rural or highly industrial areas.<sup>34</sup>

Overall, the EPA states that “a number of well-identified illnesses, such as Legionnaires' disease, asthma, hypersensitivity pneumonitis, and humidifier fever, have been directly traced to specific building problems.”<sup>36</sup> The Worldwatch Institute agrees, stating that “people living and working in buildings with poor indoor air quality suffer from respiratory problems; eyes, nose, throat and skin irritation; asthma; digestive problems; reduced productivity; possibly contributing to cancer and immune disorders.”<sup>35</sup>

Thus poor indoor air quality can have a significant impact on people's lives, especially those who are most vulnerable and exposed for long periods of time: infants and children, pregnant women, the elderly, and those who have chronic (especially respiratory or cardiovascular) illnesses.”<sup>36</sup>

### ***Causes of Indoor Air Pollution***

Multiple factors contribute poor IAQ. The primary cause in homes is the presence of indoor pollution sources that release gases or particles into the air.<sup>36</sup> For example, many carpets and paints emit volatile organic compounds (VOCs), and adhesive resins in pressed wood products emit formaldehyde.<sup>37</sup> Indoor pollution can also be exacerbated by inadequate ventilation, as well as high temperature and humidity levels.<sup>36</sup>

### ***Major pollutants, their sources and health consequences***

According to the EPA's insider's guide to indoor air pollution,<sup>36</sup> the sources and health effects of each indoor air pollutant are as follows:

*Radon* is a naturally occurring, invisible, odorless gas from natural deposits of uranium in soil, rock and water. Radon can get trapped in the home, usually through basements. Radon is the second leading cause of lung cancer and is estimated to be responsible for an estimated 21,000 deaths per year.<sup>38</sup> The level potential of radon exposure varies naturally by region.<sup>39</sup> In North Carolina, the Piedmont and mountain counties are of greatest concern for elevated levels of radon.<sup>40</sup>

*Biological pollutants* (pollen, fungi, mold, and mildew) come from wet or moist walls, ceilings, carpets, and furniture and poorly maintained humidifiers, dehumidifiers, and air conditioners. Biological pollutants cause eye, nose, and throat irritation; shortness of breath; dizziness; lethargy; fever; digestive problems; asthma; humidifier fever; influenza; and other infectious diseases.

*Carbon monoxide* comes from unvented kerosene and gas space heaters, leaking chimneys and furnaces, back-drafting from furnaces, gas water heaters, woodstoves and fireplaces, gas stoves, environmental tobacco smoke, and automobile exhaust

from attached garages. At low concentrations, carbon monoxide causes fatigue in healthy people and chest pain in people with heart disease. At higher concentrations, carbon monoxide causes impaired vision and coordination; headaches; dizziness; confusion; nausea; and can cause flu-like symptoms that clear up after being removed from the site of the leak. Carbon monoxide is fatal at very high concentrations.

*Organic gases*, such as volatile organic compounds (VOCs), come from household products including: paints, paint strippers, and other solvents; wood preservatives; aerosol sprays; cleansers and disinfectants; moth repellents and air fresheners; stored fuels and automotive products; hobby supplies; and dry-cleaned clothing. Organic gases can cause the following health effects: eye, nose, and throat irritation; headaches, loss of coordination, nausea; and damage to liver, kidney, and central nervous system. Some organics can cause cancer in animals and humans.

*Formaldehyde* is emitted from pressed wood products (hardwood plywood wall paneling, particleboard, and fiberboard), urea-formaldehyde foam insulation (UFFI), combustion sources and environmental tobacco smoke, durable press drapes, other textiles, and glues. Formaldehyde exposure causes eye, nose, and throat irritation; wheezing and coughing; fatigue; skin rash; severe allergic reactions; and may cause cancer. Older homes without UFFI have average formaldehyde concentrations well below 0.1 ppm while in homes with new pressed wood products, formaldehyde levels can be greater than 0.3 ppm.

*Pesticides* include insecticides, termiticides, and other toxic substances. When used inside the house or from lawns and gardens outside, pesticides can drift in or be tracked inside the house increasing exposure to occupants. Pesticides result in irritation to eye, nose, and throat; damage to central nervous system and kidney; and increased risk of cancer. The EPA states that “preliminary research shows widespread presence of pesticide residues in homes.” Home designs can be improved to incorporate physical measures to keep pests out, reducing the need for use of pesticides in the home.

*Asbestos and lead* are serious problems with older buildings, but have been phased out of use for decades and, thus, are not an issue for new home construction.

### ***Cost of Unhealthy Buildings***

It is difficult to quantify the resulting health costs of unhealthy homes. However, in order to get an idea of the associated costs, data on asthma can be analyzed. Allergens irritants, mold, pollutants from carpets and drapes, dust mites, pet dander, secondhand smoke and poor ventilation can contribute to asthma attacks.<sup>41,42</sup> According to the American Lung Association, asthma is the seventh-ranked chronic

health condition in the United States and the leading chronic illness of children and school absenteeism due to chronic illness.<sup>43</sup> An estimated 14 million school days are missed each year due to asthma.<sup>44</sup> In addition, asthma causes almost 500,000 hospitalizations and about 5,000 deaths annually. Overall, health care costs associated with asthma are estimated at \$14.5 billion a year.<sup>43</sup>

## **1.4 Environmental Impacts of Homes and Construction**

Nearly 116 million residential buildings existed in 2000<sup>45</sup> and more than 1.8 million residential buildings are built annually (2003).<sup>46</sup> Their enormous presence has a major impact on the human and natural environment throughout the structure's life-cycle. From material choice to energy consumption, the impacts of construction and operation of buildings are becoming better understood. As the USGBC claims, "the built environment has a profound impact on our natural environment," contributing largely to energy and water use, emissions, material consumption, and waste.<sup>47</sup>

### ***Energy Use and Contribution to Greenhouse Gases***

Construction and operation of buildings is very resource intensive, particularly in the realm of energy use and carbon dioxide emissions. The large amounts of energy used during operation affect the environment and the ultimate cost of homeownership. Environmental effects from energy consumption include carbon dioxide emissions, especially if the electricity is a product of coal burning. Additionally, materials used in the construction of buildings can be incredibly carbon intensive.

In 2002, buildings accounted for 39% of total U.S. energy consumption. Residential buildings accounted for 55% of that total, and commercial buildings accounted for the other 45%.<sup>48</sup> Additionally, buildings accounted for 68% of total U.S. electricity consumption in 2002, with 51% and 49% attributed to residential buildings and commercial buildings, respectively.<sup>48</sup> The energy consumption of buildings is especially important in regions like the South where the energy mix is largely comprised of coal, a nonrenewable resource that emits air pollution—particularly carbon dioxide—in the combustion process.

In addition to the vast amounts of energy consumed in the operation of buildings, materials used during construction can be highly carbon intensive. For example, producing cement for the foundation of a 1700 ft<sup>2</sup> home contributes about 10 tons of carbon dioxide.<sup>49</sup> The USGBC states that in the United States alone, buildings account for 30% of greenhouse gas emissions.<sup>50</sup> The Architecture 2030 group

project states that the construction industry as a whole accounts for 48% of U.S. greenhouse gas emissions.<sup>i</sup>

### ***Resource Use***

Globally, buildings use 40% of raw materials, which equates to three billion tons annually.<sup>51</sup> In the United States alone, buildings account for 30% of raw materials used. Extraction of materials for use in buildings destroys habitats and consumes energy. For example, an average sized home requires over an acre of forest to be cut down.<sup>52</sup> Diminished forests means a disturbed and out-of-balance ecosystem, the removal of habitat for flora and fauna, and may lead to less carbon sequestration. Mining for other raw materials destroys land, disrupts ecosystems, and often leaves unaesthetic scars.

### ***Water Use***

Clean and available water is growing as an important issue in certain regions hampered by drought or contamination in the United States. Buildings play a key role in water use as occupants use 12% of the total water consumed in the United States per day, or 15 trillion gallons per year. Of that total, 26% is used by commercial building occupants, and 74% by homeowners.<sup>53</sup>

In addition to the quantity of water used, it is important to consider runoff and contamination. As stated in the EPA's "Buildings and the Environment" document, "buildings and the transportation infrastructure that serves them replace natural surfaces with impermeable materials, creating runoff that washes pollutants and sediments into surface waters. Urban runoff is the fourth leading source of impairment in rivers, third in lakes, and second in estuaries."<sup>54</sup> Inefficient water fixtures, impervious outdoor surfaces (general hardscape such as driveways, sidewalks, and streets), and non-existent or inadequate catchment mechanisms contribute to runoff and potential sewer system overflow during storm events.

### ***Construction Waste***

The EPA estimates that in one year, building-related construction and demolition (C&D) generated 136 million tons of debris, accounting for 30% of U.S. total waste output.<sup>ii</sup> Approximately 43% of C&D debris is generated from residential sources

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<sup>i</sup> This information was provided to us by a fellow 2008 Bren Group Project Architecture. Visit their project at <http://fiesta.bren.ucsb.edu/~santabarb/>

<sup>ii</sup> Building-related construction & demolition debris includes debris from building construction, renovation and demolition, but does not include debris related to road, bridge or other infrastructure development. Characterization of Building-Related Construction and Demolition Debris in the United States. Office of Solid Waste, U.S. Environmental Protection Agency. July 1998. <http://www.epa.gov/epaoswer/hazwaste/sqg/c&d-rpt.pdf>.



and 57% from non-residential sources. A breakdown of the building-related C&D debris wastestream includes demolition (48% of the waste stream per year), renovation (44%), and new construction (8%).<sup>55</sup> In all, the supply chain of a 1700 ft<sup>2</sup> home generates 7,000 pounds of solid waste.<sup>52</sup> Additionally, waste disposal is costly and taxing on landfills some of which are suffering from a lack of space.

## **2 OPPORTUNITY**

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As the above section illustrated, people are becoming more aware of environmental issues, and specifically, the environmental impacts associated with buildings. This is translating into shifts in buying habits, as represented by the growing number of people demanding eco-friendly products and green homes. However, there are interested parties who cannot participate in the green building market due to the price premium associated with green building. Green Pieces will capitalize on this opportunity by designing, building, and selling green modular houses, which will provide green homes at a cost competitive with traditionally-constructed, non-green homes.

Ultimately, our greatest opportunity is located in a region where our target market segment exists and housing conditions are most favorable. We analyzed the size and potential of the green building market through general trends and willingness to pay, the characteristics of our customer, and a national analysis of consumer traits and housing indicators to determine our location. The following section explains our decision to locate in the Southeast.

### **2.1 Market Analysis**

As the previous section pointed out, the construction and operation of residential buildings can be energy and resource intensive and unhealthful. Consumers are becoming more aware of how their homes impact their lives and pocketbooks, and this is translating into preference shifts. Issues with sustainability, health, and cost are pushing homeowners to use more green building products in their homes and homebuyers are demonstrating an increased willingness to pay for such green homes.

The previously referenced NAHB consumer survey on the key drivers behind buying, building or remodeling a green home found that “reduced energy costs” was the most important driver while health was second with 55% and “the right thing to do for the environment” with 49%.<sup>56</sup> These reasons were also reflected in the NAHB survey of green builders. In this report, energy cost increases, superior

performance, efficiency, environmental conditions, and lower life-cycle costs all ranked very high as consumer-based triggers.<sup>57</sup>

### ***Willingness to Pay for Environmental Goods***

These triggers are evident in consumers' willingness to pay for green products, building materials, and homes. Still, green products are often associated with a price premium. In the case of green building, a 10.6% increase in cost of construction is expected.<sup>58</sup> The price premium may be the result of a certification process, a more expensive production process or simply that the products are of a higher quality and durability. When a customer purchases a green product they are buying more than the physical object, but the services it performs. With green products, the ancillary services, such as improved health, lower operating costs, and resource conservation are difficult to determine, and thus difficult to validate. The following studies and surveys assess consumers' willingness to pay for green products and green building.

#### *Green Products*

- ➔ A 2006 study on California consumer willingness to pay for "green PCs" reported that most people are willing to pay more for more energy efficient personal computer options. Most of the respondents were willing to pay a 1% premium for green PCs. This premium was found to be consistent among demographic characteristics such as age and income.<sup>59</sup>
- ➔ A poll of Sunday New York Times readers revealed that 65% or 3.3 million people say they are willing to pay more for a product that is environmentally safe, and 60% (or 3 million) are willing to give up convenience for environmentally safe products.<sup>60</sup>

#### *Green Building*

- ➔ The Cahners Residential Group conducted a survey in 2001 in which 96% of homebuyers expressed they were willing to pay more for green features. Of these respondents, 68% of those surveyed they were willing to pay \$2,500-5,000 more and 20% were willing to pay \$10,000 for green upgrades.<sup>61</sup>
- ➔ A 2001-2003 *Professional Builder* survey found that consumers report a WTP of \$3,569 more for green features, while builders' perception of consumer WTP is \$2474.<sup>62</sup>
- ➔ A Christopherson Homes' survey (2005) found that about half the respondents were willing to pay an additional \$100/month on their mortgage for a green home (assuming a 30-yr loan with 6.5 APR).<sup>63</sup>
- ➔ American LIVES surveyed a community in Orange County (2005) and found that respondents were willing to pay an additional \$100/month on their mortgage for green home features.<sup>64</sup>

- ➔ A McGraw Hill study (2006) found that 56% of consumers are willing to pay more for a green house.<sup>57</sup>
- ➔ A survey by Green Builder Media and IMRE Communications found that buyers ask about green building or green building products very often 14.89% of the time and regularly 40.84% of the time. The same study broke down how much homebuyers were willing to pay for “green built homes.” They found that 40.08% were willing to pay less than 10% more, 50.76% were willing to pay 11%-25% more, and 3.82% were willing to pay 26%-50% more.<sup>65</sup>

### ***Trends in Green Building***

Growing awareness of the personal and global impacts of green building is corresponding with consumers increasing their willingness to pay for green products and green building. Ultimately, this translates into a growing market sector. This is shown in the following green building trends:

- ➔ A 2007 Specialists in Business Information (SBI) report finds the compound annual growth rate for the green building materials market increased 23% in 2006 and is currently estimated at \$2.2 billion. The market is projected to increase at a rate of 17% to \$4.7 billion in 2011.<sup>66</sup>
- ➔ Throughout the nation, government agencies are encouraging—sometimes even requiring—developers to use green development principles. This appears to be a growing trend, and in many regions a green program will be expected in tandem with the usual master plan and zoning submission. Furthermore, applying green measures can win over communities and speed the entitlement process.<sup>67</sup>
- ➔ Of the estimated \$209 billion LOHAS (Lifestyles of Health and Sustainability) 2006 market size, green building is estimated to be \$50 billion. This includes home certification, Energy Star appliances, sustainable flooring, wood alternatives, and renewable energy systems.<sup>68</sup>
- ➔ The EPA’s Energy Star for Homes program has certified 750,000 homes since its inception in 2000. In 2006, approximately 200,000 single-family homes were certified, and market penetration is as high as 71% in some states.<sup>69</sup>
- ➔ The United States Green Building Council (USGBC) and its building rating system, Leadership in Energy and Environmental Design (LEED), witnessed a large increase in the number of homes in the program. Since beginning in 2000, over 1,100 buildings have been LEED certified, with another 6,000 currently targeted to achieve certification. Registered projects increased 50% from 2005 to 2006 and the number of LEED certified projects grew 70%. This upward trend continued into 2007 with a 50% increase in registered projects and a 60% increase in certified projects.<sup>70</sup>

### ***Size of Green Building Market***

Growth in the green building materials market, the large customer segment tapping into the market, and growth in the homes being certified by the EPA and LEED translate into growth of green building construction. In 2005 residential and commercial construction accounted for 6.2% of the \$12.5 trillion GDP.<sup>71</sup> Specifically, the value of residential construction amounted to \$490 billion.<sup>72</sup> As of 2005, green homes represented 2% of homes being built and \$7.4 billion marketplace.<sup>57</sup> The marketplace is estimated to grow in value to \$19-36 billion an increase of 5-10% by 2010.<sup>57</sup>

### ***Barriers to Green Building***

While evidence shows that consumers are willing to pay more for green products and homes, the studies also show that increased willingness to pay has a ceiling. There are various barriers to green building, including lack of education about the concept of green building and its products and codes and regulations.<sup>57</sup> However, perceived and real increased upfront costs are the one of the greatest barriers to green building growth. A McGraw-Hill Construction study reported that both small and large scale builders view higher upfront costs as the greatest barrier to green building.<sup>57</sup> Additionally, the NAHB found that 74% of survey respondents would pay no more than 10% for a home with green features.<sup>73</sup>

### ***The Opportunity***

While higher initial costs represent the primary barrier for green building to enter the mainstream, this can also be perceived as a great opportunity. There are consumers that want green homes but are not willing to pay the premium for the green features. The potential of this underserved market could be huge. Considering the size of the United States LOHAS marketplace is 16% of 300 million people, it can be argued that 48,000,000 of these consumers are a potential buyer of a green home if the price is not prohibitive. If green buildings could be made without the price premium or close to the cost of a custom-built, non-green home, a large portion of the market could be captured. Green Pieces looks to capitalize on this underserved market by providing high-quality, high-design green homes that are comparable with traditionally built, non-green homes.

## **2.2 Customer Analysis**

### ***Characteristics of the green consumer***

Green consumers are a relatively new market category that is increasingly being profiled, understood, and sought after. As laid out by the Natural Marketing Institute, "LOHAS is an acronym for Lifestyles of Health and Sustainability, and

describes an integrated, rapidly growing market for goods and services that appeal to consumers who have a meaningful sense of environmental and social responsibility and incorporate those values into their purchase decisions.”<sup>74</sup> This section will outline the main characteristics of this market segment and provide a more detailed profile of a green homebuyer.

### ***The LOHAS Market***

The LOHAS market is estimated to include 35 million people which comprise 16% of the total U.S. adult population.<sup>75</sup> According to *lohas.com*, this market’s major purchase interests are realized through “purchases of green building supplies, socially responsible investing and ‘green stocks’, alternative healthcare, organic clothing and food, personal development media, yoga and other fitness products, eco tourism, and more.”<sup>75</sup> In 2006, the total U.S. LOHAS market was estimated at \$209 billion, which is broken down as follows:<sup>75</sup>

- ➔ \$118.03 billion for personal health products which include natural and organic products, nutritional products, integrative health care, dietary supplements, and mind, body, and spirit products.<sup>75</sup>
- ➔ \$50 billion for green building products including home certification, energy star appliances, sustainable flooring, renewable energy systems, and wood alternatives.<sup>75</sup>
- ➔ \$10.6 billion for natural lifestyle products which comprise indoor and outdoor furnishings, organic cleaning supplies, compact fluorescent lights, social change philanthropy, and apparel.<sup>75</sup>
- ➔ \$24.17 billion for eco-tourism travel and eco-adventure travel.<sup>75</sup>
- ➔ \$6.12 billion for Alternative Transportation products and services which include hybrid vehicles, biodiesel fuel, and car sharing programs.<sup>75</sup>
- ➔ \$380 million for Alternative Energy which includes renewable energy credits and green pricing.<sup>75</sup>

This wide array of industry types and sectors speaks to the holistic worldview of a LOHAS consumer which is be collectively referred to by some as Cultural Creatives.<sup>75</sup> Cultural Creatives are seen as market drivers; a force for social, political and economic change.<sup>75</sup> Moreover, LOHAS consumers have been classified as middle to upper income consumers, particularly present in the baby boomer and young urban professional segments<sup>76</sup> and they are very well educated with 16% likely to have post college degrees as compared to 10% for the national average.<sup>74</sup>

**Table 1. Product attributes that drive LOHAS purchases.** Percentage of LOHAS consumers stating the following are important in product purchase influence.<sup>77</sup>

Industry	Product Attributes	% LOHAS (2003)	% LOHAS (2005)	Compound Annual Growth
Food & Beverage	Contains soy	7%	14%	+100%
	Organically grown	25%	40%	+63%
	No artificial colors	31%	47%	+50%
Green Building	ENERGY STAR rated	37%	68%	+35%
	No Synthetics	19%	25%	+15%
	Natural	32%	38%	+10%

### ***The Green Homebuyer***

Market research about attributes of green homebuyers aligns with the elements that categorize consumers as LOHAS. According to market research compiled by Robert Charles Lesser & Co., motivating factors for purchasing a green home includes environmental responsibility, saving energy and lowering electricity bills, and personal health benefits.<sup>78</sup> The survey was targeted at existing homeowners with incomes of over \$50,000, and an estimated net worth of at least \$250,000 for retirees.<sup>78</sup> The results divided green home-buying consumers into three buyer profiles: Forest Greens, Greenback Greens, and Healthy Greens, all of which could be considered subsets of the larger LOHAS umbrella and potential customers for green, modular homes.<sup>78</sup>

- ➔ *Forest Greens*, or 6.1% of the population, are the least homogenous of the groups. Their motivation is derived by doing the right thing and expecting nothing in return. They tend to be younger with less spending capacity than the Healthy Greens or Greenback Greens.
- ➔ *Healthy Greens*, or 8.5% of the population, are motivated by the health benefits derived from improved indoor air quality, natural ventilation, and abundant light. Though the appeal of health benefits is attractive across many age groups, the 65+ range displayed the highest interest level. This segment is characterized by high incomes and high levels of education with 37% having a college degree and 40% also having graduate degrees.
- ➔ *Greenback Greens*, or 21.3% of the population, are motivated by the personal return of a green home, such as reduced electricity bills. They believe their actions can make a difference and want to make choices in favor of the environment, yet will not pay the price premium for a green home unless their money spent on green features that will pay them back. They are characterized by older populations with price and value sensitivity.

Additionally, a report out of the University of Michigan lists a number of consumer proxies and indicators for green homebuyers.<sup>79</sup> Consistent with other data already presented, their study’s results show that green consumers exhibit the following behavior and characteristics:

- ➔ purchase other green products like hybrid vehicles and shop at Whole Foods markets, natural food stores carrying Celestial Seasonings and/or Stonyfield Farms products, Aveda stores and spas, stores selling Seventh Generation products, and others.
- ➔ subscribe to LOHAS-type magazines and newspapers.
- ➔ are exposed to green construction.
- ➔ have a Bachelor’s degree or higher.

This trend of consumers’ purchases reflecting environmental preferences for products with bundled environmental benefits is legitimized by the market research and the resulting market segmentation of the LOHAS category. Continued segmentation within the larger market allows for products—particularly green building—to be tailored to targeted customer priorities (i.e. environmental concern, cost, health, etc.). As seen in Table 2, the market for green building products is growing much faster with the LOHAS segment than with the non-LOHAS segment.

**Table 2 – Usage Growth Rates of Select Environmentally-Friendly Products**  
*(% change in usage for each product by consumer segment, 2004-2005)<sup>77</sup>*

	Total	LOHAS	Non-LOHAS
Hybrid Vehicles	+267%	+57%	+450%
Compact Fluorescent Light Bulbs	+22%	+38%	+16%
Energy Efficient Windows	+18%	+35%	+10%
Solar Panels	+17%	+44%	+13%
Organic Foods/Beverages	+8%	+3%	+12%
Natural Household Cleaning Products	+13%	+29%	+5%

LOHAS customer characteristics and preferences, in conjunction with other industry trends, were applied to spatial Geographic Information System (GIS) mapping analysis to locate concentrations of LOHAS customers within the United States. The following section will discuss favorable industry trends that, combined with the location of our target market, helped determine the greatest region to capitalize on the growing presence of environmentally sensitive customers with increased willingness to pay.

## 2.3 National Industry Trends

In addition to an accurate description of the target customer, other factors also influence the choice of location for the company. Assessing competition, the general health of the housing market, exposure to modular construction and green architecture, the price of homes, and the time it takes to construct a residence will all provide a clearer picture of where Green Pieces can best capitalize on this opportunity.

### ***Direct Competition***

#### *Green Builders*

As a green builder, our direct competition is other green builders who offer single-family homes. Being that Green Pieces uses the modular construction method to reduce the price premium associated with green building, our most direct competitors are those companies that are using the same methods to bring green homes to their customers. However, we will still be in competition with traditional green builders.

