Housing can be both green and affordable| Innovative projects demonstrate how

Elizabeth V. Hands

The University of Montana

Follow this and additional works at: https://scholarworks.umt.edu/etd

Let us know how access to this document benefits you.

Recommended Citation

Hands, Elizabeth V., "Housing can be both green and affordable| Innovative projects demonstrate how" (2003). Graduate Student Theses, Dissertations, & Professional Papers. 2596.
https://scholarworks.umt.edu/etd/2596

This Thesis is brought to you for free and open access by the Graduate School at ScholarWorks at University of Montana. It has been accepted for inclusion in Graduate Student Theses, Dissertations, & Professional Papers by an authorized administrator of ScholarWorks at University of Montana. For more information, please contact scholarworks@mso.umt.edu.
The University of Montana

Permission is granted by the author to reproduce this material in its entirety, provided that this material is used for scholarly purposes and is properly cited in published works and reports.

**Please check "Yes" or "No" and provide signature**

Yes, I grant permission  

No, I do not grant permission

Author's Signature: 

Date: 1/6/04

Any copying for commercial purposes or financial gain may be undertaken only with the author's explicit consent.
Housing Can Be Both Green and Affordable: Innovative Projects Demonstrate How

by

Elizabeth V. Hands
B.A. University of Michigan, Ann Arbor, 1992
Presented in partial fulfillment of the requirements for the degree of Master of Science Environmental Science The University of Montana December 2003

Approved by

[Signature]
Chairperson

[Signature]
Dean, Graduate School

1-6-04
Date
Housing is considered one of people’s basic needs. The National Association of Home Builders predicts that the United States will need an additional 1.6 million new homes a year to provide for the projected growth in demand from new households. The construction and maintenance of homes has an enormous impact on ecological systems, considering the industry’s consumption of energy and natural resources, associated pollution, and its production of copious amounts of solid waste. Green building is a concept that attempts to address the ecological consequences of conventional building practices. It interconnects the following: resource and energy efficiency, waste reduction, smart land use, transportation issues, healthy indoor air environment, and community sensitive design. While the construction business has been booming over the last decade, there has been a decline in our nation’s supply of affordable housing.

The application of green building principles to affordable housing projects has the potential for widespread impact on our country’s welfare. However, this potential has only recently been explored by a small, but growing number of visionary groups around the country. This thesis explores affordable housing projects that incorporate green building practices in order to better understand the opportunities and the barriers in linking these two principles.

I selected three affordable housing projects that featured extensive green building practices. By analyzing the experiences of and the knowledge gained from these nascent projects, I highlight what makes these projects work and how to better facilitate the integration of green building practices into affordable housing projects. These projects are Douglas Meadows in Portland, Oregon; Eastampton Town Center in Mt. Holly, New Jersey; and the Gold Dust in Missoula, Montana.

As leading examples of green, affordable housing, the case studies presented in this research provide excellent illustrations of the opportunities and barriers to developing such projects. Each case study looks closely at three key factors that affect the application of green building principles to affordable housing projects - zoning and regulations, financing, and the collaborative process. Through documents, interviews, and observations, I assessed how teamwork, community involvement, local policies and financing impede or facilitate a project’s green building goals.
Acknowledgements

I would like to thank Neva Hassanein for encouraging and supporting me throughout the research and writing of this thesis. Her insight, probing questions, and high expectations guided and motivated me during the gruesome thesis process. Thanks to Sarah Halvorsen and Paul Miller for their support and encouragement.

I am also grateful to all the people who helped me along the way. I would not have started this project without the interest and support of Ren Essene, the Director of homeWORD, who showed enthusiasm when I approached her about possible research topics, gave me a job when I needed one, and extended incredible support that allowed me ultimately to get this thesis done in a timely fashion. I would like to thank Dorene Warner, the Housing Director at Human Solutions, who welcomed my thesis proposal and facilitated meeting the key participants in the Douglas Meadows project. Darren Port, the Program Coordinator at the NJ Green Homes Office, hosted me in New Jersey and toured me around the state to visit a variety of green, affordable housing projects. I am indebted to all the interviewees who graciously accepted to talk with me about their involvement with one of the three projects.

Finally, I owe many thanks to all my family and friends. Thanks to my Missoula friends – Mike Kustudia (who gets extra kudos for editing), Jay McNally, my roomies Mo Hartmann and Ashley Parkinson, Dave Holley, and John Bateman. Thanks to all the homeWORD staff who have been truly supportive – Heather McMilin, Erin Thompson, Ellie Sigrist, Jessie Lundberg, Leigh Griffing, and Emily White. Thanks to the friends who hosted me throughout of my research travels – Ed Altweis, Heather Fenyk, Nan Bress, Carla Komich and Steve Moody, Banjo Weymouth, and Allison Handler.

And, of course, a big thanks to my parents.
Preface

My motivation for delving into this research emerged out of my interest in curbing sprawl and my observation that the growing need for affordable housing is often used as an argument for unmitigated housing development. I am personally invested in using this research to inform action in making social change both in Missoula and nationally. I have been involved in various capacities to address the need to link affordability with sustainability. Most notably, I started working as the community outreach coordinator for homeWORD, one of the cases profiled here, in the midst of this research. In that capacity, I apply green building principles in the development and management of affordable housing. I also work with Citizen Advocates for a Livable Missoula (CALM) and Missoula: Designing Neighborhoods Together to address concerns about Missoula’s growth management. I am connected to the national green building arena through my past work at the Rocky Mountain Institute in 2002, a leading think tank on green building, and my participation in recent conferences EnvironDesign 7 and International Association for Sustainable Businesses and Organizations. I am a member of the statewide organization, the Alternative Energy and Resource Organization, and made a presentation on energy efficient, affordable housing at their 2003 annual meeting. My research is an effort to reveal the intricacies involved in developing green, affordable housing so that the lessons learned from the initial projects can be shared with others interested in following the trend but unsure how to best capitalize on it.
Contents

vi. List of Figures and List of Pictures

CHAPTERS

1. What is Green, Affordable Housing? 1
2. Douglas Meadows: Portland Leads the Country in Affordable, Green Housing 19
3. Eastampon Town Center: New Jersey’s Greenfield Development Pilot Project 52
4. The Gold Dust: Community Driven Design Process Supports Missoula’s Green Building Project 88
5. Green, Affordable Housing: Future Steps 119

APPENDICES

A. Interview Script 136
B. Informed Consent Form 139
C. “Ten Shades of Green” 141
List of Figures

Figure 1 – Douglas Meadows Project Partners 23
Figure 2 - Eastampton Town Center Project Partners 58
Figure 3 – Gold Dust Apartments Project Partners 90

List of Photos

Photo 1 – Douglas Meadows: Path to wild area 26
Photo 2 – Douglas Meadows: Trellis and community gardens 27
Photo 3 – Douglas Meadows: Interior 27
Photo 4 – Eastampton: Pathway through houses 54
Photo 5 – Eastampton – Exterior look with hardy plank 55
Photo 6 – Eastampton – Interior look with hardwood and marmoleum floors 61
Photo 7 – Gold Dust: Street front 92
Photo 8 – Gold Dust: Rooftop gardens 96
Photo 9 - Gold Dust: Rooftop gardens 96
Photo 10- Gold Dust: Back area with workshop building 99
ONE

What is Green, Affordable Housing?

Housing is considered one of people’s basic needs. Beyond the obvious function of shelter, it also provides a family with a sense of self-control and self-esteem along with the foundation for self-sufficiency (Quercia and Bates 2002). The National Association of Home Builders predicts that the United States will need an additional 1.6 million new homes a year to provide for the projected growth in demand from new households (NAHB 2002). While the construction business has been booming over the last decade, there has been a decline in our nation’s supply of affordable housing.

Society must meet these needs; yet, it also must recognize that the construction and maintenance of homes has an enormous impact on ecological systems, considering the industry’s consumption of energy and natural resources, associated pollution, and its production of copious amounts of solid waste (Brown 1996, Orr 2002, Roodman 1994). Green building is a complex concept that attempts to address the ecological consequences of conventional building practices. Specifically, green building interconnects the following: resource and energy efficiency, waste reduction, smart land use, transportation issues, healthy indoor air environment, and community sensitive design. The application of green building principles to affordable housing projects has the potential for widespread impact on our country’s welfare. However, this potential has only recently been realized and explored by a small, but growing number of visionary groups around the country.

This thesis explores affordable housing projects that incorporate green building practices in order to better understand the opportunities and the barriers in linking these
two principles. Through in-depth case studies, this research describes three recent projects that demonstrate a commitment to both affordability and sustainability in their housing developments. By analyzing the experiences of and the knowledge gained from these nascent projects, I highlight what makes these projects work and how to better facilitate the integration of green building practices into affordable housing projects.

The three projects are located in different areas of the country and have unique factors that contributed to the approach and outcome of the development. These projects are Douglas Meadows in Portland, Oregon; Eastampton Town Center in Mt. Holly, New Jersey; and the Gold Dust in Missoula, Montana.

In selecting each project for inclusion in my analysis, each one had to meet established criteria for affordability and green building. Affordable housing projects received funding from various sources, particularly the Low Income Housing Tax Credits program and the HOME program. This funding requires housing to serve low-income households as defined by HUD, and depending on the program the household must earn between at or below 60 percent of the Area Median Income (AMI). In general, the three projects served populations that earned 30 to 50 percent of the AMI. The projects also included multi-residential units and established a goal for long-term affordability. In terms of green building, the list below describes the comprehensive elements that define green building, as determined through the literature review:

- A multi-disciplinary team was engaged in the design and construction process.
- A participatory process involving key stakeholders was employed.
- Projects included at least four of the following green building measures:
  - Site planning
Throughout this paper “green building” and “sustainable building” are used to describe the concepts above. The generally accepted term, “green building,” recognizes a holistic approach to the construction of homes and offices to address both local as well as global environmental concerns. The emerging term, “sustainable building,” broadens the idea of green building to address community revitalization and social equity along with green building principles.

