

BUSINESS PLAN FOR GREEN MODULAR HOUSING

CLIENT: WORKSHOP/APD

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Bren group project description

This project is the result of a new collaboration, named **Eco-Entrepreneurship**, between the Bren School and the Technology Management Program (TMP) 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 their project, "GreeN.O.LA", should be completed during 2008.



Enterprise vision

We have completed a business plan to create a new company, currently named "Green Pieces", whose purpose is to **design, sell, and construct green modular homes**. Our vision is that Green Pieces will create a significant positive environmental impact by pioneering a great expansion of residential green building. Our value proposition is that we create homes that are far

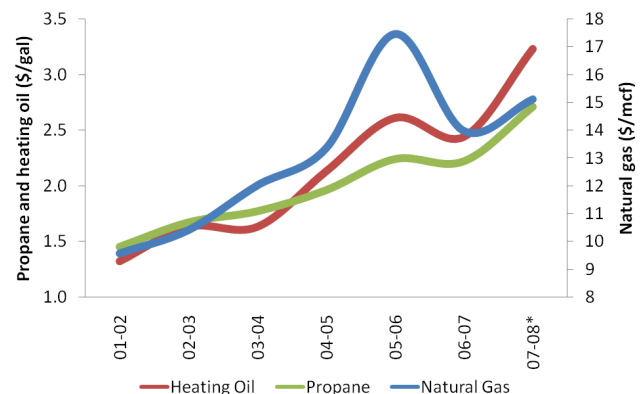
greener than the average house, without being any more expensive. We are targeting homebuyers who would like to purchase a green home but cannot afford the options that are currently available.



Problems faced by consumers

Rising energy costs

It is becoming more and more expensive for home owners to pay for the energy required to run their households. The graph below shows the wintertime (October-March) prices for fuels used to heat homes in the South over the past 8 years, adjusted to 2007 dollars. There is a consistent upward trend.



Poor indoor air quality

Air quality indoors can be **2-5 times worse** than the air quality outdoors.¹ This is due to pollutants from indoor sources, such as paints, finishes, treated wood, and carpets; pollutants from outdoor sources, such as smog, garages, pesticides, and pollen; and poorly-designed ventilation systems that are unable to adequately filter and circulate air.

Common indoor air pollutants include:

- ➔ Radon
- ➔ Pesticides
- ➔ Formaldehyde
- ➔ Carbon monoxide
- ➔ VOCs (volatile organic compounds)
- ➔ Biological agents/allergens (pollen, mold, mildew)

Environmental impacts of buildings

In the United States, the construction of buildings uses 30% of all raw materials and creates 30% of all waste. The use of buildings accounts for 65% of electricity demand, 36% of total energy consumption, and 30% of greenhouse gas emissions.

High price of green building

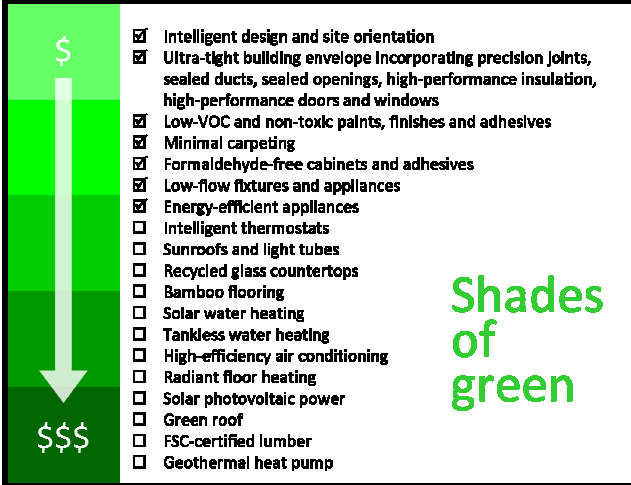
The first three problems listed above are all things that green building can solve. The problem with green building is that it is expensive. Traditional green homes tend to cost upwards of \$200/ft², and easily exceed \$300-\$400/ft². **We hope to offer green homes for less than \$170/ft².**

Product description

Our product is a single-family home that is “green” for the following reasons:

- ➔ **Modular construction** – This method of building, where homes are constructed in a number of modules in a factory, which are then assembled to a fixed foundation on-site, allows us to reduce construction waste by at least 30%², centralizes the transportation of materials and labor, and reduces the construction time by more than half, without sacrificing on quality and craftsmanship.
- ➔ **Tight building envelope** – The joints and seams of the homes are very tightly constructed, and high-performance insulation is used throughout, resulting in a significant reduction in heating and cooling needs.
- ➔ **Site orientation** – Each house will be intelligently oriented on its particular site in order to take advantage of natural sunlight and wind patterns to reduce energy needs for lighting and mechanical ventilation/climate control.
- ➔ **Efficient fixtures & appliances** – We will incorporate fixtures and appliances that are as efficient as possible in order to reduce energy and water usage in the homes.
- ➔ **Non-toxic & recycled materials** – To improve indoor air quality and further reduce the home’s impact on the environment, we will eliminate toxic materials throughout the home and attempt to use recycled materials wherever possible.