#### *Green Modular*

Broadly speaking, the market is witnessing the introduction of start-up firms. These firms are concentrated on the West Coast and specifically in California. Their products are similar to each other in both price and product offering; however, location of the manufacturing facility, design (architects), materials, and overall levels of “greenness” appear to be main differentiating factors. LEED certification for homes is the benchmark. Inherently, the modular construction business is limited to a regional service area. Therefore, location in relation to the customer base is an important detail as transportation costs and the carbon footprint of the project increase when shipping farther from the factory. Both factors can prohibit firms from capturing more than a regional market. Thus, well served regional markets can be competitive. And inversely, there are many areas nationwide that are currently underserved.

A firm can overcome regional limitations by licensing the home designs to other builders. While this will be less efficient than a factory that is completely focused on the particular design, this method can extend the company’s reach without a large capital outlay. Michelle Kaufmann Designs has taken this approach; though only owning one factory, their homes are available throughout the West Coast as well as in Colorado and Hawaii. EcoContempo, though not as focused on green design as Green Pieces and others, also uses the model of having multiple shipping points around the U.S. As the business develops, Green Pieces will seek out other markets in which to license our home designs.



**Table 3:** Green modular builders that are currently selling homes

<b>Company</b>	<b>Location</b>	<b>Price Range</b>
Michelle Kaufmann Designs	WA, OR, CA, CO and HI	\$250-400+/sq ft
Marmol Radziner	Southern CA	\$200-300+/sq ft
Living Homes	Southern CA	\$180-250/sq ft
Details Homes	WA, OR, CA and NV	\$150-200/sq ft
Office of Mobile Design	Southern CA	\$230-280/sq ft
Clever Homes LLC	Central CA	
Taalman Koch	Southern CA	
H-haus	Santa Fe, NM	
<b>Green Pieces</b>	<b>Southeastern U.S.</b>	<b>\$170/sq ft</b>

#### *Green Site-Built*

Though there are not green modular builders in every part of the country, traditional green builders are present. These builders follow traditional practices of completing every part of the building process on-site, except more attention is paid to green features. Because of the customized nature of this work, the addition of green practices and materials adds a cost premium.

#### ***Indirect Competition***

Furthermore, green homes are being utilized in multifamily developments, urban infill projects, and even vacation homes. Based on the customer needs, these can be seen as competitive threats, especially for urban customers. Residents of downtown Chapel Hill, NC, Los Angeles, CA, and St. Louis, MO now have the option to purchase versions of healthy, sustainable, townhomes or condominiums. These developments create a much simpler option as a way to obtain an affordable, sustainable home rather than needing to secure the land that a single-family home requires. As Green Pieces grows and gains traction in the industry, we plan to address this segment of the housing market.

#### ***Housing Starts***

Housing starts are a good indicator of overall housing health for a region. Nationally, housing starts are experiencing a drastic decline from the market peak in 2005.<sup>80</sup> While some analysts suspected that the downturn to be only temporary, along with the sub-prime mortgage crisis, the depression has continued into 2008, signaling an end to a 15-year increase in starts. It is difficult to determine at this point whether the decrease in housing starts is representative of a long-term trend in the market or whether it will be temporary. There is evidence that the downturn may not be temporary as the recent sub-prime mortgage crisis may make it more difficult to secure lending. The general trend over the last 30 years shows that single-family

starts are more susceptible to changes in the market while multifamily home starts have been more consistent but represent a lower share of the housing market. Over the last 30 years, housing starts have averaged between one and two million annually.<sup>80</sup>

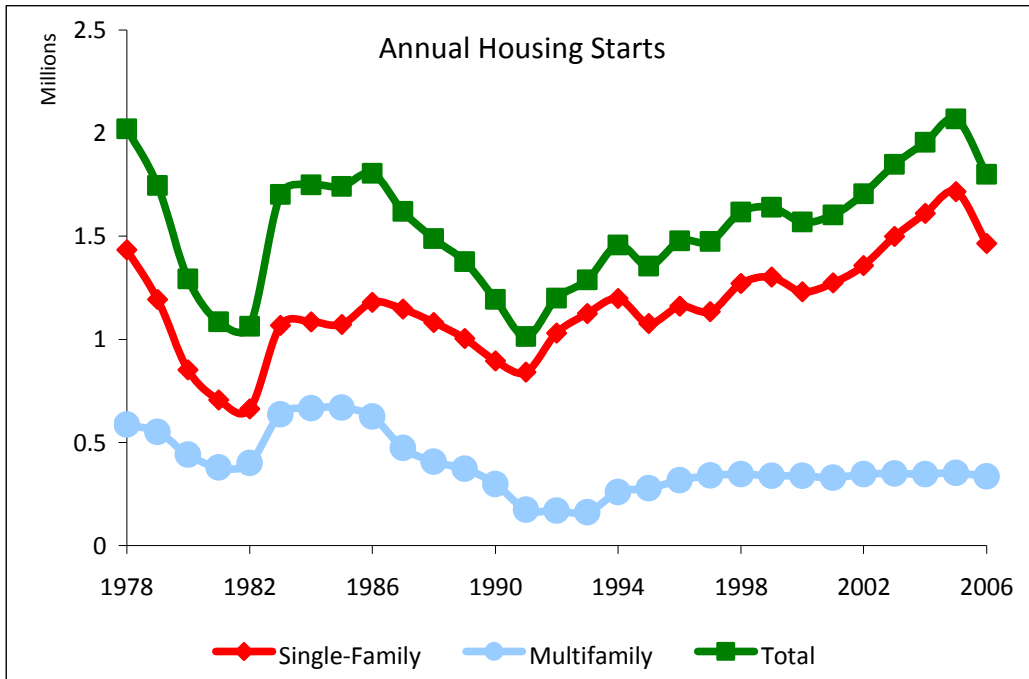


Figure 3: Annual housing starts from 1978 - 2006.

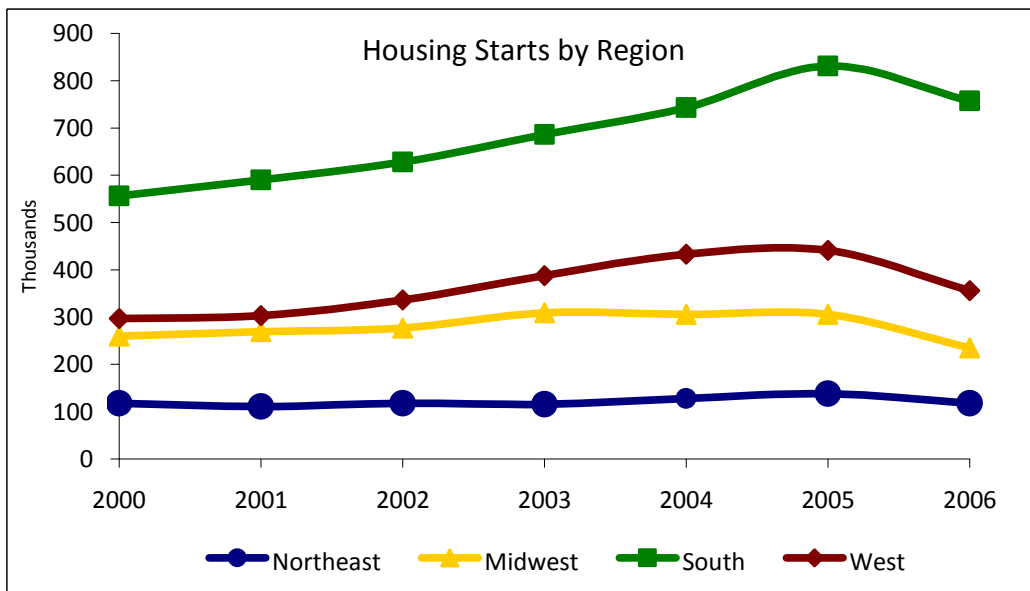


Figure 4: Housing starts by region from 2000 - 2006

The decrease in the overall housing sector highlights the importance of regional growth. While each of the regions follow a similar trend to the nation, the South has the greatest amount of starts overall and may provide the greatest buffer in light of the decline.<sup>81</sup>

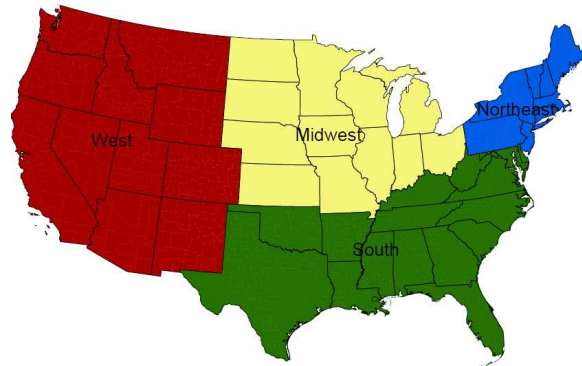


Figure 5: U.S. Census Bureau regions.

**Housing Prices**

An analysis of national and regional housing prices is necessary to determine where Green Pieces would be most competitive. Ideally, Green Pieces would operate in a region where housing prices are high and our offering provides the greatest deal.

While housing prices have increased consistently since 1940<sup>82</sup>, a January 2008 report by the National Association of Realtors reports median housing prices for single family residences have dropped for the first time since data collection began.<sup>83</sup>

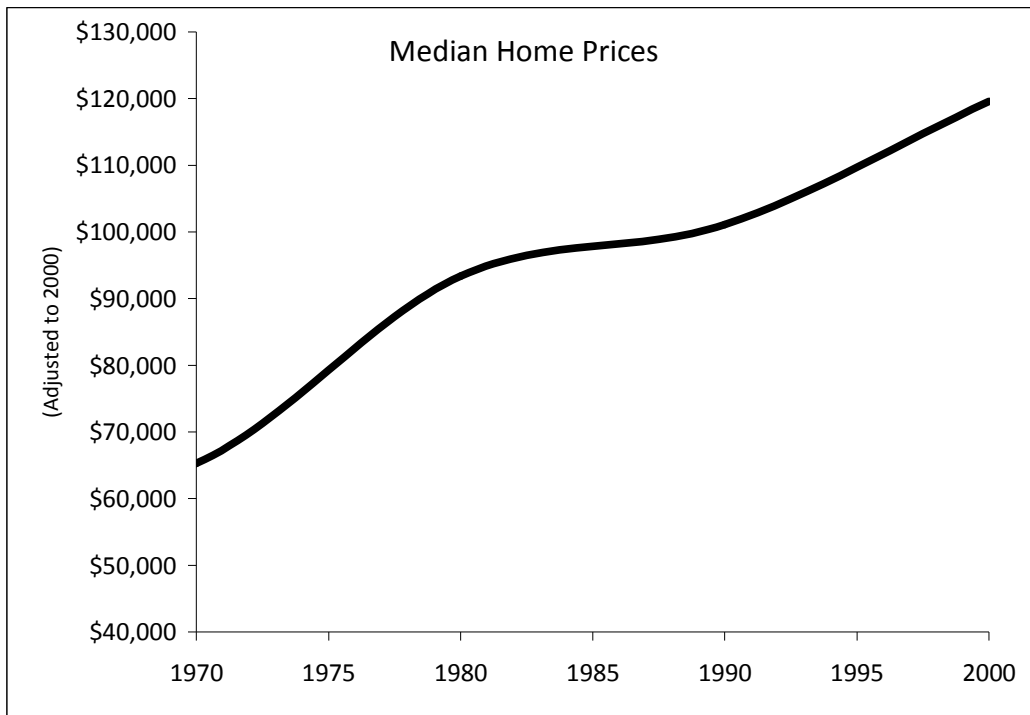


Figure 6: Historic median home prices from 1970 – 2000.

The U.S. median price in 2000 was approximately \$120,000; this value does not include the price of the lot. A regional analysis shows a similar trend of increasing

home prices.<sup>84</sup> In 2006, the Northeast and West had the highest average price of homes actually sold and have consistently demonstrated higher prices than the South and Midwest since the mid 1980s. This is consistent with median price per square foot by region. Most homes built are given a price/ft<sup>2</sup> so this is a useful measure by which to compare our product to current and historical prices. The variance in home price can depend on amenities, labor prices, the strength of the area's housing market, and the type of construction (factory-built versus on-site construction).

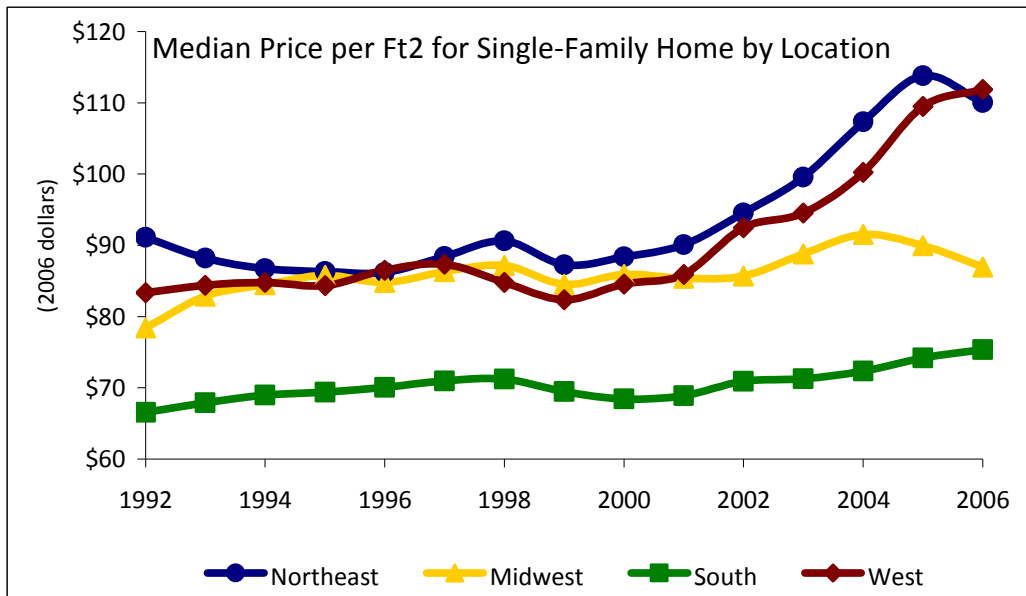


Figure 7: Price per square foot by region from 1992 – 2006, prices adjusted to 2006 dollars.

## 2.4 Location

Modular home building is a regionally-specific business, so it is necessary to select the location for the new company very carefully. A modular home factory can generally serve an area contained approximately within a 400 mile radius before transportation costs become prohibitively high. GIS (geographical information systems) software was used to create maps representing the market and customer profiles discussed below.

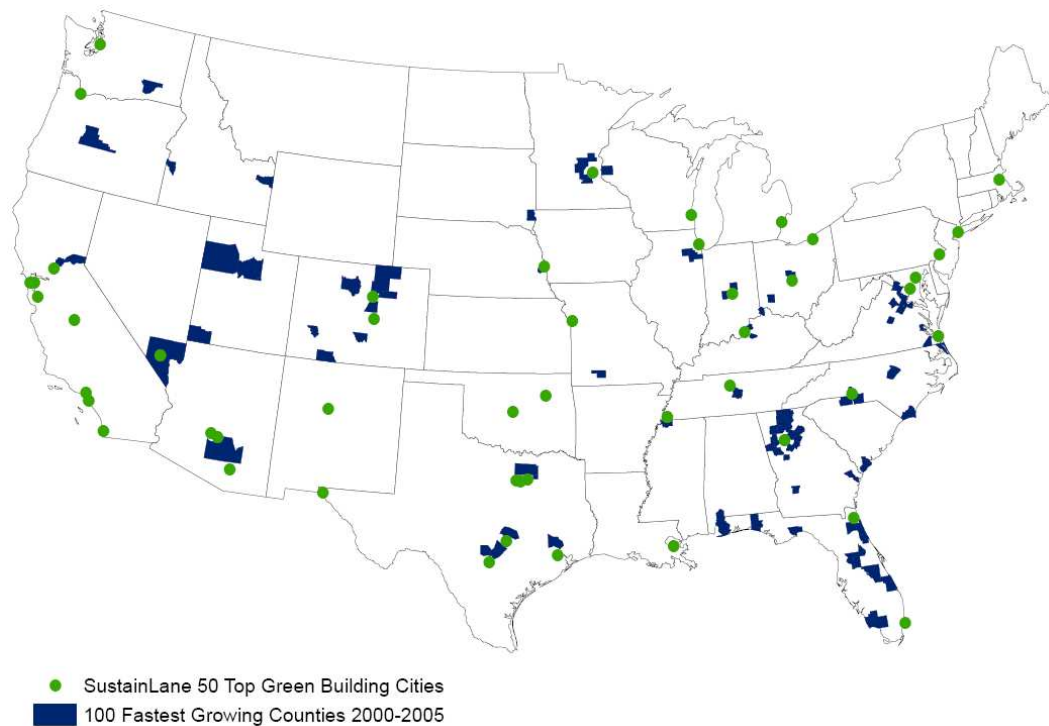
### **Geographic Analysis**

The following geographic, demographic and psychographic attributes were mapped on a national scale and then analyzed by region to find a location that maximized the combination of these factors, leading to the choice of the Southeastern U.S. (specifically NC, SC and GA) for the site of a future factory.

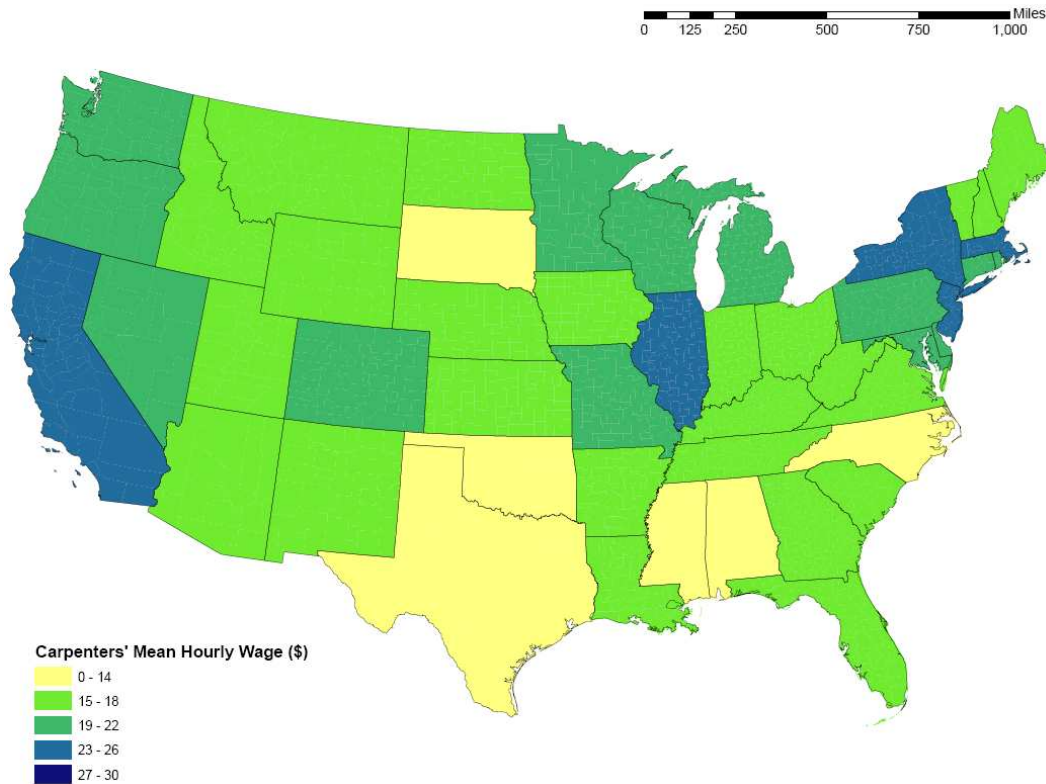
### Desirable attributes

- ➔ High population growth
- ➔ Presence of green buildings, but not saturation by green modular builders
- ➔ Low cost of labor
- ➔ Presence of other businesses matching our consumer profile. Representative companies are Whole Foods/Wild Oats Markets (whose consumers are willing to pay a price premium for environmentally friendly groceries), REI (whose customers are middle to high income and tend to value the environment), and Design Within Reach Studios (whose customers value high design and affordable prices).
- ➔ Availability of transportation routes
- ➔ Multiple cities (which are more likely than rural and suburban areas to contain populations that are young, educated, and interested in high design) within the area able to be serviced by one factory
- ➔ The presence of traditional modular builders

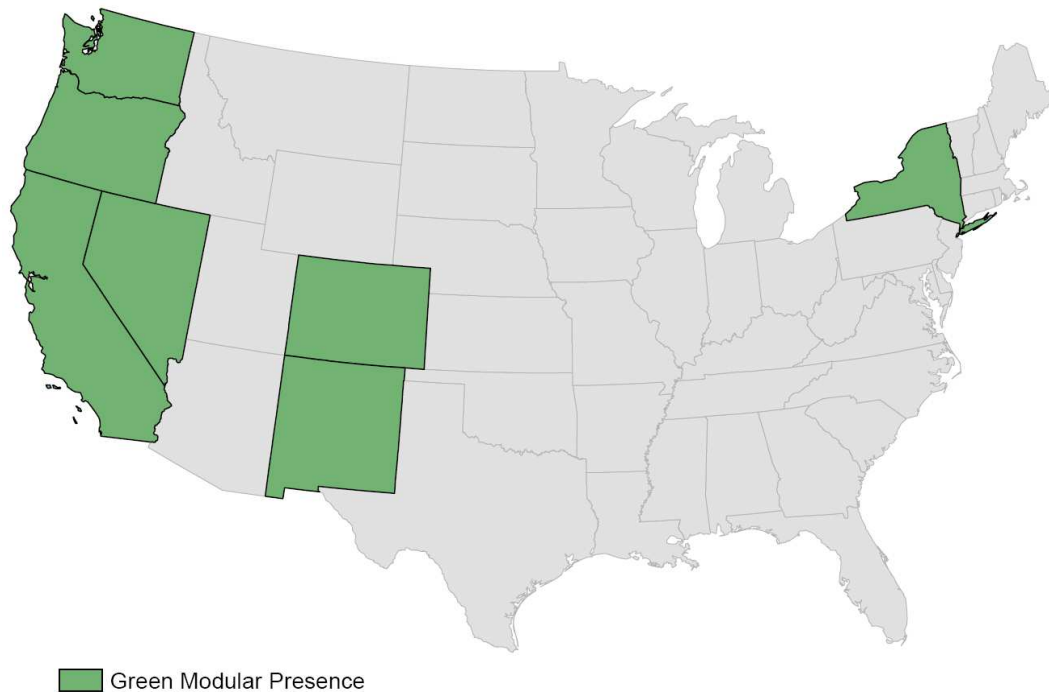
### Maps



**Figure 8: The 100 fastest growing counties (2000-2005) displayed with the top 50 cities for LEED buildings (as ranked by SustainLane<sup>85</sup>). The counties around Atlanta show immense growth, and the city ranks as #1 for LEED buildings per capita. Charlotte also has a number of LEED buildings. The areas surrounding Charlotte and Raleigh also made the list of fast-growing counties.**



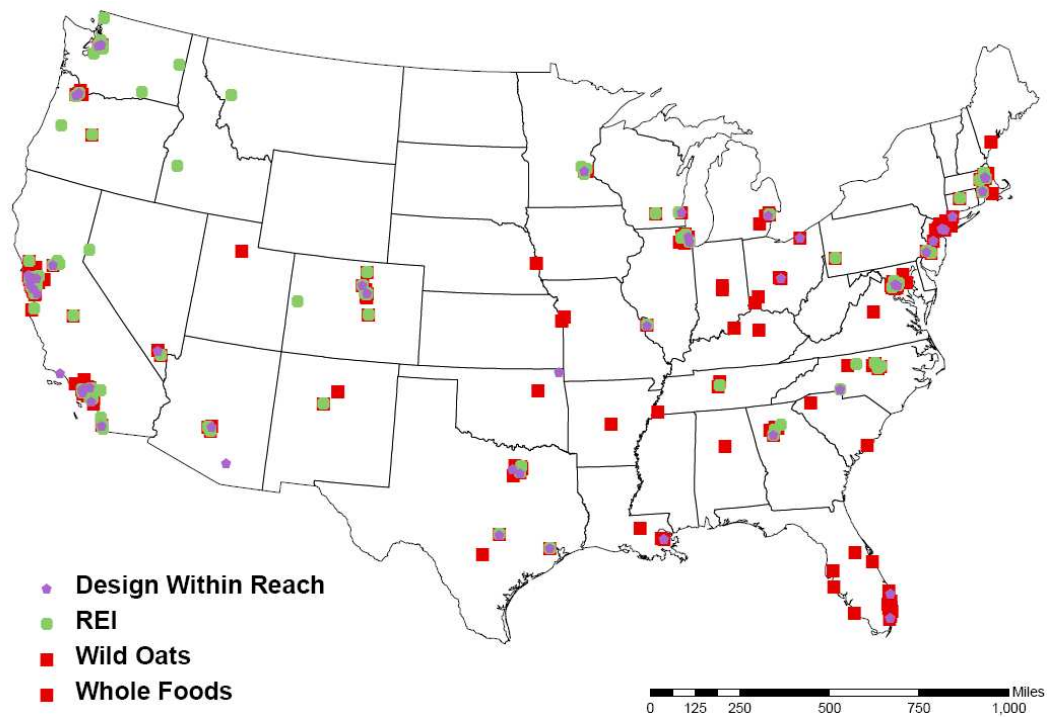
**Figure 9: The mean hourly wage for carpenters in each state.**<sup>86</sup> Labor is one of the largest cost factors in home construction. Because carpentry is one of the largest components of home construction, this statistic is used as a measure of the cost of labor in different states. NC ranks as one of the least expensive, with SC and GA in the next higher category. The high labor costs on the West Coast are one of the reasons Green Pieces will be able to produce homes more cheaply than other green modular builders.