First, Human Solutions, a non-profit organization that assists low-income families through direct services and the creation of affordable housing, developed Douglas Meadows. Douglas Meadows is a small development located on an infill\(^1\) lot next to a good transportation network in the Tri-Met area. It serves eight large low-income families.

\(^1\) Infill is considered building on a lot that exists within the city infrastructure, including services such as city sewer, transportation alternatives, and roads.
families with six three-bedroom apartments and two four-bedroom apartments. The developer, Human Solutions, partnered with the Portland Development Commission and the City of Portland, which is well-known for curbing sprawl and using green building practices. Douglas Meadows emphasizes livability, security, play and interaction with nature for larger families. Along with innovative energy efficient technologies, such as passive solar design and a turbonic heating system, Douglas Meadows includes bioswales for storm water runoff, designated community space, gardens and permaculture meant to promote food security issues. Because of obligations to various funding sources, Douglas Meadows will remain affordable for the next 60 years. Douglas Meadows gives insight into a city that provides support and policies that reinforce green building principles.

Second, Pennrose Properties, Inc., a for-profit affordable housing developer that works throughout the East Coast, developed the Eastampton Town Center. The Eastampton project offers a perspective on a statewide initiative to build sustainable, affordable housing, the development approach of a larger for-profit developer, and the creation of a greenfield development. This 100-unit townhouse development was one of eight pilot projects for New Jersey’s Department of Community Affairs and its Green Homes Office. Because this project was selected to demonstrate the potential for the state to foster green building in the affordable housing sector, a wide variety of state and federal partners were involved in setting up the goals and financing the extra costs. Eastampton Town Center is a large project on a greenfield that placed the townhomes in a compact area in order to preserve the remainder of the site as wetlands. While greenfield development can be a controversial issue in terms of sustainability and smart

---

2 Greenfields are lands that have not been developed, are usually located outside the city limits, and are removed from efficient city services and amenities.
land use, Eastampton demonstrates the potential for incorporating some green building principles that can further guide how we develop in suburban environs. The housing is clustered, connected by paths and common spaces. All of the units use 35 percent less energy than a typical home for heating, cooling, and hot water use. The area includes community gardening and composting, a bus stop at the entrance of development, and educational programs for occupants.

The third case study is of the Gold Dust apartments, an 18-unit infill project in Missoula. This case study highlights how a non-profit developer builds affordable, sustainable housing without government incentives or green financial programs. Unlike the other two case studies, which received financial incentives and government technical support, the Gold Dust relied significantly on social networks, such as neighbors and community partners, for support. The non-profit developer, homeWORD, worked extensively with the community to design a building that would respect the neighborhood’s concerns for historic preservation and fit within their comprehensive plan. Innovative components include housing density, designated bicycle-pedestrian units, and reduced parking on site. The Gold Dust incorporated other green features, such as photovoltaic panels, a roof top garden and terrace, a workshop, and a community room. The Gold Dust will remain affordable for the next 50 years due to its obligations to specific funder requirements. Key partners include a number of funders, local agencies, and community organizations.

This study is timely and appropriate for considering how social, economic, and environmental problems might be addressed in a holistic manner that revitalizes communities. Indeed, a number of scholars and community activists have argued that
green, affordable housing is a logical solution to society’s concerns regarding
environmental protection, economic revitalization, and social equity (Calthorpe and
Institute 1998). Yet, little research has been conducted on the experiences of particular
initiatives and how to foster projects that integrate green building practices into
affordable housing developments. A closer look at the opportunities and barriers
presented in affordable, sustainable housing offers examples and ideas to groups
interested in moving in this direction.

Green Affordable Housing: An Idea Whose Time Has Come

The housing industry has a significant impact on the economy, the environment,
and the strength of our communities. For example, the construction of homes plays an
enormous role in our country’s economic growth and vitality, generating consistently
more than one-fifth of the gross domestic product (Millennial Housing Commission
2002). On the household level, however, housing is a major expense that often takes first
claim to income over food and other necessities, thus inhibiting spending in other sectors
of the local economy (Quercia and Bates 2002). In 1999, for example, one in four
American households exceeded the federal government’s identified threshold of
affordability for expenditure on housing, which is typically 30% of a household’s income
(Millennial Housing Commission 2002). Additionally, homes are more than shelter; the
way we build homes has the potential to contribute to a neighborhood’s sense of place
and social fabric. The very design of houses can help foster civic engagement and a
sense of community. Simply by building housing at a human scale, integrating shared
indoor or outside spaces, and providing proximity to amenities, people have everyday and random encounters that help build feelings of trust and reciprocity and strengthen the neighborhood’s social capital (Calthorpe and Fulton 2002). The consequences of construction on our environment are far reaching and include the depletion of natural resources, the loss of open space and agricultural land, excessive use of energy, the creation of unhealthy indoor air environments, and the production of inordinate waste. Because of housing’s impact on the economy, the environment, and the community, its potential leverage in making fundamental change in a community’s social fabric and its sustainability is considerable.

Physical design embodies and reveals linkages between land use, transportation, open space, growth boundaries, energy and resource use, waste, and human health. The inefficient design, construction and maintenance of our homes are major causes of an enormous reduction in our natural resources. Currently one quarter of wood harvested in the world is used in the construction of buildings (Brown 1996). Overall, construction consumes more than 40 percent of the world’s energy and raw materials and accounts for 44 percent of the waste in our landfills (Brown 1996, Orr 2002, Roodman 1994). Buildings account for approximately half of the greenhouse gas emissions and nitrogen oxides, the cause of acid rain. Beyond using one-third of the world’s energy to just keep buildings running, there is a substantial amount of “embodied energy” required for the construction of buildings, such as the manufacturing and transportation of materials. Ironically, 30 percent of heating and cooling energy escapes unnoticed through leaky or uninsulated duct work (Roodman 1994).
We have the know-how to reduce these impacts and “design is the hinge that inevitably connects culture and nature through exchanges of materials, flows of energy, and choices of land use” (Van der Ryn and Cowan 1996, p.8). Green building practices facilitate connections between design, engineering, construction, and urban planning in order to minimize the use of resources and energy, to increase durability, to provide a healthy indoor environment, to connect the occupants with nature, and to be human in scale along side its neighboring buildings (Kilbert 1999). The application of these green building principles in residential developments and redevelopments is key to addressing environmental and social concerns in our built environment and modeling how we can create sustainable communities.

Municipalities and states cannot continue to address the design of our built environment without also acknowledging the dearth of affordable housing in this country. According to a report issued by the Millennial Housing Commission (2002), there was a supply gap of 1.8 million affordable, rental units for the poorest households nationwide in 1999. Compounding this problem, there has been a shift in production to more expensive housing so that the production of multi-family residences in the 1990s was half the level of the previous two decades (MHC 2002). The costs of residential instability are high. Over the course of a year, as many as 3.5 million people experience homelessness, and sheltering them temporarily costs more than a Section 8 certificate. In New York, the cost of sheltering people temporarily has been estimated to cost $20,000 per bed per year, whereas a Section 8 voucher in New York costs approximately $6,000-$8,000 annually (Quercia and Bates 2002). Studies show consistently that families struggling to find

---

3 A Section 8 voucher is issued by the Department of Housing and Urban Development and allows very low-income people to rent or purchase safe, decent housing.
affordable housing are forced to move frequently, disrupting their lives, the children’s schooling, and good employment prospects (Halliday 2002, Quercia and Bates 2002). A child’s emotional, behavioral, and cognitive development is significantly impacted by the instability of their housing, often leading to poor school performance, teenage pregnancy, and dropping out of high school.

In general, many of the homes that are available to low-income families are rife with problems from lead poisoning, to toxic exposure, to lack of maintenance. Besides problems associated with a declining and older stock of affordable housing, much of the newer housing being developed uses toxic materials and adhesives that are adverse to the health of its occupants. Due to poor air circulation and the use of adhesives emitting high VOCs (Volatile Organic Compounds), 30 percent of our new and renovated buildings are the cause of headaches, nausea, and long-term increases in cancer and immune disorders (Roodman 1995). Studies link the poor air quality of our indoor environment to the increase in asthma cases (National Institute for Allergies and Infectious Disease 2003, Roodman 1994). In 2000, the National Institute for Allergies and Infectious Diseases estimated 17 million Americans had asthma, a number that has risen over the last few decades along with its associated risks. Overall in 1990, asthma cost an estimated $6.2 million due to lost workdays, emergency room visits, school absences, and hospitalizations (Quercia and Bates 2002). These health concerns indicate that poor housing quality and construction have far reaching implications in the surrounding community. The affordable housing sector has begun to recognize these concerns and is now working to ameliorate the overall quality of housing, both through rehabilitation and new construction.
Ideally, green building practices and affordable housing developments both reflect the goal of transforming our communities into vital, healthy, connected places that value people. Combining the two principles addresses both environmental and social justice concerns. In fact, analysts are beginning to identify affordable, green housing as an essential priority. For instance, the Millennial Housing Commission was appointed by Congress to study affordable housing in relation to our infrastructure, the role of the private sector, and how HUD programs work with other programs to facilitate housing development. In their 2002 report, they recommended:

...that the goals of sustainability and affordability be placed on equal footing so that continued affordability is no longer the enemy of proper physical maintenance. All affordable housing needs to be designed, financed, and managed to be sustainable over the long term (MHC 2002, p.4).