Our homes will be available with an array of different green options, beginning with a high-value base model, and extending up in price and features as far as customers are willing to pay. We call our different product options the “Shades of Green”.



Shades of green

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

Market analysis

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 \$7.4 billion marketplace. The marketplace is estimated to grow in value to \$19-36 billion an increase of 5-10% by 2010.

We have identified the LOHAS (lifestyles of health and sustainability) market segment as the group of customers most likely to be interested in purchasing our homes. These are well-educated consumers who consider their environmental opinions when making purchasing decisions, and tend to be market drivers. The Natural Marketing Institute estimates that this group includes at least 35 million adult Americans, or about 16% of the U.S. population.³

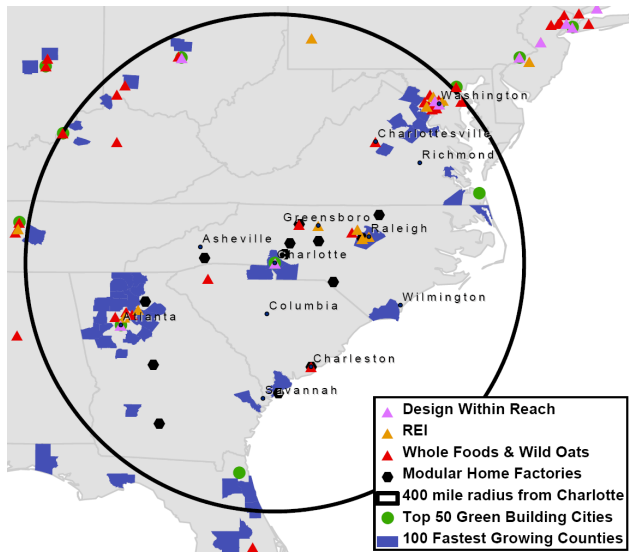
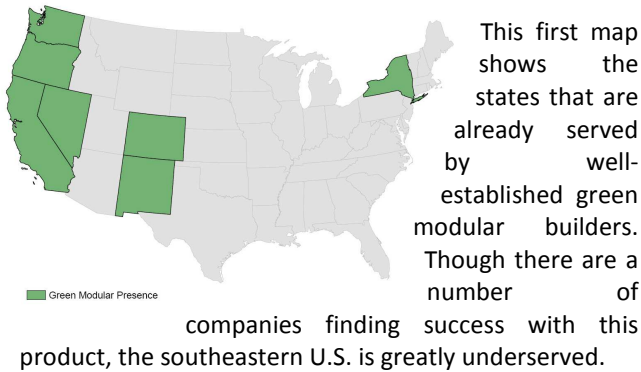
Regional market size

To calculate the regional market size, we started with the number of housing starts in 2006 for NC, SC and GA (1), multiplied this number by 16% to get the number of LOHAS housing starts (2), adjusted this for married couples using the national marriage rate (3), yielding a potential annual market size for the region (4).

- (1) 228,063 housing starts
- (2) 228,063 x 16% = 36,450
- (3) (36,450 x 55.9%)/2 + (36,450 x 44.1%)
- (4) 26,260 possible customers per year**

Location

The location of the factory is an important consideration for modular home construction, because each factory’s service area is limited to a 400-mile radius. In order to choose the most promising location for our new company, we used GIS mapping to attempt to visualize different locational attributes that are important to the success of the business.



This second map hypothesizes that we will use a factory near Charlotte, NC, and shows a 400-mile radius from that location (roughly the serviceable area of a modular factory). Not only is this region underserved by green modular builders, but it contains many areas of fast population growth, five of the top 50 green building cities (LEED buildings per capita), and a strong presence of other companies whose products target the LOHAS market segment. There are also quite a few existing modular home factories with which we can contract the construction of our homes.

Business Model/Growth Strategy		
Phase One	Phase Two	Phase Three
design sales	design sales	design sales
construction	construction	construction
site work	site work	site work
landscaping	landscaping	landscaping

In our initial startup phase, Green Pieces will design and sell the homes to customers and developers. We will contract out the construction, site work, and landscaping to local factories and contractors. Since there are real gains in efficiency to be made through vertical integration of these processes, we will incorporate more services into our business model over time. This will allow the company to lower prices, expand, and serve more customers. While we will definitely benefit from building through our own factory, we may find that it is more beneficial to develop close partnerships for the site work and landscaping, rather than offering those services ourselves.