**Figure 10: The service areas of established green modular builders.** There are enough green modular builders operating that they are gaining national attention, but there are none in the Southeast<sup>iii</sup>, giving Green Pieces a first-mover advantage in this particular market.

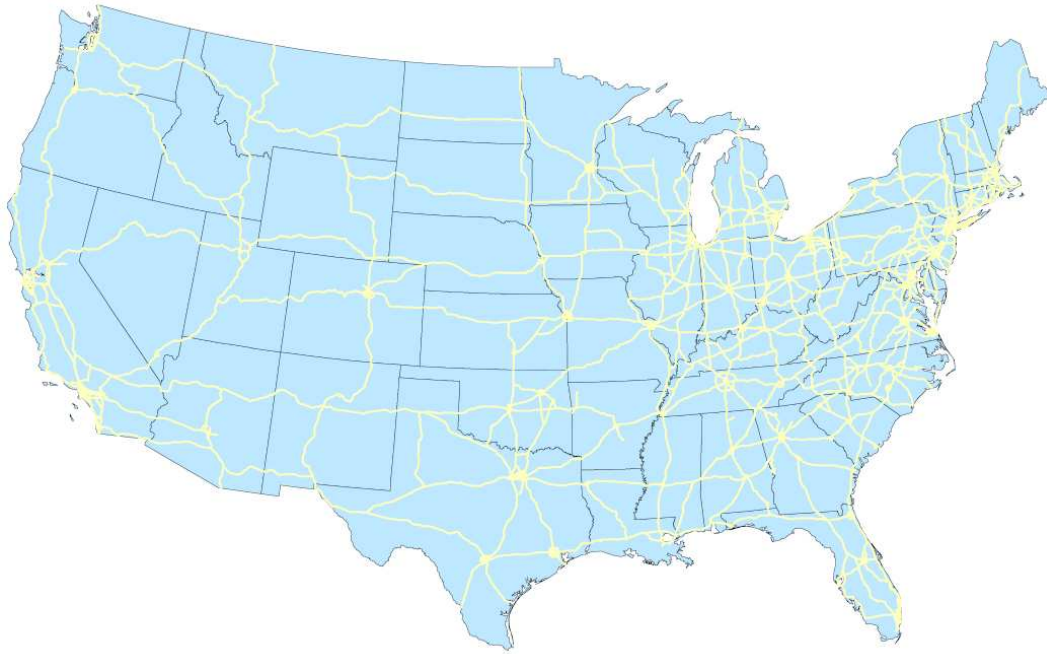
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<sup>iii</sup> There is one builder, Innova Homes, located in Asheville, NC. However, Innova builds very few homes each year, and will not work outside of a 60-minute radius from Asheville (in the western mountains of NC). Thus, geographically speaking, Innova covers a miniscule area of the Southeast and will not be a threat to Green Pieces.

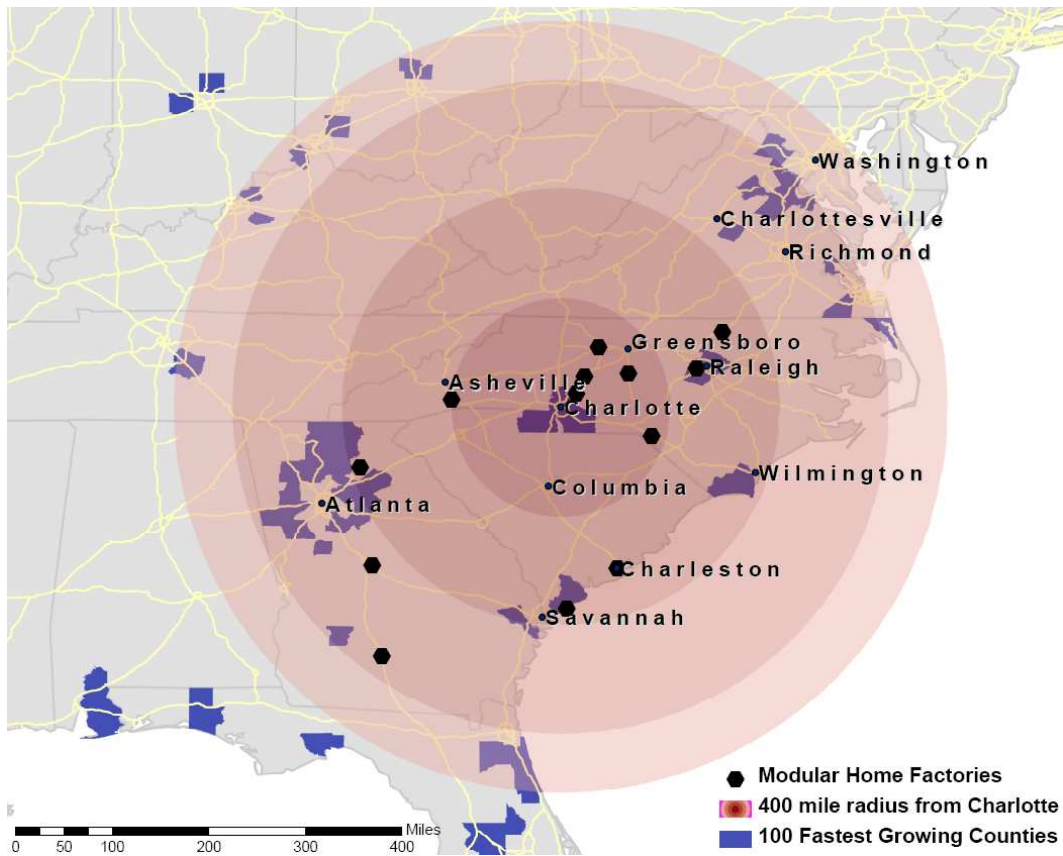


**Figure 11: Retail locations for other businesses matching our consumer profile.** All three companies are found in GA and NC, with some locations in SC, as well. Though there are larger clusters around the largest cities (Los Angeles, San Francisco and New York), our business will be more successful in less expensive areas. In addition, there is more direct competition on the West Coast, while there are no significant green modular builders in the Southeast.<sup>87</sup>

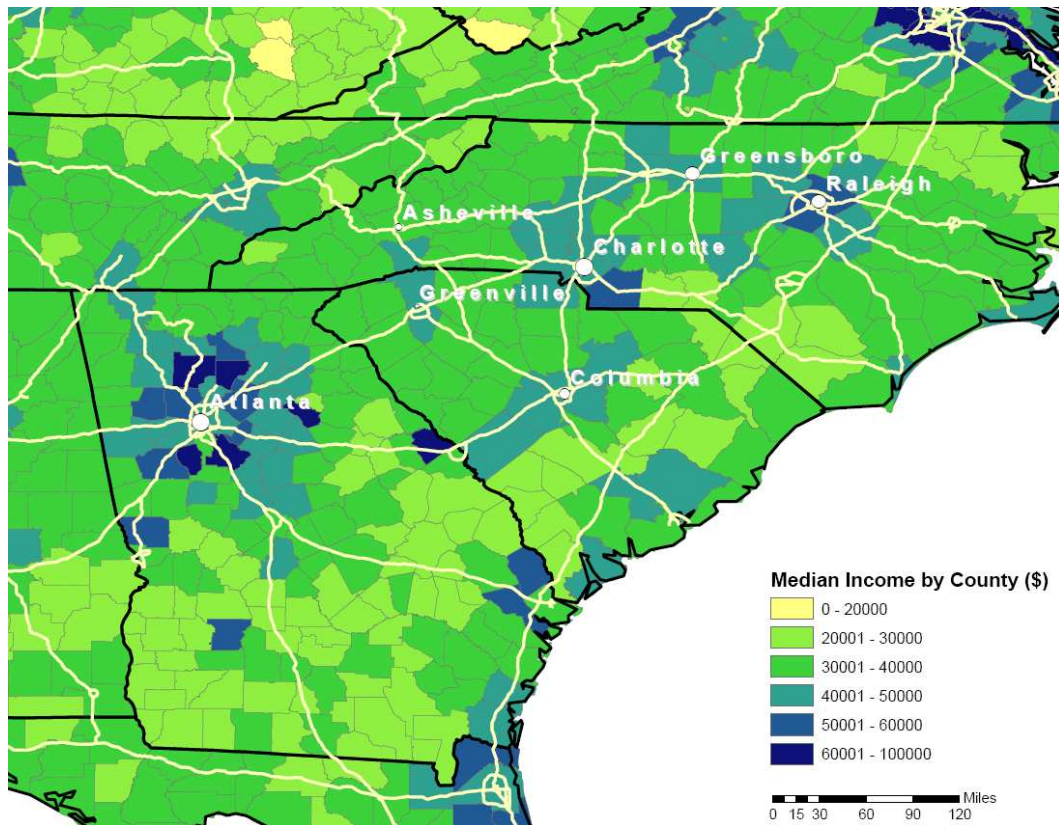




**Figure 12: The national Interstate Highway system.** There is clearly an abundance of large transportation routes in the Southeastern US.



**Figure 13: This map hypothesizes that the business is located near Charlotte, NC and shows a 400 mile service area around that city.** This shows that this location could easily sell homes in Charlotte, Atlanta, Raleigh, Greensboro, Winston-Salem, Greenville, Columbia and other smaller cities and suburbs. Also shown are the locations of traditional modular builders. This illustrates that the local construction industry and regulatory bodies are already familiar with the use of modular construction. Before acquiring a dedicated factory, Green Pieces will contract with one of these manufacturers to build the homes.



**Figure 14: Median income by county in the Southeast<sup>88</sup>.** This map shows that the higher income counties tend to be clustered around cities. It may also be noted that these counties generally overlap with the 100 fastest growing counties shown in Figure 5.

***Other Benefits of the Southeast***

In addition to the attributes discussed above, there are other reasons why consumers in the Southeast will value our homes. Energy efficient homes can actually have a greater environmental impact per kWh of usage in this region compared to the West Coast because the mix of electricity sources is much “dirtier” (most of the electricity used in this region comes from coal-fired power plants). Water efficient homes are also becoming more desirable as rainfall becomes less predictable. Much of this region has been experiencing a serious drought for the past year, with Atlanta coming very close to exhausting its reserves in 2007.

Locating the company in North Carolina has the advantage of easy access to fast growing cities such as Charlotte and Wilmington. In addition, North Carolina has a greater number of pre-existing factories than South Carolina and Georgia. By locating the factory in North Carolina, we also have the potential to reach markets in Florida and Virginia. These states have exhibited strong growth over the last ten

years; however, both housing markets have taken a larger than average tumble amidst the housing slump.

One disadvantage of locating a factory in North Carolina is being further away from the Atlanta market, which is about 220 miles from the Charlotte area. This distance depends on where exactly the factory is located. As indicated by our analysis, the Atlanta area is growing very rapidly and currently boasts the largest number of LEED buildings per capita (although these buildings are primarily commercial). Atlanta also has a higher number of residents with higher education which is correlated with green purchasing preferences. However, locating the factory within North Carolina would still put the Atlanta market well within the serviceable 400 mile radius. Areas not likely easily accessible include markets to the west, such as Tennessee. Access through the Smoky Mountains is difficult and dangerous. Therefore locating in North Carolina or South Carolina would limit the business to customers in coastal states.

### **Regional Housing Industry Trends**

As already explained, the residential market is down. While starts increased dramatically over the period from 2000-2006, the housing correction started to become evident in late 2006 and the market has continued to drop throughout 2007. Housing prices increased at levels beyond what consumers could pay and eroded housing affordability.<sup>89</sup> In the Southeast specifically, existing home sales dropped in 2006 by 12%. These trends continued into the first quarter of 2007, with the exception of North Carolina, which exhibited an increase of 0.7%.<sup>89</sup>

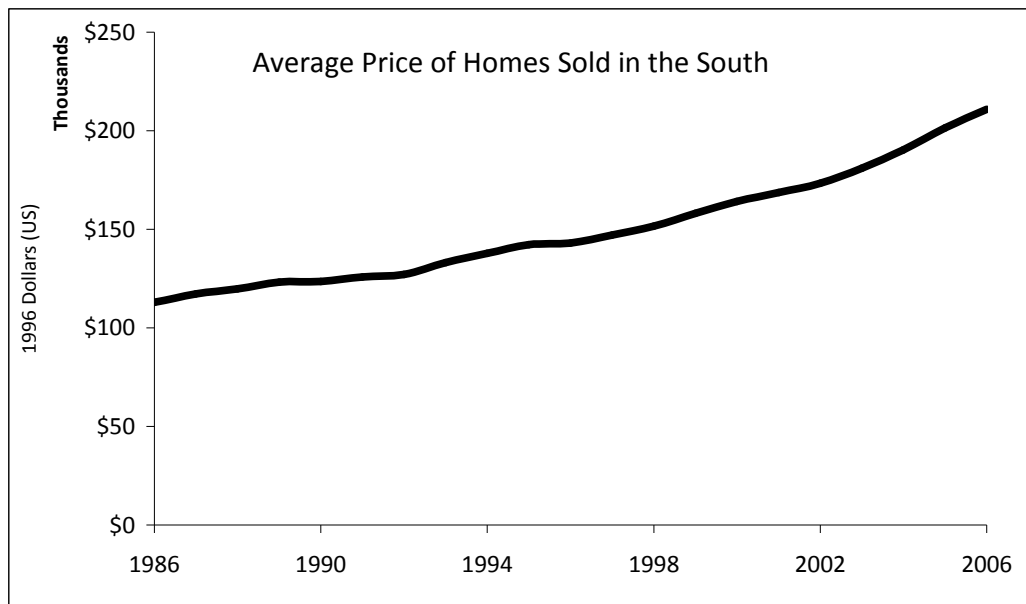


Figure 15: Average price of homes sold in the South from 1986 – 2006.

Starts have declined region-wide, with the sharpest declines in Virginia and Florida. While housing starts are down across the board, new and existing median home prices are still increasing. In the first quarter of 2007, new home prices in Virginia, North Carolina, South Carolina, Georgia, and Florida increased between 9.3%-12.8% from a year prior (Table 4).

**Table 4: Median Home Prices Q1 2007<sup>89</sup>**

	Virginia	North Carolina	South Carolina	Georgia	Florida	US Total
Existing Homes	\$229,565	\$137,156	\$121,839	\$142,462	\$208,608	\$212,300
Annual % change	5.3%	7.9	7.5	4.9	4.2	-1.8
New Homes	\$301,545	\$174,907	\$162,853	\$186,986	\$287,805	\$252,200
Annual % change	12.8%	11.5	10.5	9.3	11.8	1.8

***State-specific analysis (late 2007)***

*Georgia:* Reports for the state show a decline in the overall construction sector, however, the residential construction sector demonstrates the most significant decline. September contracts are down 37% and October contracts are down 41% from 2006. Overall, Georgia is off its 2006 pace by 26% and is estimated at \$10.7 billion.<sup>90</sup>

*North Carolina:* Of the examined region, North Carolina has shown the most stability. While still on the decline, the downturn is much less significant. Both September and October residential contracts were down 13% from a year ago, and the overall 2007 residential construction market is estimated to be \$13.4 billion, 9% off the pace of 2006.<sup>91</sup>

*South Carolina:* While South Carolina’s unemployment has improved a percentage point from a year ago,<sup>89</sup> the residential housing market is suffering. The market is down 37% and 39% from September and October contracts from a year ago. Overall the market is projected to decline 24% from last year’s pace to \$5.7 billion in new starts.<sup>91</sup>

*Florida:* This state exhibited the most dramatic decline of the region. Overall, the residential market is down 47% from its 2006 numbers. The market is estimated at about \$19.8 billion for 2007. The residential construction contracts are down 51% and 47% from a year ago for September and October, respectively.<sup>92</sup>

***Price of Electricity***

Electricity prices are greatest in Florida, indicating an environment that may be more amenable to the cost savings associated with green building. Georgia, North

Carolina, South Carolina, and Virginia all fall below the United States average of 10.24 cents/kWh (Table 5).

Table 5: Average Residential Electricity Rates<sup>93</sup> (cents/kWh)

	September 2007	September 2006
Florida	11.28	11.47
Georgia	9.59	9.21
North Carolina	9.6	9.68
South Carolina	9.2	9.29
Virginia	9.13	8.87

**Prices of heating fuels**

Many home owners in the South can benefit from the increased heating and cooling efficiency of green homes, reflected as a reduction in their monthly utility bills. This is becoming more true as prices for heating fuels increase. In NC specifically, 49% of people use electricity to heat their homes, followed by natural gas (24%), propane (13%) and heating oil (12%).<sup>94</sup> Though electricity prices have only really increased along with inflation, Figure 16 shows that prices for other heating fuels are increasing at a rate faster than inflation, especially heating oil.

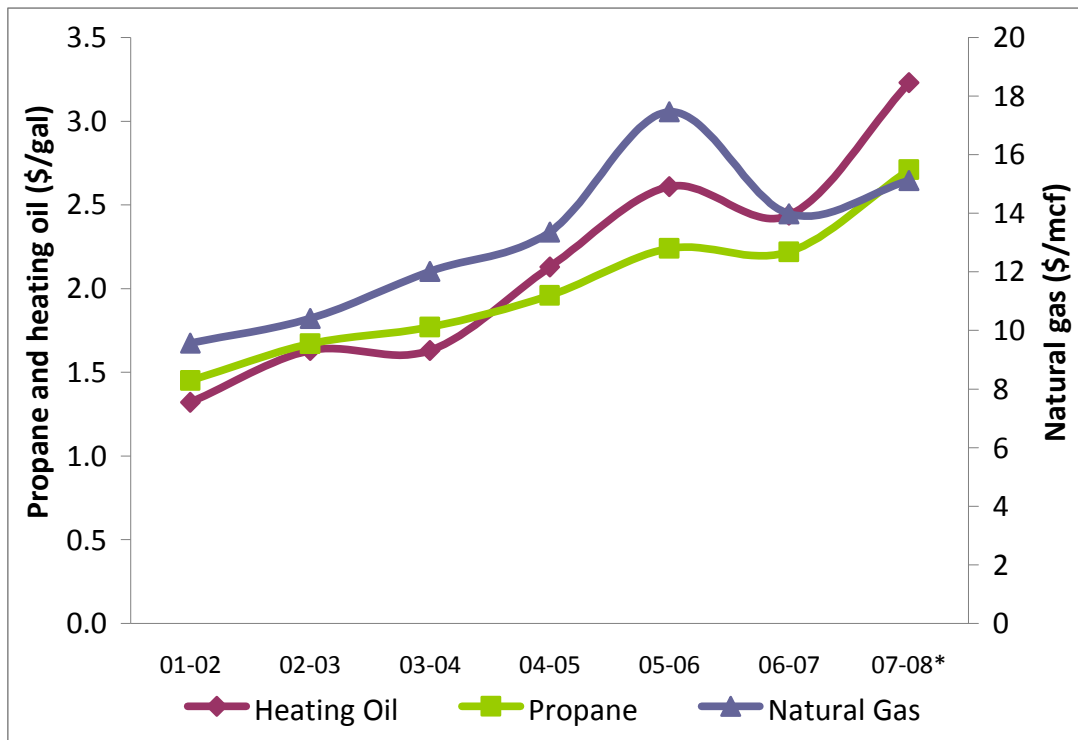


Figure 16: Wintertime (October through March) prices for heating fuels in the South (all prices are in 2007 dollars).

### ***Green building presence***

*North Carolina:* Green building presence is variable based on county, but the counties with universities show the most active green building. The state has its own green building rating system, HealthyBuilt. Western North Carolina, especially Asheville, has a strong green building presence as indicated by the existence of a regional green building council. Most green building is commercial or schools, but there are also cases of residential green building projects. Currently, there are no tax incentives for improving energy efficiency in residences, but there are incentives that pay for 35% of the cost of a residential renewable energy system.<sup>95</sup>

*South Carolina:* Similar to North Carolina, most of South Carolina's green building is in the commercial sector and in schools. However, there is evidence that interest in residential green building is growing. In addition to traditional rating systems like LEED and Energy Star, SC has adopted the Atlanta-based EarthCraft House Program. This program encourages energy efficient, healthy, and affordable homes and communities. So far over 100 homes have been certified under this program in South Carolina.<sup>96</sup>

*Georgia:* Atlanta has the most LEED buildings per capita for any city in the United States.<sup>85</sup> The buildings, however, are almost all commercial buildings. Still, residential green building appears to be growing in Georgia. EarthCraft House has certified 4,000 single family units, 1,500 multi-family units, and six communities in the Atlanta area.<sup>107</sup> Georgia Power offers incentives for homes going for Energy Star certification, and there are also tax incentives for solar hot water and heating systems.<sup>97</sup>

### ***Potential Market Size in the Southeast***

#### ***Regional Housing Market***

In 2005, new housing starts for single-family residences in the South accounted for 48% of the U.S. total that year. Our three focus states accounted for 12.8% of the national total. That year, NC, SC and GA combined had 220,000 new housing starts.<sup>98</sup> As Green Pieces grows and expands, Florida is a logical next area of focus, as this state had 206,000 housing starts in 2005.

#### ***Regional Customer Base***

While the overall market potential is relatively easy to quantify, what is more difficult to determine is the number of consumers in the South that would consider buying a green home. Research on the LOHAS segment tends to focus on the nation as a whole without drilling down to trends in smaller regions. Marketing research that might get to this level of detail is only available for purchase, costing many thousands of dollars.

As stated above, the LOHAS movement is not homogenously distributed, and is likely to be better represented in large urban areas and coastal regions. Even within the South there will be some areas with higher concentrations of LOHAS consumers than others. There are 16.9 million adults in the three-state focus area. If the estimate of LOHAS consumers as 16% of adults held true in these states, this yields a possible market size of 2.7 million customers.

However, many of these customers are families. Nationally, 55.9% of adults are married. This means that, for 55.9% of our target market (1,509,300 people) we should only assume one home per couple. This leaves a possible LOHAS market size of 1.95 million customers in NC, SC and GA.

Housing starts for 2007 in NC, SC and GA were estimated to total 228,063. Assuming 16% of the population to be green consumers yields a figure of 36,450 housing starts each year that could be attributed to LOHAS consumers. Taking into account the number of married customers (as above) brings this figure to 26,260 possible LOHAS home buyers per year. Undoubtedly, only a small percentage of these consumers are actually buying green homes, due to the high price and uneven distribution of current options.