Although their use of the word “sustainability” may be directed towards building homes that are sound financial investments and long lasting, these values are embodied in green building principles. Durable materials and reducing energy consumption are key components to ensuring a sustainable project that provides quality housing over the long-term. As affordable housing projects adopt some of the elements of green building, the occupants are beginning to reap benefits, such as lower utility bills. For example, one development in Dallas, Texas actually cut a household’s utility bills by $450 a year per dwelling by simply incorporating solar heating and efficient appliances, adding only $13 a year to the mortgage payment (Roodman 1995). A large savings in utility bills gives low-income families the extra income necessary to meet other basic needs, such as food and clothing.

Currently green building practices are more commonly used in commercial real estate development because the companies that build them recuperate their upfront
investment over the long-term through lower utility bills and increased worker productivity. While commercial buildings have been showcasing the benefits of green building, residential and affordable housing developments have been slow to adopt these practices due to market assumptions and financiers’ reluctance to fund riskier ventures (Roodman 1995).

**Keys Factors in Green, Affordable Housing**

There is a paucity of research that describes in detail how developers of affordable, green housing have been able to surmount the current system that supports conventional construction. Because affordable housing projects would benefit by incorporating green building practices, there is a clear need to demonstrate some feasible and innovative solutions and to illustrate the importance of meeting the goals of both social justice and environmental quality. The emerging attention on green, affordable housing is an effort to provide innovative solutions to address our past errors and to offer a model for housing development. The literature review suggested to me three key dimensions to focus in the analysis of the case studies:

1. **Studying zoning and regulations**: What are the local zoning ordinances and regulations, and how do they affect the project’s goals? What are the subsequent implications for developing sustainable housing?

2. **Exploring financial mechanisms**: What loans, grants, and tax breaks are available for affordable housing? Which of these are incorporating green building principles? How are groups able to finance their cutting-edge projects?

3. **Mapping the collaborative process**: Who are the partners involved in each project? How do these partnerships facilitate the application of green building principles? What role does each group play in creating a holistic project that addresses building systems, community issues, and urban planning?
Zoning and other regulations have unintended effects on how we build our towns and cities. The barriers to building green, affordable housing are diverse. Issues of affordability and sprawl are intrinsically linked through our methods of investment and zoning. James Kunstler (1996) describes this historical relationship in his book, *Home from Nowhere*. “Under zoning,” he writes, “it became necessary to create ‘affordable housing’ artificially because rules of zoning zoned out the very conditions that formerly made housing available to all income groups and integrated it into the civic fabric” (Kunstler 1996, p. 131). Zoning makes it difficult to build compact, mixed-use development that has been characteristic of many vibrant, older downtowns, and ironically today’s zoning would prevent this from happening (RMI 1998). In the 1970s and 80s, residential development was skewed towards building bigger and more expensive houses. Single-family homes in the suburbs became the focus of the home building industry and banks because there was more profit per unit in these projects as compared with creating dense, mixed-use neighborhoods that included affordable housing. The adverse effects of sprawl can be felt in increased commuting and dependence on cars, a shortage of affordable housing, a reduction in open space and agricultural lands, and increased expenditure on public infrastructure (Calthorpe and Fulton 2002, Kuntsler 1996, RMI 1998, Taeker 2000). The last few years have spawned incredible interest in applying green building to residential housing, and current issues around energy security make green building strategies even more relevant.

Accordingly, in a few areas of the country, governing bodies are developing various incentives and financial mechanisms to encourage more sustainable development. These mechanisms are clear in the case studies of Douglas Meadows and Eastapmton
Town Center. Tax breaks and funding incentives aimed at affordable housing can shape project goals by demanding green building practices, and they may influence the construction industry overall, by providing models, technical expertise, and training.

In order to design effective buildings using green building practices, experts have outlined a rigorous collaborative process necessary to accomplish a project’s sustainability goals. Unlike conventional construction, green building requires assembling a project team to work together throughout the project. This team includes people involved in all the aspects of the housing development – architects, engineers, contractors, financier, developers, and landscape architects (RMI 1998, Van der Ryn and Cowan 1996). Teamwork encourages a whole systems approach to the design, construction, and maintenance of buildings. For instance, if a unit is designed with passive solar and natural cooling and ventilation, the engineers should calculate for a smaller HVAC (Heating Ventilation Air Conditioning) system. By talking with architects during the first phase of the project, the engineers learn how design will reduce the heating and cooling needs, and they can adjust by installing a smaller and less expensive system, which frees up money for other energy efficient strategies (RMI 1998). Teamwork is an important component of green building that can either positively or negatively affect the outcome of a housing development.

Developers, whether public, private, or non-profit, are overcoming financial and zoning barriers to create a new vision for building sustainable cities. It is critical to begin to look more closely at how these different efforts have been able to get through the design, construction, and maintenance process. Some developers prefer to see the results of earlier projects before trying something new and untested, as the Rocky Mountain
Institute (1998, p.23) points out: “learning from the experience of others is one of the best ways to overcome the barriers to green development.” While the overall cost of each project is shared, it should be noted that these costs are difficult to compare since there are regional difference in wages and materials, as well as differences in the size and building type of each project. An analysis of existing projects can showcase the process of securing funding from beginning to end and demonstrate how affordable, green housing gets built.

**Methodology**

What factors have contributed to the success of particular green building projects, and what obstacles have project leaders encountered and sought to overcome? In order to better answer these questions, I selected three projects to study in-depth through case studies, as described above. Case study research offers a rich, vivid description focusing on a particular phenomenon in detail that is not typical of more analytical reports (Marshall and Rossman 1999). The benefit of case study methodology is that it makes the information readily available to its audiences, in this case, potential developers, funders, and advocates. It can also serve as a springboard for insights and hypotheses for subsequent studies (Berg 2002, Marshall and Rossman 1999). This research required in-depth interviews, site visits, and extensive review of documents, as described further below.

The chosen projects provided a diverse example of green development both geographically, as well as type of project and approach. These cases permitted exploration of the creative financial and regulatory incentives offered by leading
government agencies in Oregon and New Jersey, as well as developers who are working towards sustainability without major institutional support. The selected projects all embody green building values and are leaders in their region for combining affordability with sustainability. I selected the projects because they fit both the affordability and sustainability definitions, and they expressed an interest in participating in this study. Exploring projects in different states allowed me to compare and contrast the factors making each project possible. I also wanted the projects to represent a variety of affordable housing niches – infill development and greenfield development, low-income and moderate-income, and smaller city, suburban city and metropolitan centers. Green-Rated, a division of the Portland, Oregon’s Office of Sustainable Development, stated in its progress report that the city has developed a vision and strategy for becoming the leaders in the emerging field of green building (Green-Rated 2003). New Jersey has created a statewide pilot project for affordable housing that is encouraging developers to use green building practices in all residential projects (New Jersey Green Homes Office 2003). Missoula, Montana has a number of small non-profits and private developers that are trying to build a movement towards smart growth and green building, but without the kind of governmental influence seen in the other two cases. All three of these initiatives model innovative housing solutions that highlight the potential for other developers and state agencies.

Data Collection

Data collection involved site visits, interviews, document review, and collecting website information. Green building includes a wide variety of stakeholders and
participants due to its holistic approach to building design and construction. At each site, I spoke with a broad array of people, visited the projects, met with key participants in person, and collected relevant documents regarding the design and construction process. A semi-structured interview guided the interview and provided a systemization that helped to support comparing data from each site (See Appendix A). Site visits also allowed for informal interviewing, observation, and some photo documentation. For Douglas Meadows and Eastampton, each site visit lasted five days and consisted of face to face interviews, agency visits, and an overall orientation to the area. The people interviewed included architects, developer/owners, key funders, landscape architects, sustainability consultants, a general contractor, and government program coordinators. The interviews were tape recorded and then transcribed to ensure accuracy and full data recovery. For Douglas Meadows, there were eight interviews, two of which were conducted over the phone due to the interviewees’ schedule. For Eastampton, there were nine interviews, three of which were conducted over the phone because the interviewees’ location was far from the site. In the case of the Gold Dust, interviews were conducted over a three-month period of time as schedules allowed. There were six interviews because there was less outside involvement in the design and construction process, two of the six were done over the phone due to location. Through all of these interviews, I gathered stories about the opportunities and challenges each project faced and learned from people with a range of perspectives and experiences.

I also collected documents including pertinent guidelines and policies, funding options, budget statements, project description, meeting minutes, and design charrette papers. These documents on financing, green building elements, and stakeholder
involvement supported the information provided during interviews and add more specific
details. Documents describing the design charrette and stakeholder input explored further
the dimensions of teamwork and partnerships that helped guide these projects. I also
looked at local policies, such as zoning and building codes, that guided urban
development and provided either incentives or barriers to reaching the project’s goals.
Each city and state may have had additional incentives in the form of tax breaks or grants
that have contributed to increased green building practices within its affordable housing
market. I used the documents gathered to analyze further how the interaction between
design and construction teamwork, community involvement, local government policies,
and financial systems made these projects a success.

Analysis

Through the documents, interviews, and observations, I assessed how teamwork,
community involvement, local policies and financing impede or facilitate a project’s
green building goals. With the aid of the scientific software ATLAS-ti, I analyzed the
interviews. Content analysis of the interviews included reducing the information into key
categories, themes, and patterns that helped develop the framework of the case studies
and analysis (Berg 2001). The documents collected were also reviewed in order to further
describe and interpret the potential for and barriers to developing green, affordable
housing. Content analysis offered specific details of each dimension and helped draw
together the intricacies of the green building process. The three dimensions described
above - regulations, financing, and collaboration - guided my analysis of the field notes,
interview notes, and documents. I started by keeping a list of codes as I read through the
interviews, then reviewed each case study and assigned codes to the text. Next, I organized the codes into categories as they fit into the three dimensions. I examined how local and state policies and regulations affected the project’s goals and objectives. I also reviewed the political climate and local political process in order to understand the basis for local regulations and reaction to projects. I looked closely at how the team functioned throughout all phases of design and construction and contributed to the end product. The combination of data collection and analysis techniques offered both a participant’s subjective viewpoint, as well as a less obtrusive and reactive form of assembling information.