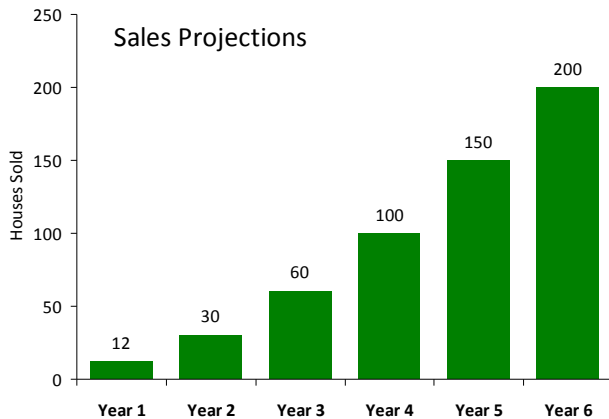
Competition

There are three broad categories of competitors for Green Pieces, and we have advantages over each one.

Competitor	Our competitive advantages
Traditional builders	Green features, faster construction, lower environmental impact
Traditional green builders	Lower cost, faster construction, lower environmental impact
Green modular builders	Untapped geographic market, lower price

Sales Plan

Our initial efforts will be focused on the design and construction of a demonstration home in our target market. We will use our first round of funding to finance the purchase of a plot of land and the construction of this house. This house will not only serve to develop relationships with suppliers, manufacturers, and contractors, but it will also be a tool for sales and marketing. Though we will sell this house, it will continue to stand as a billboard for our company. Our sales will target both individual home buyers as well as larger developers. Building homes for developers will allow us to place larger orders with the modular factory, thus increasing efficiency and decreasing cost.



Investment Proposal

We are seeking **\$1,000,000 in seed funding through angel investors**. These funds will be used to finance the construction of the demonstration home and to cover the company's expenses for the first year. By the end of the first year we will begin to have income from sales revenues. We plan to be able to offer at least a **60% return** on this investment by the end of 5 years.

For the second phase, when the company either purchases or builds a modular factory, a much larger amount of capital will be needed. We anticipate seeking \$4,000,000 in funding, using bank loans and institutional investment. Added to ongoing sales revenues, this capital will fund the new factory.

Management Team

One of the most important variables in the success of any startup venture is the **people behind the ideas**. Our management team consists of Bren graduates, who bring environmental management and entrepreneurial expertise, as well as Andrew Kotchen and Matthew Berman, founders of workshop/apd, who bring a decade of residential design and construction experience, as well as experience running their own business. Other members under consideration for the management team are Peter Everett (marketing), Seth Kessler (development), and Steven Berman (legal).

To help guide the new business, we are also assembling a highly-skilled **advisory board**, which includes Greg Sloditskie, one of the most sought-after consultants in the modular construction industry. Professor Matthew Kotchen at the Bren School will advise the business on issues of the environment and economics. We will continue to maintain a relationship with the Bren School in order to stay at the forefront of environmental science.

Our first recruiting task will be to hire a **local project manager** with a strong general contracting background in order to oversee the Green Pieces process for each of our homes.

Risks

Risk is inherent in every new venture. The main risks faced by this company are:

- ➔ **Housing/mortgage market slump** – There are a few forces working in our favor to mitigate this risk. The housing market in the South has been the least-hardest hit by this crash; in fact, some areas, such as Charlotte, are showing growth and price increases. Also, smaller, more entrepreneurial companies who target niche markets have been much less affected; the large, national home builders have had to bear the brunt of the damage.
- ➔ **Environmental trendiness** – Is the current trend towards raised environmental awareness going to subside, destroying interest in green building? With regulations such as California's Title 24 building standards, green building is being embraced by many jurisdictions across the nation. Because of the real cost savings and health benefits, it is our belief that green building methods will eventually become the norm in the construction industry.
- ➔ **Cost uncertainty** – At this point in the project, without a final prototype, there are many uncertain variables in our cost estimates. However, we have taken very educated guesses, based on solid advice, and will update these numbers constantly as the business progresses.

Conclusion

We believe that Green Pieces, as a business, provides real benefits to society, the environment, and our investors, and that we have a management team with the knowledge and passion to see it through.

www.greenpieceshomes.com

¹ U.S. EPA, Office of Air and Radiation. "Report to Congress on Indoor Air Quality, Volume II: Assessment and Control of Indoor Air Pollution." pp. I, 4-14. EPA 400-1-89-001C, 1989.

² NuWire Investor. "Cutting Costs with Modular Construction," <http://www.nuwireinvestor.com/articles/cutting-costs-with-modular-construction-51228.aspx> (March 3, 2008).

³ LOHAS. "LOHAS Background: A History of the Sustainable Marketplace." 2007. <http://www.lohas.com/about.htm>. (November 11, 2007).