If each of these 26,260 LOHAS home buyers were to purchase a Green Pieces home at \$255,000, the overall size of the market would be \$6.7 billion per year. A modular factory operating at full capacity produces about 10,000 sq ft per week, or about 340 homes (at 1,500 ft<sup>2</sup>) each year, capturing about 1.3% of this regional market.

#### *Current Regional Green Building Market*

According to the USGBC, green building accounted for 2% of the residential housing market in 2005. That year there were 1,465,000 housing starts, meaning there were 29,300 green homes started in 2005. If green building is homogenously distributed, then NC, SC and GA (12.8% of the residential market) accounted for 3,750 green homes that year.

Because of the high price of current green homes, we maintain that this figure is actually much lower than it would be if green homes were available at a wider price range. As shown by the calculations of LOHAS homebuyers, many more consumers would purchase green homes if there were more affordable options.



## 3 SOLUTION

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As the above research demonstrates, there is an overlooked market opportunity for offering green, modular homes that are affordably priced in the southeastern United States. It is our belief that Green Pieces is uniquely prepared to capitalize on this opportunity and for which we are seeking funding. The following section will address how our company intends to enter this exciting, growing market including details on our company, our product, business model, operations plan, financial plan, marketing plan, execution plan and the risks and assumptions of our venture.

### 3.1 Explanation of Green Pieces

Green Pieces is a residential green builder. We compete with other green builders, marketing to homebuyers who are interested in green homes, but cannot afford current options. Customers will prefer our homes over those of other builders because of our excellent designs, lower prices, shorter construction time and lower environmental impact over the entire building life-cycle. In addition to manufacturing high quality homes, Green Pieces will provide high quality service, incorporating all aspects of the homebuilding experience. Green Pieces will work with the customer on home design and options, obtaining the best general contractors for the project, obtaining all necessary permits, education on the impacts of materials and home use, transportation to the site, and finish work. Green Pieces will be present and active every step of the process, helping the buyer to feel secure, educated, and proud of their decision to purchase a Green Pieces home.

#### ***Enterprise Goals***

Green Pieces strives to be more than just a profitable homebuilder. Our vision is to create a significant positive environmental impact through pioneering a great expansion of the residential green building industry. Our main goal is to succeed under the triple bottom line of sustainability (people/planet/profit); placing environmental and social concerns on par with financial success.

#### ***Social Responsibility Goals***

We view green building as one of the most socially responsible endeavors that exists today. Green homes provide direct health benefits to the occupants. These homes also provide benefits to society by reducing negative environmental impacts. Not only will Green Pieces homes provide comfortable, well-built, and attractive places for people to live, but our homes will be far healthier for the inhabitants and the environment around them. Improved indoor air quality leads to lower incidence of respiratory illnesses, thus improving quality of life. Reduced energy consumption

decreases demands on our finite supply of fossil fuels, resulting in associated decreases of greenhouse gas emissions, creating a positive externality for the global community. At the same time, by growing our business we will be providing a stimulus for other green suppliers and businesses. Such market growth will be mutually advantageous, as increased demand results in price decreases over time, which will allow for these environmentally and socially preferable products to be competitive substitutes to current product market leaders.

On a more local level, we will be benefiting the community around our factory by providing a much safer working environment for laborers. The controlled environment of a modular home factory is a far safer place to work than a typical construction site. Insurance rates for Workers' Compensation are more than twice as high for on-site carpenters than for those that work in a modular factory. One study found that 42% of construction fatalities can be avoided by designing the construction process itself with worker safety as one of its goals (the so-called "design for construction safety concept").<sup>99</sup> The use of non-toxic and low-VOC paints, adhesives, and other materials will prevent worker exposure to noxious fumes that typically build up with non-green materials.

### *Environmental Sustainability Goals*

#### **Life-cycle green building**

Traditional green building is focused on choosing materials and designs that minimize environmental impacts of home operation. We not only incorporate these benefits into our homes, but our use of modular construction techniques addresses the environmental harms of the construction process itself. On a per-home basis, a modular factory creates far less waste, uses less energy, consumes fewer resources and has less site impacts as compared to traditional on-site construction. Green Pieces will raise the bar for what customers can expect and afford from the green housing industry through attainment of the following goals:

#### **Reduce natural resource consumption**

- ➔ Our homes are designed creatively and intelligently so that our customers' needs and desires are met with less square-footage, resulting in lower resource use.
- ➔ The precise manufacturing process uses material inputs more efficiently so that less material is required to construct a house.
- ➔ Materials that incorporate recycled content, such as cabinets, countertops, flooring, and wallboard will be used to reduce primary production of raw materials. More expensive options, such as bamboo flooring and certified lumber, will be offered to further decrease use of unsustainable resources.

### **Reduce construction waste**

- ➔ Modular construction generates 30% less construction waste per house compared to traditional on-site construction.<sup>100</sup> Much of these gains come from standardization of materials use and the elimination of material excesses commonly found at construction sites. If all homes were built modularly, it could reduce annual C&D waste by more than 23 million tons.
- ➔ Reducing waste reduces the amount of possibly toxic material that is getting into the environment. Additionally, by keeping waste contained in a factory setting, the chance of environmental pollution is significantly lower.

### **Increase energy efficiency**

- ➔ By constructing a tight building envelope with precise construction techniques and high performance insulation, heating and cooling needs are greatly reduced by preventing air leakage and reducing heat exchange with the outside air. By intelligently orienting windows and the structure (considering slope, site orientation, sun path and wind patterns), our designs capitalize on natural light and air flow to reduce lighting and heating needs in the home. Owners will see a direct decrease in the kWh of electricity used on their bills each month.
- ➔ Our homes will utilize energy-efficient appliances, such as tankless water heaters, and customers will have the option of adding more expensive features such as photovoltaic solar arrays, underground heat exchangers, and LED lighting.
- ➔ The main source of electricity generation in the southern United States today is coal, a particularly dirty, non-renewable resource. Thus, our gains in energy efficiency will be especially impactful in this region by reducing emissions of carbon dioxide, sulfur dioxide, mercury and particulates. Reducing reliance on coal will also reduce the terribly destructive techniques used in coal mining, such as mountain-top removal in West Virginia.

### **Increase water efficiency**

- ➔ Our homes will come installed with water-efficient appliances and low-flow fixtures, with the option of adding more expensive features such as green roofs and rainwater collection systems. This will be directly reflected in fewer gallons of water flowing through the residential meter each month.
- ➔ The patio and driveway surfaces will be permeable wherever possible to allow rain to recharge the groundwater supply rather than run off through sewer systems.
- ➔ Green Pieces homes will offer the option of gray water capture for use in irrigation.

### Improve indoor air quality

- ➔ Through the use of non-toxic, low or no-VOC, and formaldehyde-free materials, and a tight building envelope, we will dramatically improve indoor air quality in our homes as compared to traditional non-green homes. This will improve the quality of life for owners by reducing respiratory illness and allergic responses.
- ➔ A tight building envelope also reduces the ability of insects and molds to infiltrate the home, reducing the need for pesticides and toxic cleaning agents.

### The Market for Green Homes

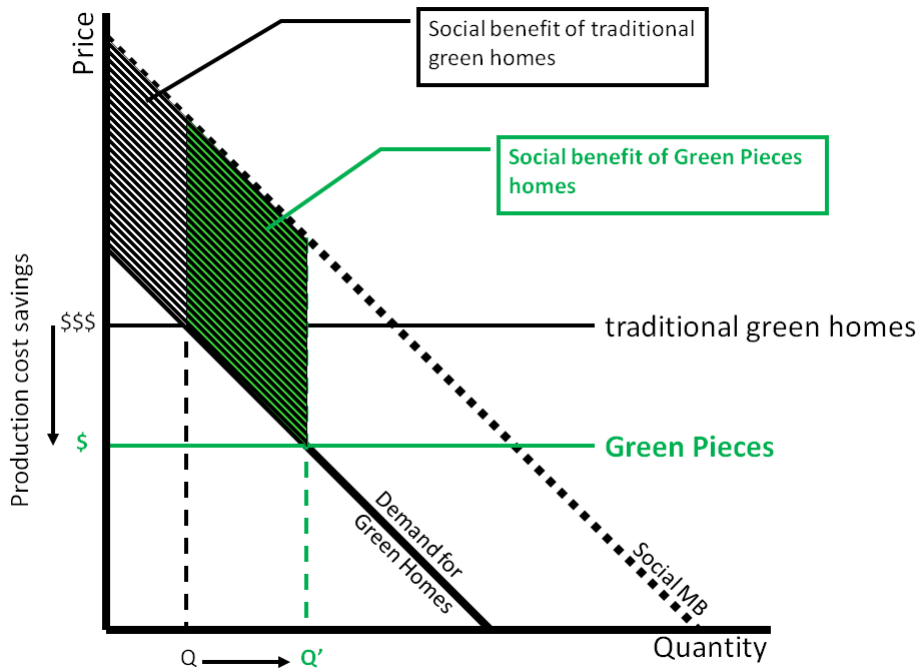


Figure 17: Our value proposition in an economic framework.

Figure 17 illustrates the increased benefit to society from Green Pieces homes. The graph represents the market for green homes. The price of the homes is the Y axis and the X axis is the quantity of green homes sold. The downward sloping solid line represents the demand curve (private marginal benefit) for green homes and the

dashed line is this plus the associated positive externality (the social marginal benefit). The horizontal solid line is the supply of traditional green homes which is at a high price point. The horizontal green line is the supply of Green Pieces homes which are offered at a reduced cost from the efficiencies of modular construction, thus expanding the market. This increases the overall social benefit from the positive social and environmental externalities from Green Pieces homes as seen from the additional area of green and black shaded area between the social MB and the demand for green homes.

### 3.2 Product Description

As a green builder, Green Pieces offers beautiful, high-performance, rapidly constructed, green homes without the price premium normally associated with green homes. Green Pieces homes are constructed in modules, giving the customer the opportunity to customize their home. Modules of a standard size can be combined in different ways to produce different floor plans in a wide array of sizes. Even apartment buildings can be constructed using this method. Workers at each station are highly skilled to complete their portion of the house, and multiple tasks are completed at each station, increasing the efficiency of the building process.

#### *High Design*

Our homes are designed by award-winning designers from the New York City-based design firm, workshop/apd. Principals, Matthew Berman and Andrew Kotchen, have nearly a decade of experience, working with various architectural styles and both modular and on-site construction. The designs for Green Pieces have the same classy, modern aesthetic as their successful portfolio boasts. In addition to looking good, the architectural team works to incorporate sustainability from the design phase.



## ***Sustainability***

### *Design for Environmental Performance*

Sustainability is the key value of Green Pieces. We want to create a home that homebuyers can afford while expressing and living out their environmental ethic. Design is essential in creating a home that takes advantage of natural site conditions, such as, slope, climate, sun path, and wind patterns. Intelligent design and landscape work can optimize the efficiency of home to use natural energy and cooling sources, and is the least expensive way to capitalize on savings from energy use. The siting features are designed to maximize passive sunlighting and ventilation, greatly reducing the use of electrical lighting, heating and air conditioning. A high quality, tightly constructed building envelope prevents air leakage and increases energy efficiency. Our homes are also intelligently designed to maximize the use of space within each house, allowing a smaller house to fill the needs that would typically be met with a larger floor plan, and thus reducing the overall amount of materials used in construction.

### *Materials Choice*

Material and product (fixtures and appliances) choice can have a major impact on the environment and the health of the occupants. Our homes will use materials that represent one or more of the following attributes:

**Table 6:** Materials and systems attributes

<b>Material Attributes</b>	<b>Systems Attributes</b>
➔ Contains recycled content	➔ Energy efficient
➔ Recyclable	➔ Water efficient
➔ No or few toxins	➔ Certified by a credited source
➔ More durable	➔ Locally made
➔ Less resource intensive	
➔ Certified by a credible source	
➔ Locally made	
➔ Sustainable	
➔ Energy efficient	

Materials used in Green Pieces homes are non-toxic, low-VOC, formaldehyde-free, made with recycled content, and durable. Carpeting is kept to a minimum and high-efficiency insulation is used to reduce heating and cooling costs. Efficient appliances and fixtures will be offered to reduce energy and water use in the homes, including efficient refrigerators, on-demand water heaters, and low-flow or dual-flush toilets. The homes will also be designed to meet the standards of third-party certification programs such as LEED for Homes, U.S. EPA Energy Star, and North Carolina HealthyBuilt Homes.



We will offer Green Pieces homes in different “shades of green” which will represent a different compilation of green features at different prices. Our base model strives to bring the most sustainable features to the customer with the least amount of cost. Customers have the option of adding more expensive features, such as solar water heaters, photovoltaic arrays, green roofs, and green screens at an additional cost.



Figure 18: Shades of green options

Ultimately, the design and material choice of green building results in a 55% improvement in energy efficiency.<sup>i</sup>

**Modular Construction**

We at Green Pieces understand that sustainability is not simply reflected in one phase of the product life-cycle. There are three distinct phases of a home’s life-cycle: construction, use, and end of life. Typical green building addresses the use phase, with occasional consideration for the other two phases. Modular construction directly reduces environmental impacts during the construction phase.

Using non-toxic and recyclable materials can help to reduce end of life impacts, as well.

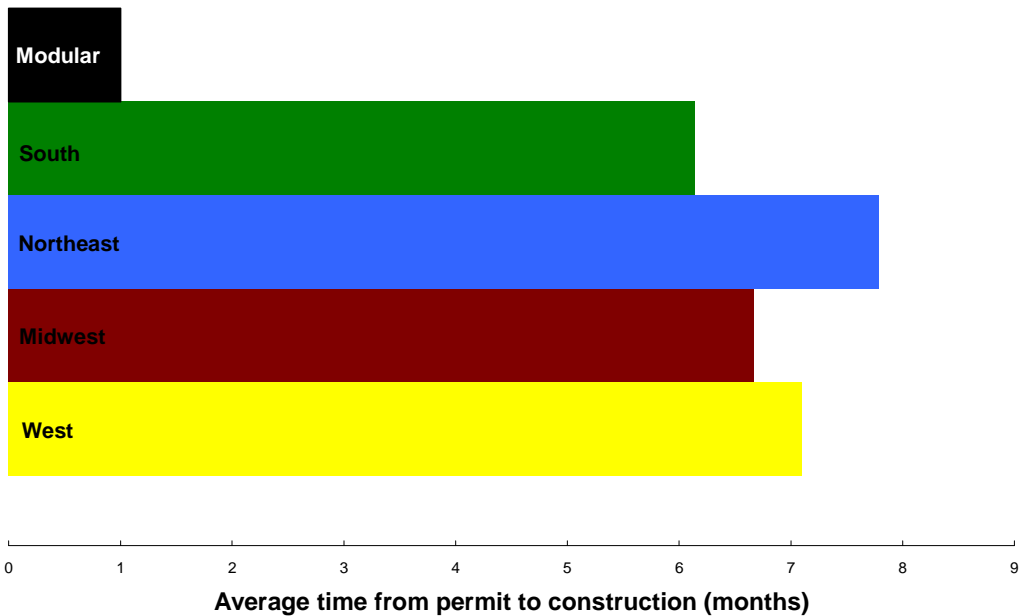
Green Pieces' homes not only operate more efficiently and incorporate environmentally responsible and healthfully, but are more sustainable during manufacturing. Modular construction is commonly lauded for its efficient use of materials and quality construction lending to a higher performing building envelope (For a description of modular construction and other types of construction see Appendix 1). Common, on-site construction is responsible for great amounts of demolition and construction waste which is usually sent to landfills. In on-site construction, extra material, such as framing lumber is ordered in excess to buffer against mistakes. This excess material accounts for 10% of construction material.<sup>101</sup> In modular construction, little material is wasted as manufacturing is very precise and replicable. Furthermore, any excess material can be used on another house. Additionally, modular construction results in 30% less waste.

In addition to the improved materials and waste management of modular construction, factory-built housing can result in a better built and higher performing building than on-site built homes. Modular homes have tighter and healthier building envelopes due to moisture avoidance and precise construction methods. One of the most common problems associated with on-site home construction is the infiltration of water during construction, often resulting in rot, air quality problems, and a less insulated building envelope. Factory construction avoids this potentially harmful and structurally dubious issue by avoiding weather problems completely. Energy efficiency and reduced energy bills are additional positive consequences of a tight building envelope. Furthermore, due to the repetitive nature of modular construction and because modules are constructed with the rigors of transportation in mind, modular homes are more durable and actually result in a higher quality product than site built construction.

### ***Rapid Construction***

Another advantage of modular construction is the speed at which the homes are constructed. Modularly manufactured homes take only days to weeks to build in a factory. Even considering on-site work such as placement of the modules, landscaping, and foundation, modular homes can be completed in a matter of 2 - 3 months.<sup>100</sup> Compared to on-site construction, modular construction takes a fraction of the time. The following graph compares modular construction to the regional averages.





**Figure 19: Comparison of time to build for modular construction against building industry average for each different census region (modular time is the same in all regions).**

***Reducing the Green Price Premium***

One of the greatest advantages of modular construction is the costs savings. Modular construction can save 15% on the building costs when compared to on-site construction.<sup>100</sup> The speed of the process reduces the cost of labor; therefore, Green Pieces homes are built faster and for a lower price than traditional green homes offering the same green features. Affordability is one of the core values of Green Pieces. We believe that in today's market, with rising fuel costs and the cyclical (and current) state of our economy, our product will be in high demand. Modular construction will lower production costs and green design will lower life-cycle operating costs. The result is a quality product that is available at a reasonable price to a large market.

Construction costs savings also emerge from lower waste disposal costs. As explained earlier, modular construction uses materials more efficiently. Disposal of waste and high overhead can be very costly; therefore the elimination of waste and efficient use of materials is also responsible for the reduction in the price premium. Economies of scale play a part as the ability to replicate these homes on a large scale can further reduce construction costs and be passed on in the form of savings to the consumer.

**Table 7:** Overall environmental and financial advantages of Green Pieces' homes

Environmental	Financial
40% less construction waste	15% lower price
55% more energy efficient	57% faster construction
30% more water efficient	55% savings on electricity bills

### ***Intellectual Property***

Intellectual property is not a large concern for this enterprise. Designs are copyrighted once stamped by a licensed architect. This does open up the possibility of licensing our designs to other builders in order to build brand recognition and expand the business in the future. The construction methods used in the factory are not protected in any way, and are already in widespread use. We are simply adapting them to produce a different product than a typical modular builder.

### ***Possible future products***

Once Green Pieces moves on from our first phase to open a factory, the company will have the opportunity to expand into new markets and eventually expand its services.

- ➔ *Expand services:* New services may include module transportation, general contracting and landscaping. Expanding services will enable Green Pieces to fully integrate the building process, thus reducing costs and increasing quality control. Ultimately, Green Pieces strives to become a developer so we can influence the growth of communities in an intelligent manner.
- ➔ *Expand geographically:* Once our initial factory is operating at full capacity, we will seek to open another facility in another location. For instance, Texas and Florida are experiencing population increases and are also demonstrating characteristics that would encourage green building. Green Pieces may look to open a factory in these regions or expand transportation to include Florida.
- ➔ *Enter additional markets:* Green Pieces would like to expand from offering single-family homes to developing multi-family buildings and integrated green communities.
- ➔ *Expand the product line:* We will strive to grow the current customer base by offering new models with the same architectural style or expanding the product line to include a line with different architectural styles. We would also like to offer both wood and steel framing options. In addition, opening our product line up to include panelized designs could help expand our geographic market.
- ➔ *License designs:* Licensing designs out to modular manufacturers outside our serviceable area or within our area during a time of high demand will increase growth and penetration into other regional markets.

- ➔ *Non-profit foundation:* A goal of Green Pieces is to make green homes affordable to the masses. As a future growth option, Green Pieces may start a non-profit organization that builds homes for those in need, especially in areas that have been destroyed by a natural disaster. This can be achieved by working in tandem with other non-profit housing groups (such as Habitat for Humanity) or with government agencies and aid programs (such as FEMA).

### 3.3 Manufacturing and Operations

#### **Business model**

**Table 8:** Business model options for Green Pieces

<b>Option 1: Contract our homes through another modular builder</b>	
<b>PROS</b>	<b>CONS</b>
<ul style="list-style-type: none"> <li>➔ Low startup cost</li> <li>➔ Low staffing requirements (design and sell the homes ourselves, but leave the construction to the builder)</li> <li>➔ Should already be located in a market for modular homes</li> <li>➔ Builder could provide useful connections with the local industry, including developers and inspectors</li> <li>➔ Does not require large institutional investment</li> <li>➔ Less liability over facility management (wastes, emissions, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>➔ Inefficient</li> <li>➔ Have to follow factory schedules</li> <li>➔ Added construction costs per house as compared to other options</li> <li>➔ Likely to present problems over use of uncommon materials</li> <li>➔ More difficult quality control</li> <li>➔ May not be located near our exact market segment</li> <li>➔ Employees of builder probably don't care about our mission</li> <li>➔ Very small profit margins</li> </ul>
<b>Option 2: Partner (exclusively) with an existing modular builder</b>	
<b>PROS</b>	<b>CONS</b>
<ul style="list-style-type: none"> <li>➔ Low startup cost</li> <li>➔ Higher efficiency than option 1, but probably not as high as option 3</li> <li>➔ Low staffing requirements</li> <li>➔ Does not require large institutional investment</li> <li>➔ Should already be located in a market for modular homes</li> <li>➔ Partner's vision more likely to coincide with Green Pieces than option 1</li> <li>➔ Less liability over facility management (wastes, emissions, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>➔ Not most efficient</li> <li>➔ Complex financial/legal/logistical issues</li> <li>➔ Still may have problems with our particular vision because the factory is set up for a different style of modular house (and materials)</li> <li>➔ Construction likely still more costly than option 3, though cheaper than option 1</li> <li>➔ May not be located near our exact market segment</li> </ul>

<b>Option 3: Build and run our own factory</b>	
<b>PROS</b>	<b>CONS</b>
<ul style="list-style-type: none"> <li>➔ Ability to implement most efficient processes, incorporating proper techniques and materials that are unique to our designs</li> <li>➔ Ultimate control over location, factory design, material selection</li> <li>➔ Ability to set company culture and instill vision with employees</li> <li>➔ More control over supply chain</li> </ul>	<ul style="list-style-type: none"> <li>➔ Largest capital outlay- includes, land, construction, machinery procurement, materials, etc</li> <li>➔ Greater staffing requirements</li> <li>➔ Greater responsibility for burdens of managing a factory (wastes, emissions, etc.)</li> <li>➔ Questionable learning curve- product price and quality is dependent on prior experience</li> </ul>
<b>Option 4: Purchase existing factory</b>	
<b>PROS</b>	<b>CONS</b>
<ul style="list-style-type: none"> <li>➔ Less risk than starting from scratch</li> <li>➔ Includes skilled workforce</li> <li>➔ Ability to retrofit factory to most efficient processes, incorporating proper techniques and materials that are unique to our designs</li> <li>➔ Some control over location</li> <li>➔ Ability to set company culture and instill vision with employees</li> <li>➔ More control over supply chain</li> </ul>	<ul style="list-style-type: none"> <li>➔ Limited by what facilities are for sale</li> <li>➔ Large capital outlay</li> <li>➔ Greater responsibility for burdens of managing a factory (wastes, emissions, etc.)</li> <li>➔ Will not reach highest efficiency right away, especially if large amount of retrofits need to take place</li> </ul>

The above table describes the business model options available to Green Pieces. After a careful assessment, the most logical model from an investment and product quality standpoint is a combination of option 1 with either option 3 or 4.

*Option 1*

The advantage of option 1 allows Green Pieces to get a foothold in the region market while not exposing the company to excessive risk by opening a factory immediately, which requires a large capital outlay. The experience gained from partnering with an existing modular builder will help Green Pieces establish relationships with key players, such as general contractors, landscape architects, local inspectors and boards, developers, and customers. The initial process of partnering will also help the management team gather information on the various ins-and-outs of the business without the responsibility of running our own factory. We plan to be closely involved in the process, including design, material choice, module manufacturing, transportation, on-site contracting, module placement, and landscaping. Our involvement will ensure initial quality control and help the process move more smoothly when we begin to operate out of our own facility.