Because green building is new and considered risky compared with conventional building, developers are reluctant to incorporate green building strategies into their housing projects. However, states are becoming more conscious of energy concerns and high utility bills, and the commercial sector has spurred a trend in green building over the last two years. This is driving a new set of policies and guidelines – some mandatory and some voluntary. It is also institutionalizing a new framework for development that includes extensive teamwork and community input. The case studies reveal how well these policies and strategies work on the ground. It is important to highlight how each project negotiated the opportunities and barriers in order to help future affordable housing projects find ways to incorporate green building practices and get through the process efficiently. By preserving natural resources, lowering utility and maintenance costs, and providing quality healthy homes, these projects can contribute to both the sustainability and stability of communities.
Douglas Meadows: Portland Leads the Country in Affordable, Green Housing

Douglas Meadows was built in Portland, Oregon, the largest city in Oregon (with over 500,000 people) and often touted as one of the most progressive and livable cities in the country. In a 2000 survey by Money Magazine, Portland was voted as the best city to live in the United States (Money Magazine 2002). Portland has been a city with visionary leaders, creating new laws around land use and establishing strong government agencies to oversee community development and environmental stewardship. In 1978, voters approved the first-ever regional government, called Metro, to oversee regional land use planning and services (Metro website). Metro, popularly known as Tri-Met, is a directly-elected government that serves more than 1.3 million residents in Clackamas, Multnomah and Washington counties, and their respective 24 cities. Alongside the establishment of the regional approach to government, Metro’s predecessor established the concept of the Urban Growth Boundary, which was subsequently adopted in 1979. Required by state law, the Urban Growth Boundary (UBG) designates areas where development is supported through city services and infrastructure in order to preserve open space and agricultural land outside the boundary. Because of these and other initiatives, Portland has become a leading example of how to foster livability, economic vitality, and environmental sustainability.

The Douglas Meadows case study explores how the progressive nature of Portland has created an environment that encourages organizations and groups to go beyond the norm and apply new ideas to foster sustainability. The case study highlights...
the combination of factors that contributed to the development as a model for green building. First, a strong culture and depth of experience around sustainable development and green building permeates the city. Second, green funding requirements, initiated by the Portland Development Commission (PDC) and the city’s Office of Sustainable Development, have forced affordable housing developers to incorporate low-cost and no-cost measures for all projects. Lastly, the developer’s enthusiasm for demonstrating a high level of green building practices in an affordable housing project was instrumental in negotiating the financial and regulatory hurdles that presented themselves.

As becomes clear in the description below, building Douglas Meadows was a long process spanning four years - beginning with land acquisition, then putting together a complicated financial package, and finally negotiating and managing the construction. Through the tenacity and commitment of the developer and the entire development team, the project was able to ride through the challenges and uncertainties, which routinely arise during pre-development and construction, and finally arrive at an end product that is a showcase for all of green housing development. In fact, Douglas Meadows was featured during Portland’s annual Green Homes Tour in the fall of 2003. A determining factor in the success of Douglas Meadows was establishing their vision for sustainability, using the recent architectural exhibition “Ten Shades of Green” as their basis for goal setting (See Appendix C for full description of the exhibit). The ten areas of concern identified as necessary for a fully green building included: “low-energy/high performance; replenishable sources; recycling; embodied energy; long life, loose fit; total life cycle costing; embedded in place; access and urban context; and community and connection” (Architectural League of New York). By setting goals early to address the above issues
and staying on target, Douglas Meadows has become a leading example of the marriage of affordability and sustainability.

**Key Partners**

Douglas Meadows brought together a wide array of individuals and groups to build the town homes. The people interviewed for this study represent a spectrum of the development team and the project’s funders. These people included the owner/developer, the architect, the general contractor, the landscape architect, a municipal funder and consultant, a state funder, a city green consultant, and a non-profit sustainability advocate. Dorene Warner was the primary developer from Human Solutions, a non-profit affordable housing provider, where she works as the Director of Housing. Dorene was responsible for leading and facilitating the development team towards the sustainability mission set forth in the beginning. While she was new to green building, she learned a lot through her initial contact with Rosemarie Cordello, the director of a small non-profit called Sustainable Communities Northwest (SCNW). After learning more about the merits of building sustainability, Dorene became committed to fulfill the vision for Douglas Meadows. Rosemarie initiated the idea of building an affordable, green housing development and worked closely with Dorene until SCNW closed its doors. She was a strong advocate for applying the new innovative ideas emerging in the late 1990s around green building to the affordable housing arena, and helped lay some important groundwork in city policies that eventually supported the development of Douglas Meadows.
Linda Barnes is a principal architect for Robertson, Merryman, and Barnes, a women-owned architecture firm, and she has extensive experience in designing quality, affordable housing. She is also a leader in designing solar homes and helps to coordinate the solar homes tour in Portland. Larry Didway works for Seabold Construction, a large general contracting company that has experience in both affordable housing and green construction. Michael Prothe was the construction coordinator assigned by the Portland Development Commission (PDC), a municipal affordable housing funder, to oversee the design and construction aspects of Douglas Meadows. He helped write the green guidelines that affordable housing projects must meet for PDC funding, and he is excited about getting green building concepts out to a broader audience. Mike O’Brien, is the Green Building Specialist at the city’s Office of Sustainable Development, and he worked as a technical assistant for the integration of green building during the preliminary stages of design for Douglas Meadows. He is a regionally recognized authority on energy-efficiency and indoor air quality. Kathleen Baughman is a landscape architect for Gretchen Vadnais and participated in the development team meetings from the beginning. She was knowledgeable on green building concepts and was thoughtful regarding land use planning issues, sustainability, and community development. Betty Dominguez is a program officer for the Oregon Housing and Community Services. She was fast paced and quick to point out the successes around Portland for redevelopment and affordable housing. She described projects that integrated mixed income, commercial use, and density to demonstrate how housing can revitalize areas. Her interest in innovation and entrepreneurship, obviously connected with her past banking experience, permeated the traditional government approach to
funding. Below is a flow chart that diagrams the various partners involved in Douglas Meadows.

**Figure 1 - Douglas Meadows Project Partners**
Douglas Meadows

Human Solutions is a non-profit that helps families gain self-sufficiency by providing affordable housing, skill development, and family support services. Human Solutions incorporates a focus on long-term affordability, respect for community, and place-specific design in their projects. Douglas Meadows serves larger families that are at or below 50% of the Area Median Income (AMI), and many of the families are Russian or Hispanic. Since initiating their housing development program in 1994, Human Solutions has rehabilitated or constructed 293 units of affordable housing using Low Income Housing Tax Credit financing and HUD’s Low Income Housing Preservation Program. Human Solutions made a 60-year commitment to affordability with their funders, made possible through their application of durable and technical solutions in the design and construction of the housing.

Douglas Meadows is a multi-family residential development with a total of eight units in Southeast Portland, Oregon. This area is on the outskirts of the city, but close to public transportation and considered infill since it is within the city limits. Initiated in 1999, the project grew out of a partnership between Human Solutions and Sustainable Communities Northwest, and construction began in September 2002. The mission of Sustainable Communities Northwest was to work with other community development corporations (CDC) to build or rehabilitate affordable housing using green building techniques. After identifying Human Solutions as an interested CDC willing to apply green building concepts to a new construction project, both groups worked together to bring the vision to fruition. Through its early work with Sustainable Communities Northwest, Human Solutions developed its commitment for green housing and its desire
to go above and beyond the established requirements. Following the initial project
delineation and early planning, however, Sustainable Communities Northwest closed its
doors due to lack of funding.

**The Green Features of Douglas Meadows**

The holistic approach to the design and construction of Douglas Meadows has enabled the project to integrate an incredible number of green features. The buildings are high efficiency and utilize passive solar design, along with hydronic gas heating systems, air tight building shells, and high performance windows to help reduce the cost of heating. The buildings also include higher insulation values, efficient gas appliances, and electric and water conservation fixtures, which further reduce each family’s utility bills. The development team paid attention to materials with low levels of Volatile Organic Compounds (VOC) and their application in order to ensure a healthy indoor air environment by using concrete flooring, low-VOC paint, and other interior materials that were selected for their low off-gassing characteristics. Materials were also evaluated to determine their recycled content and waste reduction attributes. For example, the buildings used 25 percent fly ash content in the concrete, recycled paint⁴, recycled content gypsum board, recycled content playground materials, carpets made with recycled plastic pop bottles (P.E.T.), along with using salvaged lumber, employing a waste management plan on site, and offering a recycling and a composting center on site for residents.

---

⁴ Recycled paint is left over paint that is dropped off at one of the two city transfer stations, and then it is cleaned and filtered by Metro’s Solid Waste Agency. Both contractors and individual consumers use this service in Portland.
The sustainable aspects reached beyond the actual buildings and their materials to encapsulate the wider community, landscaping, and access to service amenities.

Specifically, Douglas Meadows is an infill development built on 1/3 acre of land with a density of one unit per 2000 square feet. It is close to the bus stop and within walking distance of the Human Solutions' office as well as commercial services and employment centers. The developer believed that the development should be embedded in place and created homes that closely resemble the Craftsman style architecture, a predominant style in Portland, and landscaping that emphasized permaculture and habitat restoration.

The developers also focused on creating a sense of community for the residents through deliberate design of the outdoor spaces. The common area is found in the central area and has beautiful trellises, benches, and a children's play area. There are also raised bed gardens and edible plants throughout the site. Several native, mature trees were protected during construction and landscaping focused on native plant species to help restore the natural ecosystems and offer a pocket of wildlife habitat. The designers also worked to reduce impervious surfaces and deal with storm water runoff on site through landscaped bioswales.

Photo 1 - This path leads back to the compost bins. This corner of the property is the wild area native plantings were put in after this picture was taken.
It was the comprehensive design of Douglas Meadows - incorporating energy-efficiency, location, landscaping, building materials, innovative technologies, and indoor air quality together - make it a green demonstration project. The overall cost was estimated at $919,607 ($114,950 per unit). As discussed in the following sections, the thoughtful design and construction of Douglas Meadows was made possible through the leadership and initiative of Human Solutions. It also involved negotiating and understanding the regulations that would affect the project, the finances and funding sources necessary to stay on budget, and the process of working collaboratively to reach the predetermined green goals.

**Regulations Shape Affordable, Green Housing**

Government agencies have tremendous influence in how affordable housing gets developed, and in terms of sustainability this has both positive and negative outcomes. While federal government in the broad arena of affordable housing has an incredible
capacity to influence policies, states and municipalities are also proving that they can play a enormous role in defining specific requirements and regulations that set the course for development in their region. Municipalities perform a key role in shaping their community’s vitality and sense of place through providing zoning codes, ordinances, and regulations that guide urban development. The municipal government can also define its own specific requirements for its grants and loans to the projects looking for support. This section illustrates that cities have a variety of methods for influencing the construction of affordable housing, such as applying progressive zoning codes or developing rigorous funding requirements.

Portland is, in fact, the first and only city in the United States to tailor the U.S. Green Building Council’s LEED (Leadership in Energy and Environmental Design) guidelines to local building and development requirements and also exceed the national LEED standards⁵ (G-Rated website). Portland’s Office of Sustainable Development and its Green Building Initiative were established in 2000 by a mandate from the city council in order to research and promote environmental, social, and economic health in the city. G-Rated is focused specifically on promoting resource-efficient, healthy building practices. The Office of Sustainable Development worked closely with the Portland Development Commission (PDC) to establish appropriate requirements for the Request For Proposal (RFP) process and initiate a movement to create more green housing. In fact, PDC is interested in becoming the leading development agency in the nation on

---

⁵ LEED is a voluntary, consensus-based national standard for developing high-performance, sustainable buildings. LEED recognizes achievements and promotes expertise in green building through a comprehensive system offering project certification, professional accreditation, training and practical resources.
green building by influencing the affordable housing process and urban renewal activities (Portland Development Commission website).

Zoning and regulations play an important function in urban planning and often dictate the shape and mold of development. For the most part, Portland’s regulations have had a positive influence in terms of sustainability, through higher density, an emphasis on public transportation, attention to building design standards, and the urban growth boundary. Yet, the nature of regulations is to put limits and controls on what developers can do, which means that the city must find ways to be flexible with developers who are interested in building sustainably and implementing innovative ideas and technologies. There are instances where developers are given some flexibility in meeting city regulations, thus allowing for creative solutions that could prove to be a model for future developments. Giving variances is a method the city established in order to grant flexibility in their codes and requirements. In this case, a parking variance offered Human Solutions the opportunity to demonstrate the ability to design an ideal site in which cars use on-street parking, and the site has common space and beautiful landscaping. Human Solutions was able to get a variance to reduce on-site parking, and project participants regarded the flexibility of the city in accommodating this need as a step in the right direction.

Parking requirements are one area in city zoning and ordinances that have a huge impact in the outcome of a project. Portland supports density and actually requires higher density when the site is located near public transportation; however, this higher density conflicts with the city’s requirements for sufficient on-site parking. Parking was an issue repeatedly mentioned in interviews as an obstacle that required a variance, thus a
municipality that recognizes the need to be flexible is important so that the development team can work towards their sustainability goals knowing that the variance process will not hold them up. Mike O’Brien from the city’s Office of Sustainable Development said, “The bugger now is parking. Neighbors now typically don’t want people parking on the street.” However, on-site parking would have limited the ability for Douglas Meadows to meet all of the green goals set by the development team. Dorene Warner explained the conflict between parking spots and some of their sustainability goals, “We wanted the wildlife area, we wanted open space, we knew we were cutting back on cars, as it is we have an easement from the credit union where the strawbale trash and recycling shelter is. We needed to get an adjustment for the four parking spaces.” When asked about the current ordinances and regulations that control housing development, Rosemarie Cordello responded:

One of the things that we were able to finally overcome was the parking regulation. We had far less parking then was provided by the zoning. We are finally at a point with green building in Portland where if you can show them a really good project, they are willing to make exceptions. I am not sure that those ordinances helped us, but the fact that they were willing to be flexible on it was a real sign that green building is making headway here.

Finally, Douglas Meadows had relatively few regulation issues partly due to the fact that the lot was already zoned for a dense development, and the storm water regulations require that runoff be managed through bioswales, and city staff were open to new ideas. People I interviewed often cited the value of flexibility. For instance, Larry Didway said,

---

6 Bioswales are open channels possessing a dense cover of grasses and other herbaceous plants through which runoff is directed during storm events.
“We have not really had a great deal of conflict where we have wanted to use a green or sustainable product that is just outright denied by the city.”

Despite this generally positive picture, there have also been some conflicts between counties that hinder building sustainably. One evident disparity between counties is radically different approaches to regulation. One designer explained that many developers she worked with preferred not to develop in the city of Portland because the added regulations made it more difficult and therefore added more expense. However, this can lead to development that precedes the necessary infrastructure in the outlying counties and sprawl, which consequently adds an extra expense to the burgeoning county. A more concrete example of such conflict is demonstrated through the city of Tigard’s stringent tree code, which states a preference for the protection of trees over the removal of trees when a developer applies for subdivision or site development. The developer must provide a tree plan and the regulation specifically states:

A tree plan provided for the planting, removal, and protection of trees prepared by a certified arborist shall be provided by any lot or parcel, or combination of lots or parcels for which a development application…is filed. Protection over removal is preferred wherever possible. (Tigard Tree Ordinance, Chapter 18.790)

Kathleen explained the ramifications of this code, “If it looks like there is going to be a property that looks like it is going to be annexed into Tigard, the guy will go cut down all its trees before it gets annexed into Tigard.” In short, codes would be more effective if they were applied regionally in order to enforce a broader vision for sustainability.

Municipal departments can also tend to have a narrow, rather than holistic, view regarding the role of regulations. The city’s Forestry Department will demand a certain number of trees along the curbside disregarding the need for curb cuts and bus shelters.
Michael Prothe of PDC provided an example of one case where three departments were demanding compliance with mass transit, transportation, and forestry regulations and none were willing to bend. He described this conflict:

> We had another project that the city forester insisted on so many trees by the parking for green way but then the transit department put a new shelter where one tree was supposed to be and then the tech transportation required a curb cut at another location where another tree was required so there was no longer any stretch of parking available for a tree.

In a case for a historic preservation project, the agent responsible for the state historic tax credits refused to allow energy efficient, operable windows to be installed in a senior housing project in order to maintain the integrity of the historic nature of the building. While it is important to recognize the tactile, historic content of details, such as windows, a preservation project must also balance historic value with energy efficiency and long-term affordability. This kind of difference in goals often loses sight of the ultimate purpose of rehabilitation and affordable housing. In the end, the seniors living in the historic part of the building paid $80 more a month for heating during the winter.

Regulations also become entangled in complexities that should require site-by-site evaluation, but instead they are enforced across the board. For Douglas Meadows, there was a strict requirement that forced the development team to comply with a city standard for tree planting that did not fit the needs of the site. Since this was a residential site, there was a requirement that trees be planted around the entire perimeter to provide a buffer and privacy. However, on the north side of the property the buildings were really close to the fence. There was not a lot of space for planting full sized trees. Kathleen Baughman, the landscape architect, had originally planned on planting a vine maple, which the city considered too small to provide the appropriate buffer. Instead larger trees
were planted to satisfy the city regulations, and Kathleen pointed out these trees could potentially interfere with the sewer lines below as the roots establish themselves. Furthermore, narrower sidewalks could have reduced the impervious surfaces on the small site, but the city was inflexible on this code issue, refusing to consider the limited use of the sidewalks. Rigid codes often leave little room to address specific concerns and end up enforcing requirements that are inappropriate for the site.

Non-profit community development corporations (CDCs) can also play a significant role in influencing regulations and future city planning through their strong vision and values. Douglas Meadows went above and beyond the PDC’s required green criteria thresholds, creating a true demonstration project to point towards when discussing green development and affordability. From this project and others, the Office of Sustainable Development and PDC are revising their criteria based on the lessons learned. For instance, Douglas Meadows is testing a new rain gutter system that if it is successful could help get the city to change its regulations and allow for this alternative way for directing storm water runoff. Michael acknowledged the need to try new technologies, “There is a learning curve in almost all of this type of new venture - sustainable design - that we are trying. For Human Solutions to dare to go to that level is very rewarding.” Through the development of Douglas Meadows, Human Solutions now finds itself committed to green building and has established important partnerships and networks that will help continue to make green housing projects a reality. The organization has gained credibility and knowledge, which helps in both securing funding as well as getting variances. Douglas Meadows was given a parking variance without much hassle because they had proven themselves in a previous project. Future affordable
housing projects in sustainability rely on getting through a fast approval process. Through the advocacy and good example of cutting edge non-profits, some people believe that future city regulations could give priority to projects that demonstrate a commitment to sustainability and streamline the plan review.