However, the major drawback of this model is the modular manufacturer's likely inflexibility to use other suppliers and materials. Modular manufacturers are accustomed to building homes with the standard materials and have long, trusted relationships with its suppliers. Adding new designs to the manufacturing schedule creates supply chain issues that endanger relationships with pre-existing suppliers. Additionally, factory laborers may not know how to properly install or incorporate the materials, putting the quality of the home at risk. Therefore, in a partnering relationship most modular manufacturers will make few concessions on materials choice, making it more difficult for our initial homes to achieve a high standard of "green." Another drawback to this method could be the small profit margin, but this is counterbalanced because Green Pieces will not be responsible for a vast majority of the costs.

#### *Criteria for choosing a manufacturing partner*

When looking to partner with a modular manufacturer, we will evaluate them on environmental criteria and flexibility to work with the Green Pieces vision. An ideal manufacturing partner will have a recycling and waste reduction policy. While most modular manufacturers use less waste than on-site built construction, supplementing the inherent advantage with these policies is important to the mission of Green Pieces.

In addition, we would like our manufacturing partner to evaluate its supply chain on environmental merits and be open to using more environmentally-friendly materials. The greatest difficulty our competitors have had in making arrangements with modular manufacturers has been the manufacturer's inflexibility with using different materials.<sup>102</sup> While we understand the complexity of prior supply chain arrangements, ideally we would like to find a manufacturer open to using materials that would make our homes healthier and more environmentally friendly.

#### *Options 3 and 4*

Once Green Pieces gains a foothold in the regional market, we will look to purchase or build a factory. Purchasing an existing factory is the preferable option (option 4), as it requires a smaller capital outlay and is associated with less risk. We will be looking to purchase a pre-existing factory in North Carolina during the first year of operation through other modular manufacturers. There are several modular manufacturers located in our focus area (Figure 13), and during our first year of operation we will look to procure one of these factories.

Purchasing a factory, while less expensive than building a factory, may require heavy additional investment in remodeling and equipment acquisitions. Additional benefits of buying an existing modular factory include the equipment and, in some

cases, a labor force. While purchasing a factory with equipment included will be a large fixed cost, it should be less expensive than purchasing new equipment. Investment may need to be made in updating equipment or replacing outdated equipment. Once acquired, we anticipate little investment in equipment with the exception of routine maintenance for the first three years of the life of the factory.

If a suitable factory is not available for purchase, we will purchase land and build a modular factory. This process will take much longer and be more expensive than the prior option. Building a factory will also require procurement of equipment. While this option is more expensive and time intensive, it does have certain advantages. By building a factory we would have complete control over the factory location and construction. Not being bound by a pre-determined location would enable Green Pieces to locate in an area that would best serve our customer base. Also, by building from scratch, the factory would be custom-built to the dimensions and needs required by our particular homes.

#### *Factory requirements*

In general, the facility acquired will be a large warehouse-like structure with dimensions 200 feet by 300 feet. The height of the factory varies, but typically has space for a mezzanine and crane that feed the main assembly line or span the central bay of the factory. Depending on the dimensions, the factory operates in an assembly-line manner with a main line down the middle of the factory and feeding stations located on the sides. The feeding stations are usually where materials are fed into the line and where more detailed and slower work is completed in order to not slow the line. The floor, sidewall, and ceiling frames are constructed usually off the main line and fed into the assembly line where each station is responsible for a stage of the building process. The module will run through 12 to 20 stations. At the final station, the completed module is wrapped and moved to where it will be transported to the site and placed with the other modules to form a home. Factories usually include space for inventory and offices. The property is also large enough to store module units not ready for transport.

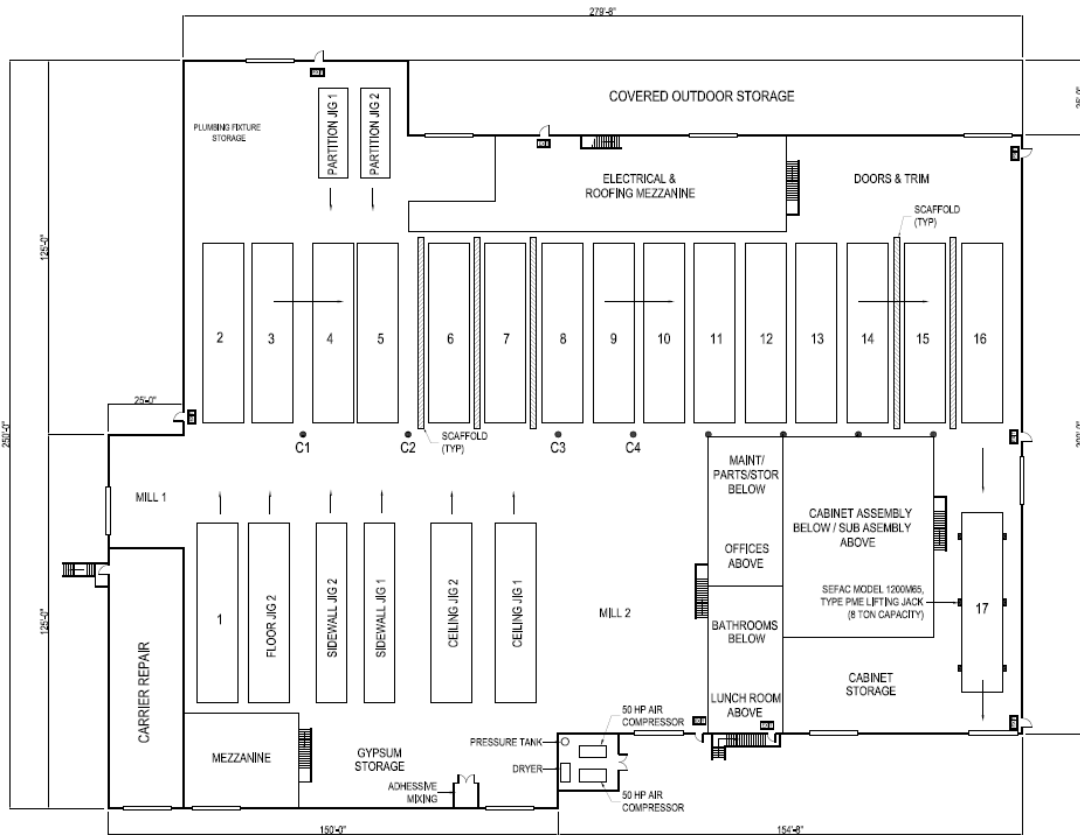


Figure 20: An example of a modular factory layout<sup>102</sup>

## Operating Cycle

### Manufacturing cycle

Modular home manufacturing consists of stations, usually 12 to 20. The home moves through each station as a car would move on an assembly line. Each station is mounted on a type of moving apparatus so the module can move to each station or be removed from the line if there are any difficulties. The modules are moved by one of a few methods: modules can be placed on wheels, wheel and turntable, pressurized air, or crane.

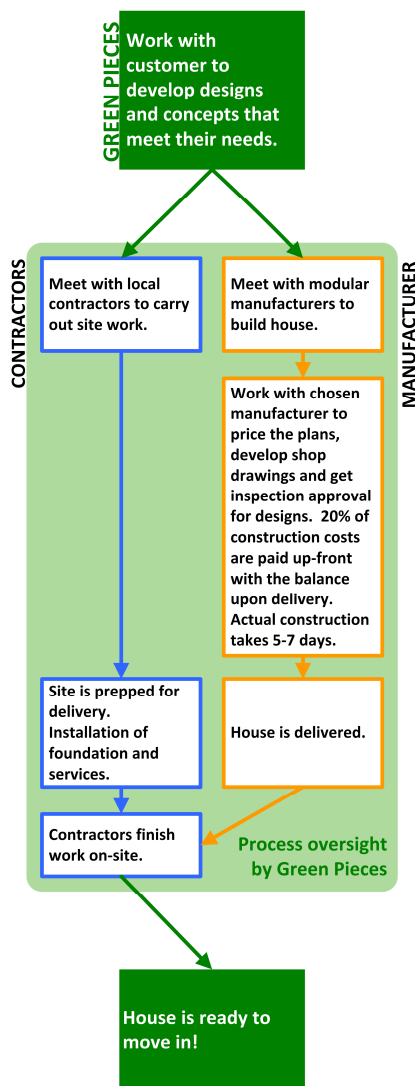
Ideally, the facility will be purchased by Green Pieces, and will be designed for modular home manufacturing. One of the more common modular factory designs has a main line through the factory that is fed from the sides with supplies. Almost all components of building are completed by employees of the company. Some services, such as roofing, may be contracted out. This will be the case for green roofing. Other services, such as general contracting and landscaping will be subcontracted. We will build partnerships with trusted builders and landscape architects in key areas.

### Quality control

Quality control in a modular factory is performed by a number of inspectors who oversee the work at various stations. Factories operating at maximum capacity generally use four inspectors. Inspectors assess the quality of the work as ensure that the plans are followed according to specification. Depending on the production schedule, Green Pieces will have 2-4 inspectors.

### General Operating Cycle

The industry standard is as follows:<sup>103</sup>



- 1) Customer signs a contract with a builder.
- 2) Modular manufacturer prices house for builder.
- 3) Builder creates final price for customer. This would include site work, basement, etc.
- 4) Builder sends 10 to 20% deposit to modular manufacturer. This establishes a production date.
- 5) Modular manufacturer builds house.
- 6) House is delivered to site. Builder pays remaining balance to modular manufacturer before trucks unhook.
- 7) House is set.
- 8) Punchlist is created by builder.
- 9) Punchlist items are addressed by MM service crew, or builder is paid directly by modular manufacturer.

The terms outlined above will differ in that Green Pieces will initially act as the designer for the modular manufacturer and the direct contact to the customer, be it individual customers or developers. In Phase One for Green Pieces, we will package the process for the customer. Customers will sign the contract with Green Pieces who will then be responsible for the design, manufacturing, transportation, and setting the home. Site-work will be contracted out to a general contractor and landscape architect. Green Pieces will act as the go-between for the customer and the manufacturer. Figure 21 explains how the logistical chain works.

**Figure 21: Operations, Phase One.**

The entire process from contract to move-in takes approximately 3 to 6 months.



### **3.4 Marketing Plan**

#### ***Background on Green Marketing***

Marketing a green product comes with many special considerations including quality and credibility. As a relatively new product-category, green products are still associated with performance issues. Consumers maintain memories of green products of the past as not being of the same caliber as substitute products. Additionally, issues of greenwashing, situations when companies overstate and irresponsibly promote green qualities of their product or service, is another hangover that today's companies need to consider.<sup>104</sup> Consumers are becoming increasingly skeptical and prudent about green marketing campaigns, which might help explain the rise of third-party certification programs, in order to help alleviate consumers' confusion. However, unique opportunities and advantages exist from marketing a green product. It is believed that when it comes to green products, consumers are oftentimes first concerned about their immediate and personal benefit.<sup>105</sup> Therefore, a modular green home that has verifiable improved indoor air quality and tangible effects felt through reduced utility bills, will be promoted in the marketing message. Associated benefits of marketing a green modular home include incentives and rebates at the state and federal level. Additionally, emphasizing the local nature of a business built on regional markets will resonate with our target market.

#### ***Marketing strategy***

The largest priorities of Green Pieces' marketing strategy are to position our product in the marketplace, create brand awareness, and educate and inform customers about Green Pieces. This section will include a customer profile, Green Pieces' positioning statement, how we will create brand awareness, methods to reach our customer, and pricing.

#### ***Our Customer***

Our target consumers are in the middle-range income category and are considered in the lifestyles of health and sustainability (LOHAS) segment. Our consumer could be a young professional that has started earning enough to consider buying a house, a family with small children, or an older couple that is looking for a retirement home. These people are ready to invest in a new house, but still have financial constraints that limit their choices. However, what sets these consumers apart are their progressive lifestyles and their awareness level of the various options they have to improve their standard of living.

These consumers pay attention to their health by keeping themselves updated with the latest health tips, watching what they eat, and establishing an exercise

routine. They are also conscious of their role in their community and society. They tend to vote regularly and volunteer in their neighborhood. Finally, this demographic is mindful of the impact their activities have on the environment. Their environmental attentiveness may vary, but most likely they recycle and conserve energy by turning lights off around the house when they are not in use.

The LOHAS consumers keep a pulse on current events, emerging trends, and products that pertain to their lifestyle. They attain their information from mainstream media as well as magazines that cover specific topics appropriate to the stage of their life, such as child rearing, home improvement, and computer software. They watch shows that are informative of modern-day American culture (perhaps Oprah), and they have a large network of friends and family with similar priorities in life as theirs. They may also participate in organizations such as book clubs, their children's school's PTA, and religious groups. The information they absorb from the news and media snowballs through these networks by word-of-mouth.

These consumers have a limit to their budget because of their income category, but are nevertheless interested in spending money on things that improve their quality of life. This group of people appreciates trends, thus they may buy the latest computer games for their children or new electronic products such as a high-definition TV for the family. Lifestyle purchases are most avidly made by this group when it affects their health or makes economical sense. They likely buy organic food and pay for gym memberships. Although these types of products are slightly expensive for their level of income, they can justify spending money on these products and services since they feel that they benefit in the long run by living healthier lifestyles (thus reducing medical bills in the future). These smart consumers think of these lifestyle choices as investments for the future that will pay off.

The following are examples of consumer profiles of Green Pieces customers:

- ➔ *True Believer Betty*: Educated and understands personal accountability of lifestyle and footprint of purchases. Is drawn to Green Pieces because of the statement it makes, and it is the best housing alternative for someone in the know. As a true believer, the modern design is a statement similar to the Prius calling attention to her beliefs and encouraging others that tend to be followers.
- ➔ *Healthy Hungry Harriet*: Is really is drawn to the tangibility of the health aspects Green Pieces offers because providing a safe, healthy environment is of paramount concern. She is family-oriented, wants to instill good values in

her children, and wants to leave the planet in good shape for the upcoming generation.

- ➔ *Cost Conscience Cassie*: Wants to be a larger consumer of environmental products but often buying things like organic food and Patagonia clothing are out of financial reach. The offer of an affordable home is her opportunity to have entry into a healthier, energy-saving lifestyle.

According to market research compiled by Robert Charles Lesser & Co., the major motivations for customers to purchase a green home include environmental responsibility, lower energy use and electricity bills, and benefits to personal health. Their survey was targeted at existing homeowners with incomes of over \$50,000, or an estimated net worth of at least \$250,000 for retirees. Their results divided green home-buying consumers into three buyer profiles: Forest Greens, Healthy Greens, and Greenback Greens, all of which could be considered subsets of the larger LOHAS umbrella and potential customers for green, modular homes.

- ➔ *Forest Greens*, 6.1% of the population, are the least homogenous of the groups. Their motivation is derived by doing the right thing, and expecting nothing in return. They tend to be younger with less spending capacity than the other groups.
- ➔ *Healthy Greens*, 8.5% of the population, are motivated by the health benefits that derive from improved indoor air quality, natural ventilation and abundant light. Though the appeal of health benefits is attractive across many age groups, the 65 and older range displayed the highest interest level. This segment is characterized by high incomes and high levels of education, with 37% having a college degree and 40% having earned graduate degrees.
- ➔ *Greenback Greens*, 21.3% of the population, are motivated by the personal return a green home affords them, such as reduced electricity bills. They believe their actions can make a difference and want to make choices in favor of the environment, yet will not pay the price premium for a green home unless the money spent on green features will pay them back. They are characterized by older populations with price and value sensitivity.

### ***Positioning***

Green Pieces will position itself as a green builder that can offer a lower environmental impact over the entire building life-cycle, delivering superior quality and lower costs as compared to other green builders. This advantage, due to modular construction, reduces environmental impacts that site-built construction ignores. Therefore, environmentally conscious customers will be persuaded by the life-cycle approach Green Pieces is uniquely positioned to offer. Green Pieces will be a first-mover in southeastern markets, looking to aggressively enter the ripe green

housing market. We will market ourselves as attempting to do for green building what Henry Ford did for automobiles, or what Ikea did for stylish furniture.

***Brand awareness***

As a new entry into the southeastern green housing market, our focus area is North Carolina, South Carolina, and Georgia. Therefore, gaining membership into the many local emerging green builders programs is paramount to assist with networking, credibility, and visibility. Listed below are programs that Green Pieces will consider for program membership.

*NC Healthy Built Homes Program* is a statewide, voluntary green building certification program. It currently has 97 certified homes and 492 homes in progress in western North Carolina.<sup>106</sup> Benefits of membership include marketing assistance, third-party verification, and listing your business contact information on their website as a current participant. Additionally, the North Carolina Professional Directory for people with a commitment to sustainable buildings has a link to the NC Healthy Built website.

*EarthCraft House, sensibly built for the environment*, is a voluntary, regional green building program offering a blueprint for green healthy homes with the goal of helping homebuilders be leaders in environmental stewardship and smart growth management.<sup>107</sup> It operates in Alabama, South Carolina, Tennessee, Virginia, and Georgia. Benefits include being listed in their green building directory, use of EarthCraft logos, yard signs, and brochures.

*Southface, Responsible Solutions for Environmental Living*, a 501(c)(3) non profit organization located in Atlanta, GA, is committed to promoting sustainable homes, workplaces, and communities through education, research, advocacy, and technical assistance. Southface offers membership benefits a subscription to *Southface Journal*, invitations to member events, monthly e-mail newsletters, Sustainable Atlanta Roundtable member discount, Greenprints conference discount, and discounts on Southface courses.<sup>108</sup>

*U.S. Green Building Council (USGBC)* has many local chapters scattered throughout our focus states.<sup>109</sup> Membership provides members with important contacts with local building experts which enables them to share best practices, strategies, and resources. Furthermore, USGBC organizes green building tours. Additional benefits include savings on LEED reference guides, training, project registration, certification fees, etc.

### ***Reaching our target customer***

Outreach and education will be a major component to reaching customers. In particular, Green Pieces marketing efforts will raise awareness on how green modular housing is different from (and we believe superior to) the manufactured housing with which people in the southeastern United States are more familiar. Manufactured housing has a large and historical presence in the southeastern United States. As such, it will take awhile to change people's perception of factory-built housing. Green Pieces will address this stigma by offering a sophisticated marketing campaign that focuses on the modern incarnation of factory housing: the quality of modular housing rivals if not surpasses traditional stick built construction; health benefits of smart materials substantially improves indoor air quality; estimating real cost savings from energy saving green design and Energy Star appliances; and the life-cycle advantage that factory housing inherently addresses. Founding members of Green Pieces own an architectural design studio, hence our attractive graphics and presentation of materials will be sleek and inviting and set the stage for a modern, green modular housing company. Much like Apple repositioned portable music with the ipod as the hip, new thing, Green Pieces will do the same for modular housing.

### ***Website***

Green Pieces intends to emulate the style of West Coast green modular start-up companies' websites as they are informative, attractive, thorough, and highly artistic. For example, [www.livinghomes.net](http://www.livinghomes.net) masters the messaging (Figure 22). Their artistic photographs offer digital tours into their interior spaces. The site assists the buyer in a step-by-step process to learn, decide, and choose a model. They have dynamic timelines that offer week by week expectations of their design, purchase, build, delivery schedule. Furthermore, weekly home tours are offered through their contact page. LEED certification is creatively explained with a 'Sustainability Scorecard' that uses helpful icons to demonstrate LEED categories, which determine the points assigned to each and the overall score attained by that combination of features and points. Additionally, a table with three columns of the same three bedroom house—one with no LEED certification, one with silver LEED certifications, and one with platinum LEED certification—are in a matrix with rows: sustainable materials, electricity use, electricity production, water use and CO<sub>2</sub> generated per year.

livinghomes. Intro Architects Homes Configure Purchase Company Would you like to sign in? My Virtual Homes Mailing List Contact

WELCOME TOUR VALUES VIEW

RETURN

- 00 Introduction
- 01 Front Exterior
- 02 Back Exterior
- 03 Lower Living Area
- 04 Upper Living Area
- 05 Media Area
- 06 Study
- 07 Kitchen
- 08 Dining Area
- 09 Downstairs Bath
- 10 Master Bedroom
- 11 Master Bath
- 12 Upstairs Bedroom(s)
- 13 Secondary Bath
- 14 Upstairs Office/Guest Space
- 15 LivingRoof

MAIN FLOOR | SECOND FLOOR | LIVING ROOF

Sustainability Scorecard  
First LivingHome  
4 bedrooms, 3 bath  
2,480 sq. ft.  
60'w x 70'd

LEED FOR HOMES V 1.7  
Rating out of 108 Possible Points

Location and Linkages	10	100%
Sustainable Sites	14	100%
Water Efficiency	15	100%
Indoor Environmental Quality	9	64%
Materials and Resources	8	36%
Energy and Atmosphere	32.5	112%
Homeowner Awareness	1	100%
Innovation and Design Process	1.5	38%
<b>TOTAL SCORE</b>	<b>91</b>	<b>84%</b>
<b>CERTIFICATION LEVEL</b>	<b>PLATINUM</b>	

BACK | NEXT

SUSTAINABILITY SCORECARD

Screenshot of Sustainability Scorecard from www.livinghomes.net

**RK1**  
5 bedrooms  
3,100 sf  
1,435 sf decking  
40'w x 80'd

EXPLORE CONFIGURE BUDGET

LEED POINTS & CERTIFICATION LEVEL

PLATINUM	90
GOLD	70
SILVER	50
CERTIFIED	30

51.5 POINTS

---

**RK2**  
4 bedrooms, 3 bath  
2,480 sf  
1,210 sf decking  
31'w x 108'd

EXPLORE CONFIGURE BUDGET

LEED POINTS & CERTIFICATION LEVEL

PLATINUM	90
GOLD	70
SILVER	50
CERTIFIED	30

50.5 POINTS

---

**RK4.1**  
3 bedrooms, 2.5 bath  
1,690 sf  
285 sf decking  
24'w x 64'd

EXPLORE CONFIGURE BUDGET

LEED POINTS & CERTIFICATION LEVEL

PLATINUM	90
GOLD	70
SILVER	50
CERTIFIED	30

50.5 POINTS

---

**RK5.1**  
3 bedrooms, 2 bath  
2,090 sf  
75 sf decking  
40'w x 72'd

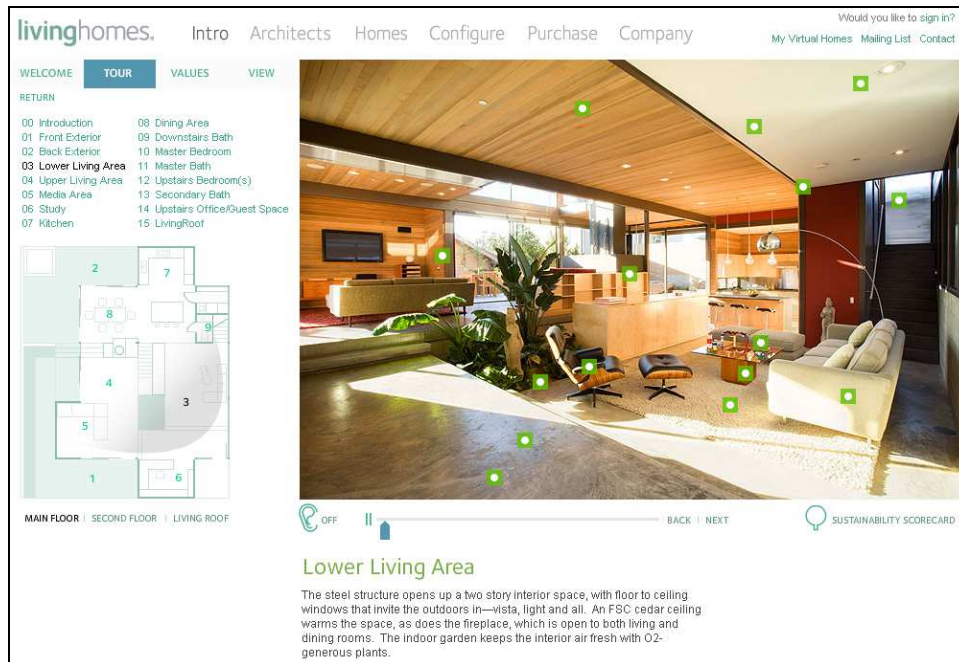
EXPLORE CONFIGURE BUDGET

LEED POINTS & CERTIFICATION LEVEL

PLATINUM	90
GOLD	70
SILVER	50
CERTIFIED	30

50.5 POINTS

Screenshot of LEED category "Report Cards" by model of house from www.livinghomes.net



Virtual tour screenshot from [www.livinghomes.net](http://www.livinghomes.net)  
**Figure 22: Examples of effective web-based marketing from Livinghomes.net.**

The matrix on the Livinghomes site is designed to show the contrast of how LEED certification affects the quantities used or generated and the percentage improvement with increased LEED certification levels. Livinghomes presents it as a nutritional label for the home. It is a brilliant method of displaying information in a way people are used to receiving it, even if the content is new to them. This information is available and tailored to each home model offered. It is artful, sleek, and informative. Green Pieces aims to do the same. Website content will include:

- Explanations of how and why green design, modular construction, and smart materials are beneficial for the environment, personal health, and cost savings
- An explanation of life-cycle analysis and how it plays into our product
- Virtual tours of completed homes and floor plans
- Local, state, and federal tax incentives as they apply to their project
- An explanation about the various green building certification programs available
- Questions regarding financing of modular vs. stick-built homes
- The timeline they can expect their project to follow
- FAQ and links to green building resources
- Links to our member organizations' and partners' web pages, as we will be listed on theirs



- ➔ A short video (after our first home is built and sold) that takes the viewer through the home and informally interviews the homebuyer on what they like about their home and why they chose Green Pieces.