**Combining Multiple Funding Sources**

In general, the construction of affordable housing is subject to complex financing systems, and the additional sustainability component only further contributes to the layers of complexity. Douglas Meadows required a large number of funding sources including Low Income Housing Tax Credits (LIHTC), small loans, low-interest loans, energy tax credits, and small grants and donations. Many people I interviewed talked about the financing of Douglas Meadows as the hardest aspect of the project due to the long process, bureaucracy, higher upfront costs, and number of funding sources. Dorene explained how the financing came together for Douglas Meadows:

> It is almost like playing chess with yourself. I was trying to explain this to a board member who knows the construction industry inside out, but has no idea what I do. You have to begin at the beginning with the bare land…and see what are the elements that you have to add to get to the finished product… I don't think I have ever done less than 6 or 7 funding sources.

The pre-development stage posed a number of tenuous and challenging components to financing the project. In order to begin the process of developing an affordable housing project, the non-profit developer needs to find and acquire a piece of land, which in Portland is becoming more and more difficult. When Human Solutions found the land they felt would be ideal for the Douglas Meadows project, they had to secure funding to purchase the lot prior to knowing whether they would be approved for the necessary funding to construct housing. Human Solutions was fortunate in that the
organization selling the land was extremely interested in seeing the project succeed.

Rosemarie described the process in this way:

Granted it was somewhat arduous buying the land, we had a very nice seller. The problem is we had to make our purchase contingent on funding. And so we had to keep rolling back our contract with our seller because we didn't have the funding secured. All of that was pretty painful.

Human Solutions secured a pre-development loan through Enterprise Foundation, a nonprofit organization that works with network members to provide affordable housing throughout the U.S. The loan enabled Human Solutions to purchase the land and have some extra money for pulling the preliminary plans together in order to apply for more funding.

While working to secure the land, Human Solutions was also pulling together a development team to begin the initial drawings of Douglas Meadows. They were worried because they were asking the architects to do a lot of work without actually having the funding in place. The irony is that in order to get funded, Human Solutions needed to have a lot of the architectural work completed, but they did not know whether they were going to get the money. In fact, they had to go through several funding cycles with PDC and the state’s Housing and Community Services Office before they were awarded funding. Rosemarie described the process of securing major funding pieces as onerous,

It's a big formal application process...and very competitive, competing with all the other projects in the city of Portland. We actually did not get funded the first time, I forgot the ridiculous reason they came up with the first time ... I think they were kind of nervous about this kind of project.

She explained that they had to go through several funding cycles until they finally got funding through PDC. This helped secure the second source of funding through the
Once the major funding sources have been secured, Douglas Meadows was still short by $50,000, and so Dorene had to continue to search for small grants and donations to make up the difference. Dorene said, “We had a huge number of delays between getting the initial design done and getting the financing in place.”

At the end of the day, it was the non-profit developer, Human Solutions, who managed the budget and found funding for the additional costs due to the green features. The state’s gap financing and the city’s grant for green technology did not cover all the extra expenses. But Human Solutions remained firm and tenacious in their commitment to build sustainably, and pursued additional funding to cover the higher budget. After securing the major funding, Human Solutions continued searching for money through local banks, grants for green building, and small donations in order to fill the remaining gap in the project budget. Dorene’s commitment to building sustainably and her experience with pulling together funding for affordable housing projects was instrumental in successfully funding the project and juggling the funding sources. To navigate this funding complexity, it required extra time, strong relationships with the potential funders, and an ability to manage a complicated budget with additional costs.

---

7 The LIHTC program is a primary source of funding for low-income housing in the U.S. It was established as part of the Tax Reform Act of 1986 and offers tax credits to developers to invest in the creation of low-income housing. As a tax program, the IRS is the federal agency primarily responsible for administering it.
Funding Agencies Can Shape the Project’s Goals

Government not only regulates, but also impresses their influence through control of funding streams. Affordable housing projects are dependent on funding through federal, state, and municipal levels in the form of tax credits, grants, and low-interest loans. Funding sources have the authority then to demand that each developer meet the agency’s designated requirements in order to qualify for project funding. The Portland Development Commission (PDC) created by voters as a special purpose government in 1957 has used its financial power to influence the development of affordable housing and assigned specific green building requirements to their Request For Proposal (RFP) process. PDC has a broad mission that includes creating sustainable communities with an emphasis on neighborhoods, the urban core, and quality jobs for all people in Portland. While PDC provides only one source of funding for a project, the Portland Development Commission’s decision to give funding often dictates whether other agencies or banks will approve funding. This is important because often the local governance’s support is necessary to leverage support from state and federal funding sources. Dorene Warner, the developer, explained that state and federal funders look for local support before they will allocate funding. She said:

It depends on your locale, but by in large whenever you are going for tax credit funding or any other level, state or federal funding. Most of those funders say - does the local jurisdiction support your project and “an at a boy letter” (a support letter) does not get you there, you have to have a commitment of some kind of local dollars.

Mike O’Brien also explained:

If PDC gives a project approval and plus some funding, then it is much easier to go out in the world and get other funding. Quite a few projects go through that process every year [the RFP process]...The PDC started requiring the applicants
to incorporate those [green] measures and if they were not going to incorporate them explain why not.

While a lot of the affordable housing money is distributed through federal programs, such as HUD and HOME funding, local governments are given a designated amount to dispense as they see fit. In this case, the city of Portland has set a clear agenda to influence development and planning towards a more sustainable model.

PDC and the Office of Sustainable Development established green guidelines that outlined 33 criteria for the environmental performance, tenant health, and long-term durability of affordable housing. All affordable housing developers applying for PDC funding must show they are making an effort to incorporate these criteria into the design and construction of the housing in order to be considered for funding. Douglas Meadows was subject to these guidelines when Human Solutions applied for funding. The green guidelines are considered cost effective options that will move affordable housing above and beyond the city's current codes and standards (Green-Rated). A lot of time and energy was put into developing the green policy guidelines in order to establish appropriate measures to require. Rosemarie commented, "It would have been much harder to do Douglas Meadows without the policy pieces in place. So we were able to get those pieces in place and then use those policies to develop projects." In order to make these ideas more accessible and understood, both PDC and the Office of Sustainable Development offer technical assistance to developers. In fact, PDC assigns an architect to oversee each project through design and construction and to ensure that these criteria are being met.

State and municipal offices gave the primary funding for Douglas Meadows. In the end, the support from PDC and the Oregon Housing and Community Services was
instrumental. They recognized the importance of green building and worked together to prioritize projects that demonstrated a commitment to building energy efficient, healthy buildings. These agencies’ support can be divided into three areas: funding both with gap financing and a small grant, technical assistance, and influence in regulations and small donations. Michael Prothe, who was assigned by PDC to oversee Douglas Meadows, was also a key participant in the development of the green guidelines for affordable housing.

Michael’s influence and interest in green building played a role in pushing innovative solutions for Douglas Meadows. He became a member of the development team for Douglas Meadows, and he worked with the team to solve design problems and find ways to relieve the cost burden of certain materials. Michael had considerable influence with other city offices and commercial distributors of construction materials; therefore, he was able to push for certain green features in the project. Since many of the affordable housing developers in Portland are non-profits, Michael negotiated with some businesses to get a price reduction for materials, such as low-VOC paints. The companies then received a tax deduction for their contribution, which helped offset the cost. Michael also had influence within other city departments and was able to ask for necessary variances. In one case, Michael approached the city to get permission to use a new rain handler system instead of the traditional gutter system. Larry Didway of Seabold Construction said:

He was able to approach the city plumbing department and get permission to allow this rain handler system to be used for the first time in Portland on multi-family housing... because of his stature at PDC and his stature as an architect - he was able to act as a liaison and go straight to the city and say, 'how about letting us try this, we really want to try this.'
There was an interesting dynamic to note in terms of this funder collaboration. At times the funder can sit in a development team meeting and participate as collaborator, but other times the funder has final say. All members acknowledged that the rain handler system was an idea that came from the PDC architect, and that there were development team members who expressed doubt as to whether this system would function properly. The development team acquiesced because Michael was persistent that it was an appropriate solution. Dorene said,

The only particular detail we had some issues on is that rain handler substitute system. That is not something that the storm water folks had approved, the Bureau of Environment Services had not approved it as a system. The manufacturer wanted to do this and through Michael Prothe at PDC they said we will provide the material at cost.

Kathleen commented on the addition of the rain handler system, “then we are starting a pre-construction meeting, and Michael Prothe mentioned the rain handler system. And everybody is saying, ‘Hmm I wonder if that really works, I don't know.’” There is not a final verdict yet on the success of the rain handler system.

Managing the Budget

Because funding was uncertain and required asking multiple sources repeatedly, Dorene needed to be a leading force behind fundraising. Funding for Douglas Meadows involved sifting through bureaucratic requirements and filling out loads of paperwork. Funders and others acknowledged that it is quite normal for a developer to apply two or three times before getting approval for funding. While this may allow funders to work with developers to hone their application, each funding source must be rewritten and often funders have conflicting priorities. Kathleen gave an example of this inconsistency:
Every time we turned around there was another grant application, and each grant source had different requirements or different low-income housing things that exactly contradict somebody else's code for a whole lot of stuff, like outdoor storage - had to be a certain size and somebody else said it couldn't be that big.

Larry Didway, the contractor at Seabold, pointed out that often times with the smaller projects the extra paperwork tends to increase the cost of the development, which would otherwise be absorbed in larger projects. Finally, PDC’s tax increment financing, which is a large source of funding for affordable housing in the city, changes its focus each year to prioritize promoting homeownership one year, and the next year shift to special needs, such as homeless populations, seniors, or people with disabilities. PDC hopes to help solve all housing needs by focusing on different needs each year. However, by shifting priorities from year to year, a developer risks losing funding if the project does not fall into the appropriate category. Considering that the fundraising process can take a year or more, this leaves the developer vulnerable to the city’s changing priorities.

The Oregon State Energy Tax Credit was an added challenge for Human Solutions. As non-profit developers, they were not able to apply for the residential program, which would have given Human Solutions $3500 per unit if they complied with the requirements. As an alternative, they were forced to apply for business tax credits, and the amount of credit ended up much lower. If they had access to the residential tax credit program, they calculated an additional $35,000 for energy upgrades. But they could only ask for $6000 in credits since Human Solutions had to apply to the business tax credit program. Furthermore, Human Solutions had difficulty finding an investor for the tax credits. Dorene described the program’s policy conflict with the state’s energy tax credit program: “We fell through cracks...because I am collecting rent on these units, I am a business so I have to go through the state's business energy tax credits, which is
one of the more frustrating experiences of this whole project.” Despite the loss in tax
credits, Douglas Meadows still was built with a high standard of efficiency and
incorporated cutting edge technologies, including hydronic gas heating system and
passive solar design.

In the end, there were not enough financial incentives for building green housing;
therefore, Human Solutions balanced the upfront costs with the long-term benefits and
kept the overall costs down. The development team incorporated low-cost/no-cost
concepts into their design and construction of Douglas Meadows. For example, they
designed the roof eaves to overhang the exterior walls and protect the walls from
excessive wear and tear. These options are suggested in the G-Rated green building
guidelines and are an excellent tool for implementing ideas that balance the cost versus
the benefit. In addition, Human Solutions worked closely with the general contractor,
Seabold Construction, and initiated their partnership through a negotiated fee for the
contract. This negotiated fee contract enabled Human Solutions and Seabold to work on
budget management and find the best options for staying within the budget while
maintaining the green goals. Human Solutions, through the uncertainty of funding,
budget shortfalls, and increased costs, upheld their long-term vision for Douglas
Meadows. This vision, which included putting together a holistic design team, utilizing
green building techniques, and creating a model housing project, was grounded in the
understanding that the upfront costs are paid over the long-term through lower utility bills
and lower maintenance needs.
Collaboration Helps Build a Successful Project

The collaborative aspect of Douglas Meadows was discussed with each interviewee. While Dorene was the final decision maker, many development team members commented that the collaborative nature of the process was the greatest strength of the project. For instance, when asked what contributed most to the project’s success of the project, Kathleen Baughman said, “The design team. I would say the collaboration, and I would say I think that there was a lot of personal investment in the project.” Consistently people discussed the collaboration and the commitment of people working as a team and working to make Douglas Meadows succeed. Larry Didway said, “They [Dorene and Michael] kept giving us these milestones, and then I worked with the architect back and forth suggesting products, and she would suggest different ways of doing things. It’s just a collaborative effort.” Similarly, when asked what went well, Mike O’Brien answered, “It took a lot of integrated design, a lot of collaboration between the designer, the CDC, and the contractors to work it all, to figure out how to do it without going over the budget.”

In many ways, Douglas Meadows was built through a truly collaborative process; the development team was committed to meeting regularly, allowing different opinions, and seeing the project through to the end. It was clear that the team members respected one another and recognized the strength to the diversity of experience within the group. Michael Prothe was very enthusiastic about the collaboration and commented, “That creativity needs to be allowed to flow, but we need to share in our creativity as a team. Where our ideas are from, where we each come from, we each have our different strengths, we each have our different weaknesses.” While Dorene relied on each team
member to participate fully in the collaborative process, ultimately she was responsible and made the final decisions. There were four factors that contributed to the successful collaboration, which included strong partnerships, early planning, understood culture, and team cohesion, as discussed.

**Strong Partnerships Make Collaboration Easier**

Strong partnerships and previous working relationships among the team members were key factors in determining the success of the collaborative process. Initially, Sustainable Communities Northwest (SCNW) essentially sought out partnerships to initiate a community wide vision for sustainable, affordable housing. As SCNW and Human Solutions met to discuss the application of green building techniques for affordable housing, a strong partnership evolved and led to the development of their combined vision statement. Together these two organizations created the development team through their personal connections and previous partnerships. Rosemarie of SCNW had worked with both the architect and the contractor, and she knew that the architect’s work was ideal for the goals of Douglas Meadows.

In the same way, partnerships with funders were important for seeking funding, going through the approval process, and meeting green standards. The strong relationship Human Solutions had with some local banks facilitated the realization of small low-interest gap loans because the banks were willing to take a chance on a known entity and previous customer. Betty Dominguez from Housing and Community Services explained that she knew Human Solutions and was interested in helping them figure out how to develop Douglas Meadows. She said, “Human Solutions is probably the only
housing provider we serve in East Multnomah County. They have been around for a long time, and we have funded a number of projects over the years.” Additionally, her state agency requires that each project go through an architectural review. When the agency knows the architect or contractor hired, the outcome is more likely to be successful because the architects/contractors know what the city and state expect from them. Similarly, since PDC has set green building standards for affordable housing, there has been a long dialogue between PDC and contractors. Therefore, the contractors who have been building a high volume of affordable housing really understand the requirements and the objectives of the city’s green building program.

**Early Planning: Vision and Goals for the Project**

Early planning and goal setting is crucial to laying the groundwork for a successful green housing project. Douglas Meadows started from the beginning as a green project, with a vision statement that guided that development team throughout the design and construction process and ensured that no one lost sight of the final goal. Their approach was holistic in design and process, and all the development team members were engaged early in the process with an understanding that Human Solutions really wanted to push the envelope.

The early planning process included a diverse array of participants including a green building specialist from Green-Rated, the PDC construction coordinator, the architects, a landscape architect, the non-profit developer, the general contractor, and the director of SCNW. All the people interviewed remarked on the frequency of meetings and the importance of working together to solve problems. For example Kathleen said, “I
don't know what our meeting budget was but that cost was more then I have ever met than on any other project. We were probably sick of each other we met so much. But, that helped the project. It helped everybody know what was going on.” There was a strong belief that the early meetings helped shape an effective design and get each person on the same page. The meetings were also important for problem solving and dealing with issues as they arose. Rosemarie felt these meetings were important and said, “There was an excellent process of meeting and dealing with obstacles as they came up quickly because we had this team formed.” Larry emphasized the importance of including the general contractor in the early meetings. He explained, “We always tout to the owners and the developers that they should get the general contractors on board early and get that collaborative effort; and they will get more value that way than they will be by doing a hard ball bid.”

*Understanding the Mission*

In order for the planning process to really be effective, the team needs to believe in working together to create long-term strategies. This process takes extra time. Douglas Meadows in particular took extra time and dedication due to financial constraints and the exceptional level of commitment to sustainability. Mike explained that, “It had a long gestation. I mean, I don't know if everyone was all happy about that actually, but it gave it a lot of time to go through the thought process.”

This commitment to the collaborative design process was especially important because building for sustainability means thinking about long-term costs versus short-term, upfront costs (RMI 1998). The funding entities required that Douglas Meadows
remain affordable for 60 years, which means if the developer uses cheap materials in the beginning then they end up paying more to rehabilitate in five years when those materials wear out or need maintenance. Human Solutions made it clear that they were invested in the long haul and wanted to think about costs in terms of how it would pay off 30, 40, and 50 years after it was built. These concerns had to be balanced with the reality that the extra costs could not exceed 5 to 10 percent of the overall budget.

By including Seabold in the early planning process, Human Solutions helped build a sense of culture and common interest. Traditionally, general contractors and sub-contractors are often labeled as operating within a different culture than the sustainability consultants and architects; however, development team members gave Seabold credit for their dedication and desire to work towards a common goal. In fact, Rosemarie said, “Having a strong contractor who was motivated definitely made a big difference in Douglas Meadows as well.”

**Team Cohesion**

When people discussed the collaborative process for Douglas Meadows, there was an undeniable consensus that the development team had an incredible amount of cohesion in delivering a green project. This cohesion has been described in terms of commitment to the mission, an understanding of green building principles, and a personal investment in seeing the project succeed. Each team member felt that people made financial sacrifices to ensure that Douglas Meadows was built and met standards set during the initial visioning process. Members donated extra time, money, and materials to Douglas Meadows. Michael remarked on Seabold’s interest and generosity,
Seabold also donated some materials and labor because they wanted to really make this project happen as green, sustainable as they could. To see where the problems might lie for the future and where they can improve. So, they really had their heart in this.

When asked about the factors that led to the success of the project, Larry said immediately, “A higher commitment from the owner and the lender.” Linda Barnes also said, “I would say the team,” and Michael responded, “Team collaboration.”

Many interviewees also praised the dedication of Dorene and Human Solutions to see the project through. Rosemarie said of Dorene, “She is amazing, very conscientious and her heart was in this for sure, I don't think it would have happened otherwise.” Dorene also stated that she wanted to make sure the project succeeded, and Human Solutions’ donation of $26,000 from their developer fee is proof of the organization’s dedication. Dorene said, “through the hard times that we were going through financially - I was just going to keep this sucker alive if it killed me.” The strong commitment and vision of team members were driving forces behind the collaborative process, which never wavered.

**Douglas Meadows Guides Future Projects**

As should be apparent from the above discussions, Douglas Meadows has emerged as a leading demonstration housing development for Portland. Human Solutions created a vision for building green housing and followed it through construction while staying on budget and, once over the financial difficulties, on time. Betty Dominguez acknowledged that if one project proves itself, it means that others can succeed as well. The values and mission established through the non-profit developer played a key role in building Douglas Meadows above and beyond the current PDC requirements. A
demonstration project, such as Douglas Meadows, helps show the outdated nature of some current regulations and offers innovative solutions and valuable experience to all people involved. Participants in the Douglas Meadows project shared with me their thoughts on success and on lessons learned for future projects as discussed below.