The website will be an enormous channel of information and communication. Ease of use and aesthetic website design will be areas in which we will invest heavily. Brochures will also be printed that highlight the major pieces of educational material that will be most compelling.

### ***Promotional Events***

Green Pieces will seek opportunities to participate and sponsor local, green home building tours, educational seminars, modular factory tours, and other related events as they arise. Examples include:

- ➔ Solar and Green Building Tours hosted by North Carolina Sustainable Energy Association, an event held in Charlotte, Raleigh, Asheville, Durham, and Greenville.<sup>110</sup>
- ➔ North Carolina Sustainable Energy Association hosts a ‘Speaker’s Bureau’ which will operate statewide to educate citizens and businesses about business opportunities, technology, sustainable energy alternatives, and policy options.<sup>111</sup>

### ***Public Relations***

Green Pieces will capitalize on all opportunities for public relations. Leveraging all of our memberships listed above, including industry events, Green Pieces will strive to be a community leader and voice for green building in local communities. All company milestones will be celebrated with press releases. Our press release list will include:

#### *Newspapers*

- ➔ The Charlotte Observer
- ➔ The news & Observer (Raleigh, NC)
- ➔ Greensboro News & Record
- ➔ Winston- Salem Journal’s Online Edition
- ➔ The State, South Carolina’s largest newspaper
- ➔ The Atlanta Journal-Constitution, Georgia’s largest newspaper

#### *Magazines*

- ➔ Dwell
- ➔ Green Builder Magazine
- ➔ Fine Home and Building
- ➔ Greenerbuildings.com



## **Outreach**

To reach out to our target market, we will attend events such as trade shows, Earth Day Fairs, and local festivals that attract the LOHAS crowd. Furthermore, we will attend local farmer's markets in the towns and cities with the highest concentrations of our targeted customer. Taking our message to our customer will be done through sophisticated and informative displays and brochures and handing out recycled pens, pencils, and canvas totes adorned with our logo. In addition, photocopies of articles that further legitimize green building attributes, benefits, and costs will be available to passers-by.<sup>iv</sup> Attractive and informational post cards will be available, as well as brief customer interest surveys to be filled out by potential customers interested in having a sales rep contact them for more information. The survey will also have several market research questions regarding what magazines they read, organizations they belong to, radio stations, etc. in an effort to better profile and target potential customers.

Other methods of outreach include:

- ➔ Sponsorship of local music festivals, wine tasting events, pops orchestra summer series, and such. There are hundreds of options that will need to be assessed based on more detailed local demographics.
  - Greensboro Farmers' Curb Market dates back to 1874 and operates year round with many vendors and special events throughout the year.<sup>112</sup>
  - The Durham Earth Day festival is a family-friendly event that has live music, booths, many local sponsors, and raises local environmental awareness.<sup>113</sup>
- ➔ Green building conferences will allow us to meet suppliers, attend informative seminars, and gain further exposure to the industry.
  - National Association of Home Builders National Green Building Conference is in May 2008 in New Orleans, LA.<sup>114</sup>
  - Green Build International Conference and Expo, the premier green building event is in November 2008 in Boston, MA.<sup>115</sup>

## **Sales**

According to the results of a survey of green building professionals conducted by Green Builder® Media and IMRE Communications, the primary way green builders promote their green products is:<sup>116</sup>

- ➔ 50.38% In-person sales pitches
- ➔ 17.18% Internet
- ➔ 14.89% Literature, like brochures
- ➔ 11.07% Advertising (TV, radio, billboards, signs)

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<sup>iv</sup> See example article: "Bringing Green Homes Within Reach", Environmental Health Perspectives. Available at <http://www.ehponline.org/members/2008/116-1/EHP116pa24PDF.pdf>

- ➔ 4.96% Other
- ➔ If you answered “other” above, please describe:
- ➔ 0.76% #1 reason: word of mouth

### ***Word-of-mouth marketing***

Ultimately, all of our marketing efforts are an attempt to encourage and facilitate word-of-mouth communication. Green Pieces recognizes the significance of this channel for generating buzz, interest, and sales. Done well, this is the least expensive and most convincing form of advertising. Providing Green Pieces customers with a positive experience, one worthy enough to tell their friends and family about is our end goal.

Accordingly, our strategy much like our competitors, will be direct-to-customer sales which will mainly be facilitated through our very detailed, and informative website, participation in events, facilitating direct sales efforts as listed above, literature, promotions, public relations opportunities, and eventually, advertising.

### ***Pricing***

Our base model, as described in the Product section of this document, will be sold for \$170/ft<sup>2</sup>. The price includes on-site work such as the foundation and utility hookups. The options for upgradable features are available for additional costs. Over time, more options and designs will be available.

## **3.5 Financial Plan**

### ***Costs***

#### ***Capital Expenditures***

Green Pieces will initially require a small amount of capital to set up the physical presence of the business. This includes securing an office, furniture, utilities, computers, web hosting, internet access and other initial costs of getting the business running. This should cost about \$22,000 for the first year. We do not require the capital to begin home construction because this cost is passed directly on to the customer. A typical modular home manufacturer will require 20% of the cost up-front with the balance payable upon completion. This cost will be passed on to the customer in the same fashion.

The only large, single capital expenditure associated with this business will be the purchase or construction of a modular home factory. The cost of buying a factory would be lower than building one because there would be an existing labor force and a proven market for prefabricated homes. The factory would likely have to be modified to some extent to accommodate different materials and methods, and the

workforce would have to be trained on these changes as well as the differences in design from what the factory had previously produced.

Building a factory would require a greater up-front investment of capital and would require more time to build as well as hire and train skilled laborers. The benefits would be that we would have more control over the choice of location, and that the factory would be designed from the ground-up with our product in mind, which would likely help increase efficiency at full capacity. The factory itself could also incorporate green materials and efficient design, further contributing to the company's commitment to sustainability.

The cost of a factory has been quoted to range between \$5 - 10 million. Our revenue models assume that we will purchase a factory for \$5 million during the second year of operation. If we purchase an existing factory, we will seek funding from banks rather than venture capitalists. With our expected volume of future sales, the company should not have a problem making monthly loan payments, and can thus avoid giving away equity to venture capitalists.

#### *Construction (Costs of Goods Sold, or COGS)*

The prototype design for one of our homes has not yet been completed, and it is not known what the actual cost/ft<sup>2</sup> will be. This depends on the size of the house (we are expecting 1,500-2,000 ft<sup>2</sup>), the materials used, the distance from the factory, the cost of contractors in the area, and variables related to the site.

Conversations with our client have yielded a rough estimate of the costs associated with building a home. In their experience, the factory construction of a typical modular home costs around \$60/ft<sup>2</sup>, and the on-site costs add another \$60/ft<sup>2</sup>. They estimate that while contracting our designs through another manufacturer we can expect a 15% premium on the factory construction costs, bringing it close to \$70/ft<sup>2</sup>. Adding in the site costs, this is a total of \$130/ft<sup>2</sup> for the whole construction process. With a reasonable margin of 30% this yields a selling price of around \$170/ft<sup>2</sup> for the customer. Obviously this price will fluctuate based on the particular design for each customer as well as the options and materials that they choose to have included.

Below we provide two more detailed cost estimates to give a more in-depth view of the different cost variables. It should be noted that different companies include different variables in their price estimates (some leave out site work or transportation), so direct comparisons of price are not always as useful as comparisons of total cost of a completed house.

### ***Cost of a Green Modular Home***

An initial plan with best-guesses for materials options was prepared by an expert at Allen Associates in Santa Barbara, using a prototype for a 4,000 ft<sup>2</sup> house that was designed to the specifications of a particular customer (thus, it includes extra design features that may not be used in our final designs). This estimated Bill of Materials (BOM) is included below (Table 9). The prices in the left column are the estimates of the expert based on our specification of the “greenest” options for a house. The column on the right leaves out the costs that are not included in the price estimates of our competitors (such as transport, crane costs and on-site contractors) and the two most costly green features, solar panels and a green roof. The final cost/ft<sup>2</sup> using this method is \$122. Some of the costs, such as paint and lumber, will vary directly according to the size of the house, while others, such as cabinets and doors, may not.

This cost estimate does not include all of the site work, and is thus near the upper bound of where our costs could lie, meaning it will likely prove accurate until all of our processes (design, construction, sales, installation) have become more efficient. Thus, for the revenue analysis, we use this estimate of \$122/ft<sup>2</sup>.

**Table 9:** Initial prototype cost estimate.

PROJECT: Bren Project Cost Breakdown Ian Cronshaw ROUGH ESTIMATE ONLY		ALLEN ASSOCIATES 835 North Milpas Santa Barbara, 93103	DATE: 10/10//07 Phone: 884 8777 Fax: 884 0029
CATEGORY	AMOUNT	Compared to competitors	
BAMBOO FLOORING (BOTH FLOORS)	\$30,000.00	\$30,000.00	
TILE (LABOR)	\$8,000.00	\$8,000.00	
TILE (MATERIALS)	\$3,000.00	\$3,000.00	
SURFACE MOUNT ELECTRICAL. LIGHTS	\$500.00	\$500.00	
CABINETS KITCHEN/BATH (IKEA)	\$6,000.00	\$6,000.00	
COUNTERTOPS	\$5,000.00	\$5,000.00	
PLUMBING FIXTURES	\$5,000.00	\$5,000.00	
DOORS ( INTERIOR)	\$2,000.00	\$2,000.00	
EXTERIOR DOORS AND WINDOWS	\$25,000.00	\$25,000.00	
DOOR HARDWARE	\$1,000.00	\$1,000.00	
TRANSPORT OF PREFAB UNITS	\$20,000.00		
CRANE TO SET UNITS	\$10,000.00		
CARPENTRY LABOR (BUILD FRAMES FOR UNITS)	\$80,000.00	\$80,000.00	
TIE IN LABOR (ON SITE)	\$30,000.00		
ROUGH LUMBER	\$40,000.00	\$40,000.00	
FINISH CARPENTRY LABOR	\$20,000.00	\$20,000.00	
FINISH LUMBER	\$5,000.00	\$5,000.00	
ROUGH HARDWARE	\$5,000.00	\$5,000.00	
CORRIGATED TIN SIDING/ OR HARDIBOARD	\$40,000.00	\$40,000.00	
CONCRETE FOUNDATION	\$40,000.00		
GARAGE DOORS	\$6,000.00	\$6,000.00	
DRYWALL:(LABOR AND MATERIALS)	\$20,000.00	\$20,000.00	
ELECTRICAL	\$25,000.00	\$25,000.00	
PLUMBING	\$25,000.00	\$25,000.00	
HEATING (HYDRONIC SYSTEM)	\$5,000.00	\$5,000.00	
ON DEMAND WATER HEATER	\$2,000.00	\$2,000.00	
SHOWER ENCLOSURES	\$5,000.00	\$5,000.00	
CLOSET INTERIORS	\$4,000.00	\$4,000.00	
STAIR UNITS (TWO)	\$20,000.00	\$20,000.00	
GENERAL LABOR/CLEAN UP	\$10,000.00	\$10,000.00	
SUPERVISION	\$40,000.00	\$40,000.00	
ESTIMATING	\$2,500.00		
TRASH HAULING	\$1,000.00		
EQUIPMENT RENTAL	\$500.00	\$500.00	
INSULATION (CELLULOSE)	\$5,000.00	\$5,000.00	
APPLIANCES	\$0.00	\$0.00	
PAINTING	\$30,000.00	\$30,000.00	
ROOF (CORRIGATED TIN)	\$15,000.00	\$15,000.00	
ROOF (WTRPRROOF MEMBRANE) FLAT	\$25,000.00		
SOLAR (2.5 KW SYSTEM)	\$25,000.00		
<b>Subtotal =</b>	<b>\$641,500.00</b>	<b>\$488,000.00</b>	
Subtotal cost/sq ft =	\$160.38	<b>\$122.00</b>	
Contractor's Overhead 10% =	\$64,150.00		
<b>Subtotal =</b>	<b>\$705,810.38</b>		
Contractor's Profit 10% =	\$70,565.00		
<b>Total =</b>	<b>\$776,375.38</b>	<b>\$488,000.00</b>	
Profit Margin 40% =	\$256,600.00	\$195,200.00	
<b>Final Sales Price =</b>	<b>\$1,032,975.38</b>	<b>\$683,200.00</b>	
<b>Sales price/sq ft =</b>	<b>\$258.24</b>	<b>\$170.80</b>	

### ***Cost of the Average New Home***

The National Association of Home Builders (NAHB) conducts a national survey each year to determine the average cost of construction for new homes. The table below gives the results for the 2007 survey, which was conducted during the first half of the year. This survey to NAHB members includes more types of costs than the table above, including financing, lot costs, and sales commissions. However, many of the same line items also differ in magnitude. Items where there is a significant difference from the green modular estimate are marked with an asterisk on the right-hand side of the table. Listed at the bottom of the table are a few of the significant omissions when compared to the estimate above.

This national survey gives a construction cost estimate of about \$66/ft<sup>2</sup> for the average single-family unit (3,340 ft<sup>2</sup>). There are many items with an asterisk where the green estimate is much higher (double in some cases), and there are some items which the NAHB includes that the green estimate does not. The items mentioned below the table, which were not included by the NAHB, would add about \$22/ft<sup>2</sup> to the construction cost, so there are some very significant differences between the two estimates. In addition, some of the largest builders in the U.S. are those that build mobile and manufactured homes, which are extremely inexpensive, but are of far lower quality than our homes.

Because green materials are not the norm for builders in the United States, it can be assumed that the NAHB survey represents the average cost using traditional (non-green) materials and fixtures. Due to the huge number of different materials, components and processes necessary in the construction of a house, as well as other cost variables depending on location and supplier market trends, it will be quite difficult to know what the cost of one of our houses will ultimately be until we know what will be built and where.

There have been studies and surveys to try to determine the general cost premium for green building, but they generally focus on non-residential buildings. One such study of 33 LEED-certified buildings in California found the overall cost premium to range from 0-6%, including multiple LEED Platinum buildings (Donald Bren Hall at UCSB was part of this sample).<sup>117</sup> Using the highest premium, 6%, would bring the NAHB construction cost estimate up to \$70/ft<sup>2</sup>, still well below the estimate from the green modular expert. A study by the World Business Council for Sustainable Development, which included both qualitative interviews and quantitative surveys with building professionals, found that respondents from the U.S. building industry assumed an average cost premium of 16% for green building, while the Council estimated the actual premium to average 5% in developed countries. They

concluded that there are widespread misconceptions within the building industry, mostly due to a lack of personal knowledge<sup>118</sup>.

**Table 10:** Construction cost builders' survey

Construction Costs for Single-Family Unit NAHB 2007 National Survey Results (10/03/07)				
	Lot Size	11,968	sq ft	
	Finished Area	3,340	sq ft	
Sale Price Breakdown		Average	% of Total	
Finished lot cost (including financing)		\$111,476	24.5%	*
Total construction cost		\$219,015	48.1%	
Financing cost		\$10,718	2.4%	*
Overhead and general expenses		\$31,969	7.0%	
Marketing cost		\$11,258	2.5%	
Sales commission		\$19,499	4.3%	*
Profit		\$50,971	11.2%	
<b>Total Sales Price</b>		<b>\$454,906</b>	<b>100%</b>	
Sales price per sq ft		\$136.20		
Construction Cost Breakdown		Average	% of Total	
Building permit fees		\$3,708	1.7%	*
Impact fee		\$3,175	1.4%	*
Water and sewer inspection		\$3,535	1.6%	*
Excavation, foundation, and backfill		\$15,249	7.0%	*
Steel		\$1,852	0.8%	
Framing and trusses		\$34,600	15.8%	
Sheathing		\$3,494	1.6%	
Windows		\$6,322	2.9%	*
Exterior doors		\$2,080	0.9%	*
Interior doors and hardware		\$3,348	1.5%	
Stairs		\$1,674	0.8%	*
Roof shingles		\$7,070	3.2%	*
Siding		\$12,476	5.7%	*
Gutters and downspouts		\$965	0.4%	
Plumbing		\$11,753	5.4%	
Electrical wiring		\$8,457	3.9%	*
Lighting fixtures		\$2,284	1.0%	
HVAC		\$8,641	3.9%	
Insulation		\$3,471	1.6%	
Drywall		\$11,185	5.1%	*
Painting		\$7,425	3.4%	*
Cabinets and countertops		\$12,477	5.7%	
Appliances		\$3,826	1.7%	*
Tiles and carpet		\$11,058	5.0%	
Trim material		\$6,831	3.1%	
Landscaping and sodding		\$6,148	2.8%	*
Wood deck or patio		\$1,450	0.7%	
Asphalt driveway		\$3,157	1.4%	*
Other		\$21,305	9.7%	
<b>Total</b>		<b>\$219,016</b>	<b>100%</b>	
Total cost per sq ft		\$65.57		
* These items are significantly different than the modular estimate				
<i>Not included: Bamboo flooring, garage doors, supervision, general labor</i>				

### *General & Administrative Costs*

This category includes all of the overhead costs of running the business, including employee salaries. In the first year of operation, before the purchase of a factory, overhead costs will be low. In the NAHB survey above, the overhead and administrative costs for the average home were 7% of the selling price. There is no reason to assume that this will be any different with a green home. However, due to the low volume of sales expected at first, and to be conservative, we have estimated that G&A costs will be 10% of sales revenues.

### *Employee Salaries*

Matthew Berman and Andrew Kotchen are the principal designers and will play a role in the daily operations of the new company, with Andrew in the role of CEO and Matt as Chairman of the Board of Advisors. Matt and Andrew are skilled salesmen and have industry and business experience. They currently earn salaries through their existing architecture and design firm, workshop/apd, and it is not determined what their compensation will be in the beginning of the new venture.

The four Bren students all have the option of participating in the creation of the new venture as Directors (see Management Team) after their graduation in June, 2008. It is assumed that, if any student joins the business, they will need a salary that at least covers cost of living. This cost in NC is generally low, requiring salaries of at least \$30,000 per year. As of now, it is unlikely that more than two students would choose to be employed with the company after graduation. It is assumed that if other students do not join, their assigned roles will be filled through local recruiting.

We are also actively recruiting for a Project Manager with a background in general contracting, to oversee the daily operations of the business. This will become more important as the business grows and we attempt to incorporate more of the building process into our business model. According to Salary.com, the range of salaries for a Construction Project Manager in the Charlotte area is between \$55,000 and \$100,000.<sup>119</sup> With the nature of the startup business, we will likely only be able to offer a salary near the low end of this range initially, but can possibly include equity in the company as an incentive.

In the early stages of a new business, it is customary for employees to receive stock options in return for accepting below-market salary. Thus, if the business is successful, they have a chance of earning an above-market return when they exercise their options.

In the second year of operation, after the purchase of a factory, we will also be paying for the construction labor within the factory. NC has a low average wage for



carpenters of under \$14/hr (about \$29,000 per year). This extra salary base is reflected in the construction cost estimates.

### *Marketing Costs*

Entrepreneurial marketing is based around the idea that new ventures have very small marketing budgets. Marketing cost will probably not be a significant factor within the financial plan due to its relatively small size as compared to other costs. Sales within the housing industry are often driven by word-of-mouth and PR (public relations) “buzz”, and each house we build stands as a permanent advertisement of our product. Our architects run a highly successful firm with projects in and around New York and Nantucket without spending any money on marketing other than maintaining a functional, attractive website, which is inexpensive.

Our revenue model estimates that marketing costs will be 2.5% of the selling price of homes (\$76,500 for Year 1), matching the NAHB survey industry average. Refer to the Marketing Plan section for more details.

### *Revenues*

Sales revenue is calculated as the selling price of each house multiplied by the number of houses sold. Sales price depends on the costs incurred plus a profit margin. The capture rate is defined as the number of customers divided by the total customers in the market.

### *Selling price of each house*

The sales price of our houses is directly dependent on the final costs of production and the profit margin that we add on. 30% is generally accepted as an attractive profit margin for investors, so that is the estimate that we use in our analyses. Within the housing industry margins will vary depending on the builder and the number of houses that they can sell in a given period. Large-volume manufacturers can succeed with a much lower profit margin than can custom homebuilders.

**Table 11:** Example of Green Pieces cost and price breakdown

	<b>1,500 ft<sup>2</sup> House</b>	<b>2,000 ft<sup>2</sup> House</b>
Cost/ft <sup>2</sup>	\$130	\$130
Total Cost	\$195,000	\$260,000
Price/ft <sup>2</sup> (30% margin)	\$170	\$170
Sales Price	\$255,000	\$340,000
Profit	\$60,000	\$80,000

### *Market Size*

Using the methods described in Section 3.4.b, we have determined that there is a maximum market size of 26,260 LOHAS home buyers per year. To estimate growth in this market we used future projections from the USGBC of growth in LEED certification over the next three years. They estimate annual growth of 140%, 150% and 200% from 2007 to 2009. To extend this out for one more year we assumed the trend would continue to 250%.

For a regional business, these are aggressive estimates. However, we also plan to expand the geographic reach of our company as quickly as possible, hopefully moving into other fast-growing markets such as Florida and Texas. Because of that, these estimates should be considered reasonable.

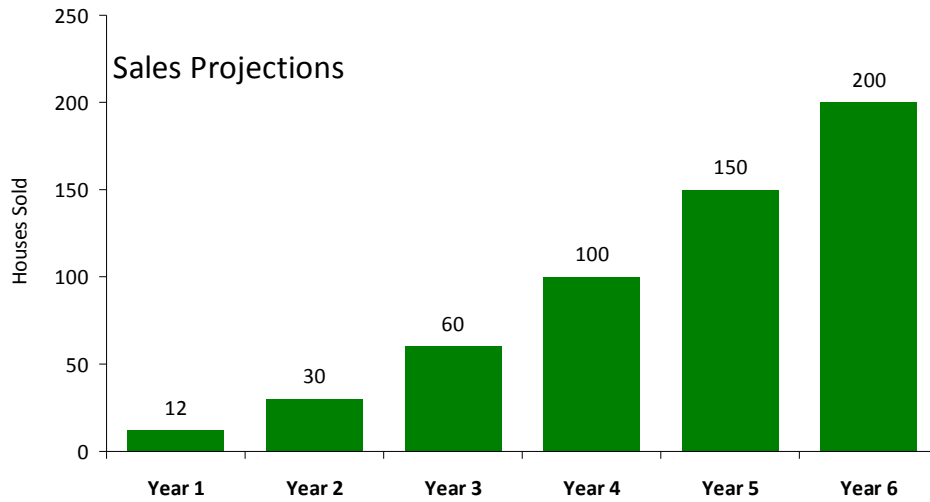
### *Capture Rate*

Sales and marketing ability will determine our capture rate, which is based on not only our personal abilities, but having the funds available to effectively reach our market segment.

Construction capacity is theoretically bounded by the capacity of a modular factory. However, if we are contracting our homes through another builder, construction will likely be delayed since they will have to fit our homes into their schedule. One of our competitors, Michelle Kaufman Designs, gives their maximum capacity as 40 homes per year, which is 900-1,500 ft<sup>2</sup> per week, since her houses range in size. A common maximum capacity for a traditional modular home factory is 10,000 ft<sup>2</sup> per week, which is 250-350 houses per year depending on the size of the houses. Thus, our theoretical maximum number of sales per year could be as high as 350.

It is likely that the first year's sales will not be near factory capacity, but far lower, as designs are tweaked and specifications are reworked in the factory environment. We hope that within this first year the business will sustain itself and gain enough customers to justify raising the capital necessary to procure our own factory, whether by purchase or by construction. Again, it is unlikely that during the first year in our own factory we could push sales and construction up to full capacity. It is possible that sales will outpace capacity, leaving backorders into the third year of the business. However, by the third year processes should be well-developed and we should be nearing full capacity of our factory, between 40 and 350 houses. At a maximum output of 350 houses in a year, we would only be able to capture 1.3% of the regional market.

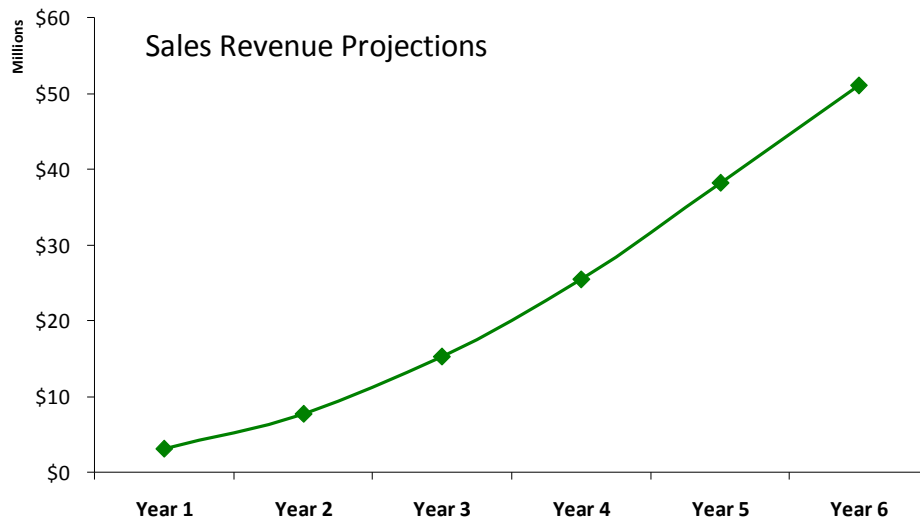
As the company gains market experience and market traction, sales are expected to roughly double each year until we reach factory capacity.



**Figure 23: Green Pieces' Sale Projections for Years 1 – 6.**

*Revenue Projections*

Sales revenue is based on the number of homes sold and the selling price of those homes. Using the sales projections above and an estimated price of \$255,000 for a 1,500 ft<sup>2</sup> home, the following graph of revenue projections is created. This does not account for costs, which are covered in the income projections. Modular builders typically receive 20% of the sales price as a down payment, with the balance due before delivery of the home. With our estimated sale price of \$255,000, this translates to \$25,500 up-front payment for each home, with \$229,500 due before delivery.



**Figure 24: Sale revenue projections for Years 1 – 6**

### Income Projections

The income projections start with the revenue projections, then subtract out the costs incurred in each year. Our income model includes capital expenditures (the factory purchased in Year 2), General & Administrative costs and Marketing costs.

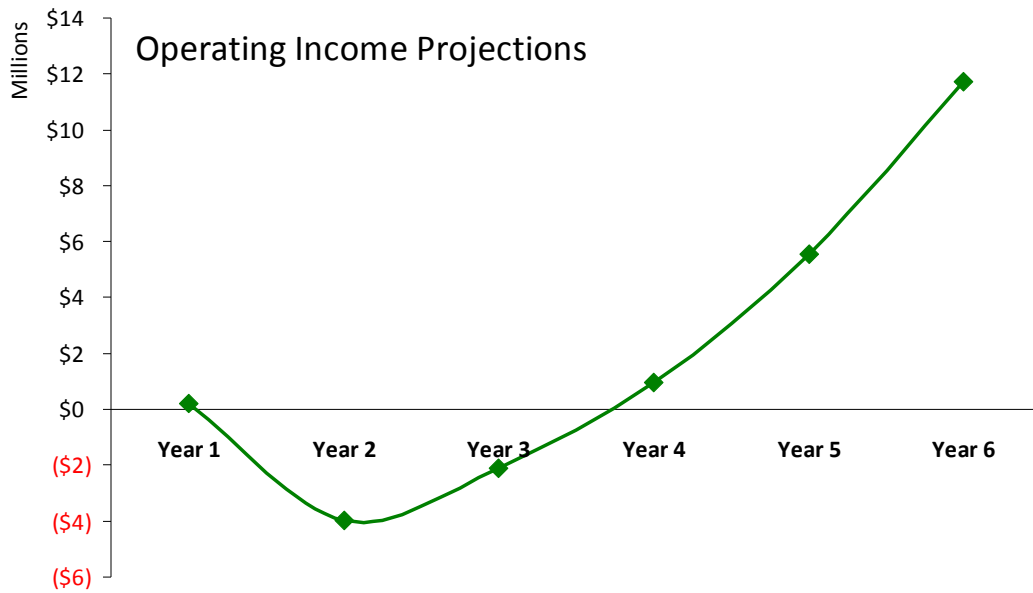


Figure 25: Income projections from Years 1 – 6.

**Table 12:** The Excel model used to generate the income statements and projections.

Phase 1	Cost/unit	\$195,000	G&A cost	10.0%	Taxes	35%
	Price/unit	\$255,000	Mkting cost	2.5%		

Phase 2	Cost/unit	\$175,500	G&A cost	10%	Taxes	35%
	Price/unit	\$255,000	Mkting cost	2.5%		

		PHASE 1		PHASE 2		
		Year 1	Year 2	Year 3	Year 4	Year 5
<b>Revenues</b>	Market Size (customers)	26,260	36,764	55,146	110,292	275,730
	Market Size (units)	26,260	36,764	55,146	110,292	275,730
	Market Size (\$ millions)	\$6,696	\$9,375	\$14,062	\$28,124	\$70,311
	Capture Rate	0.0457%	0.0816%	0.1088%	0.0907%	0.0544%
	Units Sold	12	30	60	100	150
	<b>Sales Revenue</b>	<b>\$3,060,000</b>	<b>\$7,650,000</b>	<b>\$15,300,000</b>	<b>\$25,500,000</b>	<b>\$38,250,000</b>
<b>Costs</b>	Construction (COGS)	\$2,340,000	\$5,850,000	\$10,530,000	\$17,550,000	\$26,325,000
	General and Administrative	\$306,000	\$765,000	\$1,530,000	\$2,550,000	\$3,825,000
	Marketing	\$76,500	\$191,250	\$382,500	\$637,500	\$956,250
	Capital Expenditures	\$22,000	\$5,000,000	\$ 50,000	\$50,000	\$50,000
		<b>Operating Income</b>	<b>\$315,500</b>	<b>(\$4,156,250)</b>	<b>\$2,807,500</b>	<b>\$4,712,500</b>
	Cumulative operating income	\$315,500	(\$3,840,750)	(\$1,033,250)	\$3,679,250	\$10,773,000
	Taxes	\$110,425	\$0	\$982,625	\$1,649,375	\$2,482,813
	Net income	\$205,075	(\$4,156,250)	\$1,824,875	\$3,063,125	\$4,610,938
	<b>Cumulative net income</b>	<b>\$205,075</b>	<b>(\$3,951,175)</b>	<b>(\$2,126,300)</b>	<b>\$936,825</b>	<b>\$5,547,763</b>

## Cash Flow Overview

**Table 13:** Green Pieces Cash Flow Analysis

	Year 1	Year 2	Year 3	Year 4	Year 5
<b>Cash flows from operating activities</b>					
Cash from sales to customers	\$ 3,060,000	\$ 7,650,000	\$ 15,300,000	\$ 25,500,000	\$ 38,250,000
Cash paid to manufacturers	(2,340,000)	(5,850,000)	0	0	0
Costs of manufacturing	0	0	(10,530,000)	(17,550,000)	(26,325,000)
Cash used for general & administrative costs	(306,000)	(765,000)	(1,530,000)	(2,550,000)	(3,825,000)
Cash used for marketing costs	(76,500)	(191,250)	(382,500)	(637,500)	(956,250)
Cash generated from operations	337,500	843,750	2,857,500	4,762,500	7,143,750
Income taxes paid	(110,425)	0	(632,625)	(949,375)	(732,813)
<b>Net cash flows from operating activities</b>	<b>\$ 227,075</b>	<b>\$ 843,750</b>	<b>\$ 2,224,875</b>	<b>\$ 3,813,125</b>	<b>\$ 6,410,938</b>
<b>Cash flows from investing activities</b>					
Cash paid for capital equipment	(22,000)	(5,000,000)	(50,000)	(50,000)	(50,000)
Business-related investments			(1,000,000)	(2,000,000)	(5,000,000)
<b>Net cash flows from investing activities</b>	<b>\$ (22,000)</b>	<b>\$ (5,000,000)</b>	<b>\$ (1,050,000)</b>	<b>\$ (2,050,000)</b>	<b>\$ (5,050,000)</b>
<b>Cash flows from financing activities</b>					
Infusion of capital	400,000	4,000,000	0	0	0
Prize money from business plan competitions	10,000	0	0	0	0
Loan Payments	0	0	(973,267)	(973,267)	(973,267)
Dividends paid to investors	0	0	0	(560,000)	0
<b>Net cash flows from financing activities</b>	<b>\$ 410,000</b>	<b>\$ 4,000,000</b>	<b>\$ (973,267)</b>	<b>\$ (1,533,267)</b>	<b>\$ (973,267)</b>
<b>Net increase in cash and cash equivalents</b>	<b>615,075</b>	<b>(156,250)</b>	<b>201,608</b>	<b>229,858</b>	<b>387,671</b>
<b>Cash and cash equivalents, beginning of year</b>	<b>0</b>	<b>615,075</b>	<b>458,825</b>	<b>660,433</b>	<b>890,291</b>
<b>Cash and cash equivalents, end of year</b>	<b>\$ 615,075</b>	<b>\$ 458,825</b>	<b>\$ 660,433</b>	<b>\$ 890,291</b>	<b>\$ 1,277,962</b>

Assume that the \$4,000,000 in year 2 is a small business loan from a bank. Assume Term of 5 years at 8% interest rate

Assume that \$50,000/year will be spent to maintain and update equipment after the purchase of the factory.

### **Breakeven Point**

The breakeven analysis details the estimated timeline and events after which the company will become profitable. Before buying or building a modular factory, this company will break even when sales revenues are greater than COGS plus operating expenses, since there are no large capital expenditures. However, after expensing the amount of capital needed for a factory, it will take longer to reach the breakeven point.

Based on the model used above, the business is profitable in the first year, but falls in the red after the purchase of a factory. However, we predict that sales will be strong enough that the company will once again break even by the end of the fourth year, finishing that year almost \$1 million in the black.

### ***Valuation***

The valuation of a company is mostly based on its balance sheet, which details the net worth of the business after accounting for total assets and total liabilities. Investments increase the cash assets of a company, and thus increase its valuation. The value of the company is used to determine the amount of ownership that is given up for an equity investment of a particular size.

In a business without patentable intellectual property, or some other method of direct valuation, the value of the company is based simply on others' opinions of how successful the company will be. What is most unique to Green Pieces, and thus the source of value for the company, is the packaging of detailed regional market analysis with environmental and architectural expertise. The value of this venture will be based on the amount of funding we receive, until we begin to generate revenue through sales. Since we are asking for \$400,000 in investment, the initial value will be that amount plus whatever is determined to be the valuation of the business itself.

### ***Funding Strategy***

There are four main types of funding available to our new venture: debt, equity, grants/prizes, and revenue. Debt funding refers to loans from banks or individuals that have specified timelines and interest rates. This type of funding does not require the loss of any equity in the business and is very stable. However, banks will typically not provide money during risky, early stages, and they will require either sales revenue or collateral before lending money. Equity funding gives the investor shares in the company (and often seat(s) on the Board) which are usually also the first to be paid back if the company is sold, goes public, or bankrupt. Shares are given based on the valuation of the company, so the more the company is worth before receiving investment, the less equity is given up to the investors. Equity investors often expect higher returns on investment. Grant and prize funding can come from government agencies and business plan competitions, and is not paid back, resulting in no debt and no loss of equity. Revenue is funding generated by the business itself through sales. This is the most valuable funding source since it is generated by the company and increases the company's valuation.

### *Amount Needed*

The first round of funding will be sought to cover the first year's operating expenses, as described above, as well as the financing of our demonstration home. Summing the costs of G&A, marketing, and office setup yields a figure of \$404,500. The construction of the demonstration home should cost \$200,000-\$250,000, plus the cost of land. In total we are seeking \$1,000,000 in seed funding. In the second phase we will seek \$4,000,000 of bank funding for the purchase of a factory at around \$5 million. The Cash Flow Analysis above assumes a 5-year bank loan at an 8% interest rate, paid back in monthly installments of \$81,105.

### *Sources of Funds*

The following are the sources of funding that we are seeking and the characteristics of each:

#### ➔ **Friends and Family (debt, equity or grant) – Phase 1**

This money can be given in the form of loans (debt) or shares in the company (equity). Friends and family that invest in the business are usually not large sources, but instead provide seed money during the risky, initial stages of the venture. These investments are not usually paid back until the business is profitable and sometimes not even then. Friends and family investments can have mixed results depending on the expectations and nature of the interpersonal relationships over time. Friends and family investors typically do not require startup opportunities to be large or promise high returns.

#### ➔ **Competitions (prizes) – Phase 1**

The business plan is being entered into multiple competitions before June, 2008. Being a winner or finalist in these competitions can bring with it various prizes.

- William James Foundation Socially Responsible Business Plan Competition: Our business plan placed first overall and second place for sustainability, with cash prizes totaling \$4,000. We also received in-kind prizes of 25 hours of legal consulting by the firm of Swankin & Turner (valued at \$5,000), as well as 10 hours of service by Strategic Sustainability Consultants.<sup>120</sup>
- New Venture Competition hosted by the Technology Management Program in the College of Engineering at the University of California, Santa Barbara: This competition awards multiple prizes, including Best Business Plan, Most Fundable Idea, Best Pitch and Alumni Choice. The prizes for 2007 were, respectively, \$4000, \$10000, \$4000 and \$5000.<sup>121</sup>

#### ➔ **Angel Investors (equity) – Phase 1**

These investors are typically wealthy individuals who are interested in contributing capital in return for equity in the resulting company. These individuals will vary in their expected role in the company, some being willing



to contribute only money, others expecting to play an active role in operations and decision-making. If these individuals are experienced in green building, construction, or entrepreneurship, they may prove to be valuable advisors. Angel Investors will fund startup opportunities of all sizes and possible returns.

➔ **Banks (debt) – Phase 2**

Banks can fund new ventures by issuing loans. However, banks do not deal with risk, and will not fund a business that cannot pay back the loan. Thus, a firm needs to have money (or collateral) to get money. Banks will loan to a business that has at least as much real value as the loan, has consistent sales revenue, or has other capital with which to pay back the loan. It is useful for large capital expenditures, such as the purchase of a factory, because that factory can be resold to pay back the loan if necessary. Debt funding allows the startup to avoid losing ownership to an investor, and shows that the business has achieved a certain level of stability.

➔ **Venture Capital Funds (equity) – Phase 2 (if necessary)**

Venture capital funds are legal entities representing the investment of multiple individuals. VC funds look for companies that have grown beyond the riskiest initial stages and can demonstrate a high probability of success. They generally attempt to earn an average 30% ROI, knowing that many businesses will fail, so they are mainly interested in finding “home run” opportunities that will yield higher ROIs. When a company receives such a large investment, it gives up a large percentage of ownership. For example, if a company is worth \$1 million, and receives an investment of \$1 million, the investor receives 50% ownership.

➔ **Sales (revenue) – Ongoing**

Sales revenue is the ultimate source of capital for maintaining the business, but is generally not sufficient for large expenditures. If sales are good, the money coming in is enough to keep the business functioning, but maybe not enough to let it grow with any speed. We hope to be earning sales revenue right away through the sales of houses. The timing of this revenue is contingent on the payment structure that is developed for our customers (how much is paid up-front and when the balance is received).

➔ **Government (debt) – Phase 2 (if necessary)**

The U.S. Small Business Administration organizes and guarantees small loans to new businesses which are unable to secure funding from other sources on “reasonable terms”. These can range up to \$2 million, but are only guaranteed up to \$1 million.

➔ **Strategic Partnerships – Ongoing**

Partnerships with other companies can provide investment in non-monetary ways. For example, partnering with particular factories or contractors can

allow mutually-beneficial marketing arrangements and help save costs for both companies. It may also be possible to obtain more favorable prices from a partner than would be found by finding contractors on a per-house basis. We will also pursue the possibility of partnership or part-ownership through a national home building company that does not already produce green homes.

#### *Investors' Rate of Return*

The Cash Flow Analysis above shows that we will seek \$400,000 in seed funding to get through the first year. In Year 2 all available cash will be needed to finance the purchase of a modular home factory. We estimate that by Year 4 sales will be strong enough that we will pay back investors with a 40% Return on Investment.

### **3.6 Execution Plan**

#### ***Milestones***

Funding will primarily be used to supplement and build upon our preliminary research in the following manner.

#### *Phase One*

- ➔ Fill the gaps in our management team. Our major efforts will concentrate on finding a CEO with proven experience in the building industry. This person will ideally have experience in modular and green construction. Key to filling the position is previous success in managing and budgeting a business in the building and construction industry.
- ➔ Hire Project Manager/General Contractor to oversee daily operations.
- ➔ Incorporating the company as an LLC. This can be easily obtained with little financial resources.
- ➔ Design and develop prototype. The prototype will be designed to meet specifications for green certification programs of the region (LEED, HealthyBuilt, EarthCraft etc.) and maximize energy efficiency.
- ➔ Find our first customers. Using brand promotion through green building memberships, outreach activities, aggressively pursuing public relations opportunities, and other marketing methods.
- ➔ Find and contract an existing modular manufacturer to complete initial projects. These factories must be amenable to using different materials than traditionally used by their factory.
- ➔ Build a network of green (preferably local) suppliers, distributors, and marketers.
- ➔ Join local green building programs and chapters. This will include Western North Carolina's Green Building Council, North Carolina's HealthBuilt

program, and local USGBC chapters. Depending on our revenue projections it would cost \$750-\$2500 to join the USGBC<sup>122</sup>, \$750 for NC HealthyBuilt Homes Program<sup>123</sup>, and \$150-\$1000 for Western North Carolina's Green Building Council<sup>124</sup>.

*Phase Two*

- ➔ Purchase, remodel or build a modular factory in the Southeast (preferably in North Carolina). We estimate that this milestone will cost around \$5,000,000, requiring bank funding of around \$4 million, as well as cash generated from home sales in the first year and continuing.

**Table 14:** Milestones

<b>Milestones</b>	<b>Description</b>	<b>Time required</b>	<b>Funding required</b>
<b>Phase One</b>			
<b>Fill in gaps of Management Team</b>	Our major efforts will concentrate on finding a Project Manager with proven experience in the local building industry.	5 months	\$5,000 for time and travel
<b>Incorporate</b>	LLC	days	Legal fees
<b>Design and develop prototype</b>	Prototype to meet green building criteria and local regulations	3 months	\$0*
<b>Contract with existing modular manufacturer</b>	Find NC modular manufacturers to work with our design, materials and vision.	4 months	minimal
<b>Build a network of (local) green suppliers, distributors, and marketers</b>	Attempt to coordinate these networks into initial homes as soon as possible.	6 months	moderate
<b>Secure customers</b>	Direct sales, developer sales.	2-6 months	\$15,000
<b>Join green building programs/councils</b>	Western North Carolina's Green Building Council, North Carolina's HealthyBuilt Homes Program, USGBC	1 month	\$1650-4250
<b>Phase Two</b>			
<b>Purchase an existing modular home factory in the Southeast</b>	Green Pieces will move from contracting our homes through other suppliers to building them ourselves, leading to increased profit capture.	months	\$3,500,000
<b>Hire factory staff</b>	Search for well-qualified construction laborers in various trades. Train employees in green construction techniques and company policies.	2 months	TBD
<b>Double first-year sales</b>	With the lower costs and increased efficiency of our own factory, we will enter a growth phase.	1 year	9.5% of sales

\*Assumed cost to be zero because designs are funded by workshop/apd

### ***Growth strategies***

As Green Pieces advances through Phase One and Phase Two, additional steps can help advance and grow the company.

- ➔ *Expand services:* include transportation, general contracting services, and landscaping. Expanding services would enable Green Pieces to fully integrate the building process under one roof, possibly eventually becoming a developer. Integrating the process would make the product much more attractive to the customer and ensure a higher degree of quality.
- ➔ *Open another factory or license our designs* to other builders, allowing us to reach other geographic markets.
- ➔ Currently, the Florida market is struggling, but with an aging population, Florida is likely to grow as retirees move there to enjoy a warmer climate. It also demonstrates characteristics that would encourage green building. Green Pieces may *look to open a factory* in this region or expand transportation to include Florida.
- ➔ *Expand the product line:* Grow the current customer base by offering new models with the same architectural style or expanding the product line to include a line with different architectural styles. We would also like to offer both wood and steel framing options.
- ➔ As we are able to increase efficiency and reduce the costs of construction, it would become feasible to form a *non-profit foundation* to build homes for those in need, such as disaster victims. This would involve financial partnerships with other non-profit groups and government aid agencies.

## **3.7 Management Team and Organizational Structure**

### ***Management Team - Core Team Members***

We are aware that the strength of the venture team can be as, or more, important than the business concept itself. Therefore, we have worked to bring together a strong team comprised of experience, award-winning home designers, and specialists in marketing, sales, operations, and business relations. All directors described below are currently completing a rigorous graduate program in environmental science and entrepreneurship. All team members are energetic, hard-working, and have a strong personal drive to bring to the market a home that is greener and more affordable than competitors’.

As is common with entrepreneurial ventures, the present team members will perform many duties, over and above those described in this section. We will draw upon expertise and gain advice from our advisors. The following team members are expected to take the company off the ground. When the managerial/VP positions

are filled (described in the following sections) the Directors (Jamie, Nicole, Max, and Kelly) described below will work to support the VPs and Officers.

*CEO: Andrew Kotchen*

As CEO, Andrew Kotchen, will establish the strategic direction for Green Pieces while assuring the day-to-day operations are appropriately executed. Andrew will lead the organization in achieving its goals through developing and implementing strategic and operational plans, and integrating the work of all team members into a coherent, consistent and effective operating program. Andrew received his Master's in Architecture from the University of Michigan College of Architecture and Urban Planning, where he was awarded the prestigious Chairs Cup. Prior to the founding of workshop/apd, Andrew worked on the Island of Nantucket, focusing on the complexities of residential design within an historic context. This interest led to the development of a thriving practice on the Island and New York City. Andrew is an Associate member of the AIA and a member of the Architectural League of New York.

*CHAIRMAN OF THE BOARD OF ADVISORS: Matthew Berman*

As Chairman of the Board of Advisors, Matthew Berman will facilitate communication between the company and the advisors. He will also be actively involved in the strategic decisions and every day business operations of Green Pieces. Matthew received his Master's in Architecture from the Columbia University Graduate School of Architecture, Planning and Preservation where he held the Publications Assistantship. He is the co-editor with Bernard Tschumi of INDEX Architecture (MIT Press, 2003), a book that examines the current state of academic and professional architectural practice at a critical moment in contemporary architectural history. Prior to graduating from Columbia, he served as Associate Editor of *ANY* magazine. Matthew is an Associate member of the AIA and a member of the Architectural League of New York.

*PRINCIPAL DESIGNERS: workshop/apd*

The design team will draw on the experience of the successful New York design firm, workshop/apd. Founded in 1999, workshop/apd have designed residences in New York City, New Orleans, Nantucket, Charlottesville, San Diego, and beyond. The firm has experience in various types of architectural styles and types of construction. workshop/apd is recognized as one of "New York's Top 50 Designers" by *New York Home* and received national acclaim for their winning green design (GreeN.O.LA) in the Sustainable Design Competition for New Orleans, sponsored by Global Green as part of the effort to rebuild New Orleans after Hurricane Katrina. workshop/apd is gaining additional experience in building modular green housing beyond their

Green.O.LA project – they are currently designing four green modular homes for customers in Connecticut, Nebraska, South Dakota, and Massachusetts.

*VP OF BUSINESS DEVELOPMENT: Seth Kessler*

Seth is currently Executive Vice President of Graphography. With an extensive background in procurement and strategy, Seth oversees a number of key areas at Graphography, including consulting services related to strategic sourcing, process re-design and e-procurement. Prior to Graphography, Seth was one of the founding employees and a member of the Board of Directors at one of the leading print management and reverse auction technology providers. Seth has also worked at BuyerZone, Purchasing Magazine, Marakon Consulting, and The Wharton Small Business Development Center. Seth graduated from The Wharton School at the University of Pennsylvania with an MBA in entrepreneurial management, receiving academic fellowships from both the Price Institute for Entrepreneurial Studies and the Milken Institute. He also holds a BA in economics and journalism from Brandeis University. Seth's experience with startups is key for the successful development and implementation of Green Pieces' growth strategy.

*JAMIE BRITTO: Director of Business Development*

Jamie brings to Green Pieces experience in different startup ventures ranging from biotech to communications. Experience in the environmental field includes marketing and sales of renewable energy, coordinating technical divisions at a national trade association in solid waste, and collecting and analyzing market research of neighborhood electric vehicles at a communications firm. Her professional graduate degree from the Donald Bren School of Environmental Science and Management with a specialization in Eco-Entrepreneurship enhances her strategic understanding of managing new ventures for growth and positioning Green Pieces for long term success. She holds a BA in Environmental Studies from the University of Southern California.

*VP OF MARKETING: Peter Everett*

Peter has 13 years of new business (product) marketing. Peter's experience includes marketing for several online and development companies such as The Generations Network, Next Testing, and Yahoo. He received his BA in Government at Lehigh University. As VP of Marketing, Peter will administer marketing tools such as market studies, signage, brochures, model homes, promotional events, budgets, product developments, and will actively promote word-of-mouth. His knowledge of web development, online marketing, and communications will help position Green Pieces as a leader in the Southeastern green building market.

*NICOLE DEJONGHE: Director of Marketing*

Nicole will fulfill her role as marketing director through raising awareness, encouraging connections, and building an understanding of and excitement around the benefits that Green Pieces Homes has to offer. Nicole has work experience as a Marketing Director for an environmentally focused start-up company. She also has a Master's in Teaching, two secondary teaching credentials, and eight years of experience as an educator where she has developed the important skills to clearly communicate and educate others on new concepts. Furthermore, her work experience as a LEED project manager gives her an understanding of the many aspects involved in green buildings. Nicole's work experience is complemented by her own education, giving her necessary background knowledge: she holds a BS from University of Michigan in Environmental Policy and Behavior, and is currently finishing her UCSB Master's degree in Eco-Entrepreneurship.

*MAX DUBUISSON: Director of Sales*

Max DuBuisson has six years of direct-to-customer sales experience, including two years of sales management, where he consistently met or exceeded sales goals. He has experience with sales that require a high level of product information and customer education as well as experience managing sales people. Max's background in biology and analytical research skills afford him the ability to break down real-world problems into more easily solvable units. His Master's degree in Environmental Science and Management gives him entrepreneurial skills and knowledge. Max's expertise with web-site development and graphic design has proven invaluable in producing powerful communications for Green Pieces. His experience with the local North Carolina market and his excellent communication skills will benefit sales of Green Pieces homes.

*KELLY SCHMANDT: Director of Operations*

As Director of Operations, Kelly will manage production schedules, compliance, quality control, labor relations, suppliers, and inventory. Kelly is experienced in product and material life-cycle analysis (LCA), green building consulting, and green product markets. She has also researched modular factory design and operations as a part of workshop/apd. She received her BS in Environmental Policy from Vanderbilt University and a Master's from the Bren School of Environmental Science and Management at the University of California Santa Barbara, where she studied Eco-Entrepreneurship and Technology Management. She has written for several publications, including *Erosion Control Magazine*, *MSW (Municipal Solid Waste) Management Magazine*, and *The South Coast Beacon*. In addition to her experience in journalism and background in environmental analysis, Kelly has held leadership positions as a professional tennis player and college coach for several years.

*STEVEN BERMAN: Legal Counsel*

Steven A. Berman is a partner at a successful Connecticut law firm, practicing in the areas of business, corporate, and commercial law, as well as real estate and land use. He holds over 25 years of experience in corporate finance and corporate transactions. He represents both borrowers in acquisition, working capital and construction financing, and various types of commercial lenders in all forms of commercial finance including various types of real estate related financing. Mr. Berman has extensive experience in multiple lender transactions and has broad experience in various levels of mezzanine financing and in drafting and negotiating various forms of inter-creditor agreements. Mr. Berman recently published an article entitled "How to Buy a Business with Little or No Cash". Prior to joining Rogin Nassau, Mr. Berman worked as a manufacturing engineer, and earned his Master's of Business Administration. After receiving his Juris Doctor degree, Mr. Berman helped found two firms in which he was a named partner, practicing business and commercial law.

***External Advisors***

*GREG SLODITSKIE: Modular Consultant*

Gregory Sloditskie earned a BS degree in Mechanical Engineering Technology from the Pennsylvania State University in 1983. He has worked exclusively in the prefab industry since graduation. While most of his work has focused on volumetric prefab (modular), he also has experience with manufactured housing (mobile). Prior to his involvement with Green Pieces, Greg formed Modular Building Solutions (MBS) in 1997 to provide engineering services to the prefab industry. MBS became "MBS Consulting, Inc" in the summer of 2007 with the addition of a partner. Current architectural clients include: Resolution: 4 Architecture, Marmol Radziner Architecture, LGA Architects, JKD Architects, and The University of VA School of Architecture. Current modular prefab clients include: Integrity Building Systems, Ritz-Craft of PA and MI, Avis America, Excel Homes, Apex Homes, Simplex Homes, and Marmol Radziner Prefab. Foreign modular prefab clients include: Zenkaya (South Africa) and Timberline Homes (Lisarow, NSW, AU). Before forming MBS, Greg was employed by DeLuxe Homes of PA, Ritz-Craft of PA, and Penn Lyon Homes. His work is primarily in the engineering field, but additionally, Greg possesses management, costing, and sales experience.

***Phase One Recruiting***

Our initial recruiting efforts will be focused on finding a Project Manager to lead the company as we incorporate more of the construction process into the services we offer. As Green Pieces grows, we will also hire highly qualified and experienced individuals in the positions of: CFO, VP of Marketing, VP of Sales, and VP of



Operations. As new team members are added, the Directors will work to support the VP's and Officers. Green Pieces will outsource accounting needs.

#### *Project Manager*

This person will be directly responsible for the day-to-day oversight of the development of Green Pieces. The Project Manager will have proven interpersonal skills and managerial experience, as they will work with general contractors, design team, local building officials, other consultants, and testing agencies. Additional skills and experience should include: planning, organizing, purchasing/contract administration, cost/schedule monitoring, and job documentation for assigned projects. This individual will be directly responsible for coordinating build times, quality control, and site safety. The project manager will be versed in reviewing work in process to ensure compliance with plans and specifications, building codes and company standards.

#### **Phase 2 recruiting**

##### *Vice President of Sales*

Green Pieces is recruiting a VP of sales who has a proven track record of meeting sales targets. This person must be results-oriented. We are seeking someone who has experience selling homes or major purchases, and/or selling to customers who show they are willing to pay for items that consider health and sustainability issues. Ideally, this person would have experience working in Southeastern markets. This person will be energetic and possess the ability to explain modular and green building concepts to our customer. The VP of sales will also have the ability to listen to our customer and effectively communicate customer preferences to the Green Pieces team. The VP of Sales will work closely with the marketing staff, and should have professional written and oral communication skills. This person also needs to have managerial skills and a demonstrated record of supervising and leading a successful team.

##### *Vice President of Operations*

Green Pieces will hire a VP of operations who is knowledgeable of and has technical experience in the modular building system. This person will have proven experience in establishing and managing building schedules to ensure on-time delivery. Our ideal candidate will have effective communication skills and experience in building and managing a work force. The VP of Operations will be knowledgeable on labor issues and well-versed in meeting building codes of the Southeast. This person will be responsible for quality control, quality assurance, EPA and OSHA compliance. The ideal candidate will be able to mentor and develop construction personnel. Additionally, the VP of Operations will review and recommend improvements to

both existing and proposed designs as the liaison between the designers and the factory floor.

### ***Business Structure***

All three business structures of C Corporation, S Corporation, or a limited liability company (LLC) would give Green Pieces personal liability protection, but they all differ in important ways that have significant implications for the business. It is our opinion that an LLC would be the proper legal structure for Green Pieces, for the following reasons:

- ➔ C corporations are subject to “double taxation,” whereby they are responsible for income taxes at both the corporate and individual level. S Corporations and LLCs are not subject to this because profits are passed on directly to the members.
- ➔ A C corporation structure is necessary to receive institutional (VC) funding, which we do not expect to seek.
- ➔ C and S corporations are run by a Board of Directors, rather than the owners/members, and are therefore subject to very strict requirements for formal meetings and officially documented meeting minutes.
- ➔ The owners of S and C corporations are the shareholders, while the owners of an LLC are the members.
- ➔ Management of an LLC is much more flexible than S and C corporations, which require directors that are elected by shareholders.<sup>125, 126</sup>

In the future, Green Pieces has the option to switch from the business structure of an LLC to that of a C corporation. This may be preferable in the future as the company grows and profits increase.

## **3.8 Risks**

Startup companies will inherently face many risks while they work to establish themselves in the market. Prior to investing in Green Pieces, here is the disclosure of perceived risks.

### ***Current housing market slump***

Dismal news abounds regarding the state of the U.S. housing market. A recent article by *MarketWatch* claimed that 2007 capped off the worst performing housing market in 25 years; 2007’s 13% decline was the largest decrease since 1982.<sup>127</sup> They stated that borrowers asking for large mortgages or those with poor credit are still facing a tighter lending environment.<sup>128</sup> The bright news is that though sales in all four regions of the country fell, the South experienced the smallest decline of just

1% as compared to the northeast which experienced a 4.6% decline.<sup>127</sup> As Green Pieces will be located in the South, it recognizes it might be facing a more competitive housing market oftentimes considered a “buyer’s market” due to depressed sales overall. However, Green Pieces is well positioned to survive this market downturn since the product offering is value oriented—modular construction, energy saving design and appliances, and rebates—offer insulation to overall lower housing prices. Additionally, green modular homes cater to a somewhat niche market that might be less affected by the overall downturn due to their higher income demographic. A tight market can also favor a startup that is agile, flexible, and has little overhead as compared to larger companies with greater liabilities.

### ***Lack of experience***

Green Pieces’ current management team is a visionary, skilled, award-winning group. However, there is specific industry experience lacking from the core team. To counter this dilemma, Green Pieces is actively recruiting experienced, connected, successful team players to guide Green Pieces to the next level. In the meantime, outside resources and experts will be relied upon for guidance.

### ***Price Uncertainty***

Our price and market projections reflect our best estimates which underlie significant uncertainty. Our high margin will allow for flexibility as we approach our milestones as outlined in our execution plan. As our projections become more concrete, all figures, financial projections, and timeline will be updated accordingly. It can be expected that as first-time green homebuilders, our cost estimates can run 10% higher.<sup>128</sup> However, as materials and subcontractors get sorted out, the second house is expected to be only 3% over cost and the third home is usually not more than 1% higher.<sup>128 {132}</sup>

### ***Environmental Trendiness***

The current consumer trend towards environmentally-friendly products could be just that, a finite trend. However, we believe the contrary, that Green Pieces is poised to take advantage of a paradigm shift in product markets. Local and state building regulations are continuing to incorporate environmental considerations (such as California’s program for all new homes to be carbon neutral by 2020), and will only become more stringent with time, making it more likely that this movement represents a lasting change to the construction industry. We also believe that the green features of our homes are based on such sensible, rational ideas (such as health and lower utility bills) that they will be sought out by buyers even if the wave of green consumerism subsides. Though the current fervor over green products may lessen with time, consumers will continue to operate with a certain level of environmentalism ingrained into their behavior.

## 4 APPENDICES

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### APPENDIX 1: Types of Construction<sup>129</sup>

Our project focuses on modular construction, but there are various other types of construction. The two major categories of construction are on-site and factory-built construction. The most conventional type of construction is on-site, stick-built. Conventional construction involves building the structure on the site and attaching it to a concrete foundation. Factory-built housing includes modular, panelized, pre-cut, manufactured, and mobile homes.

There is a great amount of confusion between the various types of factory-built housing. Modular housing is most similar to conventionally-built, on-site homes. These homes are built to state, local, or regional codes and once completed within the factory, are transported in segments (modules) and then ultimately assembled on the site and attached to the foundation. Modular housing has the benefit of faster construction time (commonly 95% of construction is done in a factory) and suffer less of the potential quality effects of out-door construction (primarily water damage). However, modules are limited in their size and where they can be located by transportation route. Modules are commonly limited to 60' by 15'9" by 11' due to road width and height restrictions.

Panelized homes are built as walls, floors, and ceilings and shipped as panels. The panels are then constructed on-site. Panelized construction does not share the disadvantage of modular homes in that the homes are not limited to certain dimensions because of transportation limitations. Panelized construction does require much more on-site finish work and takes longer to complete and is more susceptible to water damage as a result.

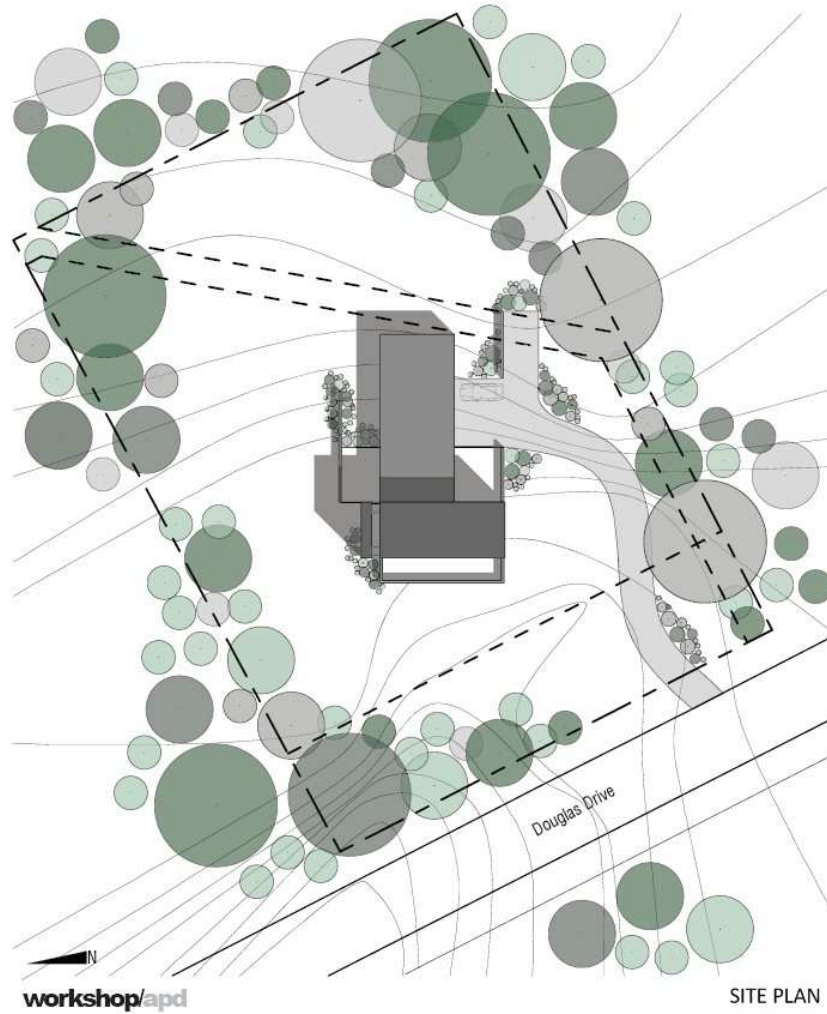
Pre-cut homes are similar to panelized homes in that they are pre-cut into sections. These homes fall into the category of kit, log, and dome homes. These homes are less customizable than panelized.

Mobile homes were known as manufactured homes prior to 1976 and are built to industry standards. These homes are built similarly to manufactured housing, but are built to different codes. These homes are built and completed within the factory and then transported to the site. These homes are not permanently fixed to a foundation.

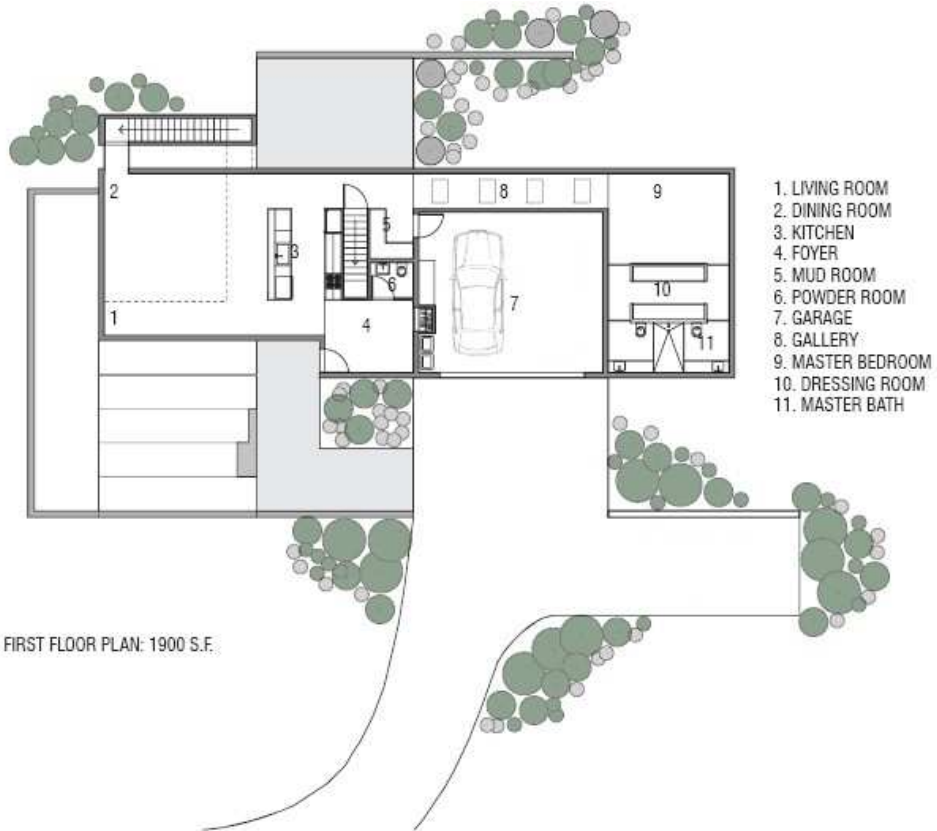
Manufactured housing is built to HUD (U.S. Department of Housing and Urban Development) requirements. These homes are built within the factory and then transported on-site where they are not attached permanently to a foundation. Both mobile and manufactured housing have limited amount of customizability.

In general, factory-built housing is less expensive than on-site construction due to a shorted construction time (2 - 6 months versus 6 - 12 months). Factory construction also has the added benefit of waste reduction, improved employee safety, and decreased material theft.

APPENDIX 2: Connecticut Prototype Designs (workshop/apd)  
Site Plan

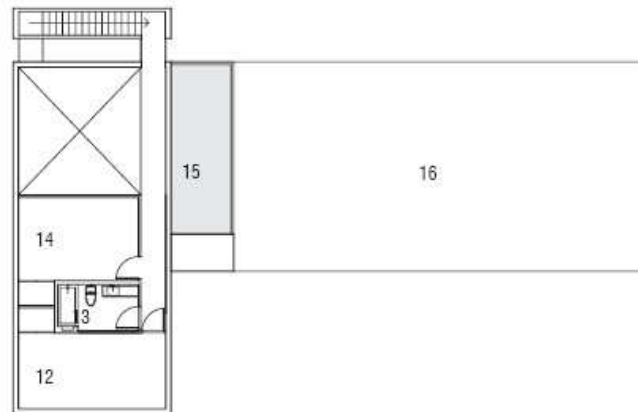


# Floor Plan



- 1. LIVING ROOM
- 2. DINING ROOM
- 3. KITCHEN
- 4. FOYER
- 5. MUD ROOM
- 6. POWDER ROOM
- 7. GARAGE
- 8. GALLERY
- 9. MASTER BEDROOM
- 10. DRESSING ROOM
- 11. MASTER BATH

1. FIRST FLOOR PLAN: 1900 S.F.



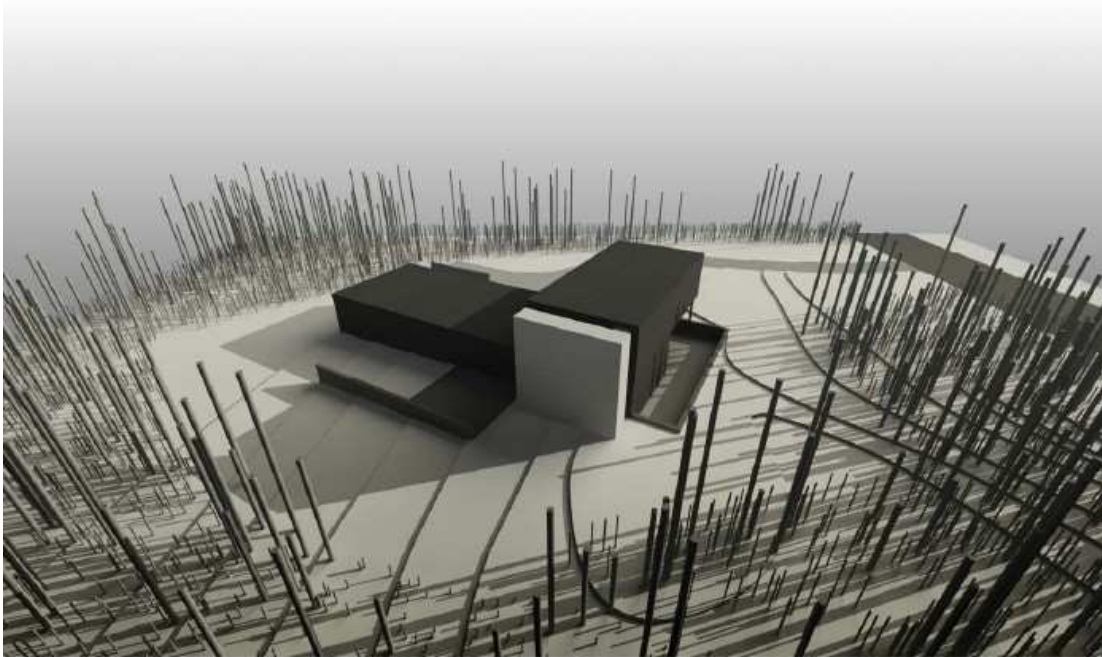
- 12. BEDROOM
- 13. BATHROOM
- 14. BEDROOM
- 15. ROOF DECK
- 16. SUSTAINABLE ROOF

2. SECOND FLOOR PLAN: 617 S.F.

**workshop/apd**

FLOOR PLANS

North View Massing



NORTH VIEW



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