Lesson Learned

Douglas Meadows can attribute its success to a variety of factors. The funders were supportive, and there was a small amount of money allocated to the green aspects of the project. The team was committed and shared a similar vision for affordable sustainable housing. Dorene remarked, “we just kept slugging away to get it done. And everybody on the development team had that same sense of commitment – the architects, PDC, the contractors - they all were determined it was going to happen.” Rosemarie emphasized the need for a clear, shared vision when asked to give some advice for future projects, “I would say to start with a strong vision statement that is commonly shared by of the participants in the projects that really has to come from a strong cohesive vision that everybody can become invested in.” The team members brought extensive knowledge and experience to the project, which enabled Dorene to evaluate and manage the project budget according to the cost and benefit of certain features and materials. Mike explained the strategic thinking that guided decision-making, “HUD has a standard rent allowance, that if you can prove to them that you are going to save the tenants money on the energy costs, you can get the money back into the rent instead of to the energy. It can be a direct benefit to the developer.”
Participants shared ideas on how to make green building even more successful in the future. Kathleen felt it was important to have good regulations, but it was equally important to provide incentives instead of punitive fines. Kathleen suggested, “If you do a sustainable building, your plan review gets streamlined and you go to the top of the pile, stuff like that is huge in the development world… There should be incentive, if you do this, you will get a tax break.” The other area that was mentioned by a couple people was the location of the project and transportation availability. Interestingly, these people felt that a project could not be sustainable without addressing transportation concerns.

Larry Didway said:

Try to make sure the green building aspects that you are for are really sustainable, really sustainable, and have a reasonable payback expectation. And location is a part of that because what good does it do any of it to spend $20,000 a unit more and build it away from transit so that you are spending all of those savings on transportation - on gas, driving back to town.

This suggests that there is still a fair amount of work that lays ahead for green building in terms of overall regulations and land-use planning. The city needs to find ways to create incentives that encourage green building principles, and the city needs to think about sustainability in the big picture, including the development of strong public transportation and the implementation of denser land use planning.

There is a learning curve that must be overcome if Portland and other cities are going to build more green housing. Through the creation of green housing, people are given opportunities to find new products, learn about cost savings techniques, gain insight during problem solving exercises, and network with contractors knowledgeable in the green building industry. Rosemarie reflected that the first projects set the stage for future projects to follow, “I think the earlier projects are always the harder ones, and then
it gets easier after it’s been done a few times. And, you know the various players and are used to how it’s done.” In fact, Douglas Meadows was a project that required extra time specifically for planning and finding funding; overall, the overall development period was four years from 1999 to 2003, people moved in the spring of 2003. To take the bold step and be the first developer to implement green building strategies requires dedication and a strong understanding of the bigger picture of how housing affects people. Mike O’Brien observed that the affordable housing arena and its developers are particularly sympathetic with green building goals:

And when you go out and talk to this affordable housing community, there are very client centric. They want their clients to have affordable housing, they want it to be durable, they want it to be healthy and safe. They get the connection with the green building stuff. They will get in, roll up their sleeves, not complain, and figure out how to do these things. I am really impressed because they have the biggest budget constraints of all of the developers, and yet they are the ones who are consistently figuring these things out.

Douglas Meadows is breaking ground not only in demonstrating green building techniques and materials, but also connecting the city and the construction industry to the future of green housing by applying for variances, asking companies for non-toxic products, and establishing a knowledge base for the actual design and construction of green housing.
THREE

Eastamptoon Town Center: New Jersey’s Greenfield Pilot Project

Eastampton Town Center is located in New Jersey, a state known for its expansive suburbs, vacation seafronts, and verdant, but less often noted gardens. Because New Jersey is under pressure from population growth, increasing density, and a need for affordable housing, it is actually a leading state in developing innovative programs and policies. New Jersey is the most densely populated state in the country with the highest average number of people per square mile (1,158) (New Jersey Department of Labor 2002). Accordingly, real estate has become a core business for New Jersey. In the 1970s, a crisis of affordable housing led to the “Mt. Laurel decisions”\(^8\) and the subsequent New Jersey Fair Housing Act, which demonstrated the necessity of government intervention in regulating housing in order to ensure that poverty did not become further segregated into blighted inner cities.

The case study for Eastampton Town Center takes a closer look at the factors that helped create a greenfield development that embodies the principles of sustainable development. First, the historic aspect of the “Mt. Laurel decisions” laid a foundation for filling the need for affordable housing in the township. Second, New Jersey’s Pilot Program was instrumental in setting green goals, providing technical assistance, and funding the higher costs of the green development. Lastly, the developers’ leadership and vision were essential for moving the project from a traditional suburban development to a demonstration project for future New Jersey housing projects.

---

\(^8\) The “Mount Laurel decisions” were NJ Supreme Court cases that prohibited townships from creating large lot zoning, thus making it unaffordable for low-income housing development.
The New Jersey Department of Community Affairs (DCA) established an ambitious pilot program in 1998 to test their ability to work with developers to create energy-efficient, green housing that is affordable (NJ Department of Community Affairs). Eastampton Town Center was one of eight pilot projects. Ultimately, the DCA developed the pilot program to help determine how they could incorporate creative strategies into their funding programs for housing, and demonstrate the possibility for raising building standards and transforming the construction industry. While the Pilot Program is managed by DCA’s Housing and Community Resources division (and the newly created Green Homes Office), many state entities played a role including: Public Service Electric and Gas Company (PSE&G is the state’s largest utility), NJ Housing and Mortgage Finance Agency, the NJ Department of Environmental Protection, the Department of Energy, Vermont Energy Investment Corp, and the NJ Commerce and Economic Growth Commission. According to Peggy Huchet, the first program coordinator, the DCA played a key role in establishing the Pilot Program: “It really came out of the upper administration of the department.” The Commissioner of DCA traveled to the Netherlands and was impressed by their conservation oriented-building techniques. Additionally, the Deputy Commissioner, Anthony Cancro, had connections with PSE&G and had also worked for the state’s Department of Energy. The lessons learned from Europe and the connections shared with other agencies and organizations shaped policies that would address energy concerns. The state had a vested interest and concerns with providing energy and controlling pollution in a state that has a growing population, an industrial based economy, and large commuter-based communities. The long-range goal of the program is to “identify approaches to sustainable design, which are reliable and
can be widely replicated by affordable housing developers” (NJ Green Homes Office 2003). The DCA hopes that by facilitating learning in green building and providing supplemental funding, the construction industry will adopt practices that make sense and ultimately save the developer/owner money.

Eastampton Town Center is located in Eastampton township, a former agricultural area about 30 minutes northeast of Phil adelphia. Eastampton Town Center was the only project selected as a greenfield, suburban development in order to demonstrate appropriate methods for developing outside city limits. Eastampton Town Center is a multi-family, townhouse development built on a 25-acre site. There are 100 units of affordable housing available to households earning at or below 50% of the area median income (AMI). Through the development of this affordable housing, Eastampton Township fulfilled its past and current obligation for income-restricted housing required by the state law. A for-profit developer, Pennrose, who recognized the opportunity to participate in New Jersey’s Pilot Program for green, affordable housing, developed Eastampton Town Center. By seizing the chance to secure extra financing and taking calculated risks in applying new technologies and materials, the developer has set themselves apart as a leading proponent of green building that is feasible and economically beneficial.

Photo 4 - Eastampton’s pedestrian oriented layout.
Photo 5  Eastampton Townhouse: The hardiplank siding looks better than vinyl, lasts a long time, and needs little maintenance!

Key Partners

Pennrose is a reputable developer that has been building affordable housing since 1970 throughout the Eastern seaboard. Unlike the other two case studies which have non-profit developers, Pennrose is a for-profit corporation. They have developed over 5,000 units of affordable housing. Their properties are beautiful and well maintained, and their projects have received a long list of awards for good planning, design, and overall excellence.

When Pennrose took over the development of the land at Eastampton, it was then obligated to search for funding, secure the necessary permits and approvals, and design and oversee the construction of the housing. Their first attempt at tax credit funding was denied, and then they decided to apply for the Pilot Program after learning about the opportunity to incorporate green features into their project plans. The impressive feature of Pennrose's application was their willingness to remain open to change. One of the goals of the Pilot Program was: “To encourage site selection, site planning and building
design which minimize the impact on environmental quality and limit emissions of greenhouse gases” (NJ Green Homes Office 2003). Despite having attained full approval from the township for a traditional suburban neighborhood, Pennrose worked diligently with the assigned consultants to resolve site planning issues and reapply for township approval. Through site plan changes and additional green features, the Eastampton Town Center has become a showcase project that all the development team members continue to highlight when discussing the potential to build green, affordable housing.

The interviewees for the case study represent a wide variety of people involved in the development of Eastampton Town Center. They include the developer/owner, the energy specialist, the sustainability consultant, the architect, the landscape architect, the coordinator for the NJ Green Homes Office, the DCA program manager, and the former coordinator of the Pilot Program (See Project Partner Chart on page 60). Below is a synthesis of the different people involved in the development of Eastampton. Tim Henkel was the development officer for the Eastampton Town Center and works for Pennrose. Sitting in an office on the 13th floor that overlooks Philadelphia, Tim spoke from a business standpoint about how Pennrose got involved in green building. As a busy project manager, he is young and calm, responding to the details of projects and overseeing the work on site. Steve Schoch was the principal architect at Kitchen and Associates and is experienced in green building. Darren Port works for DCA and NJ’s Green Homes Office (which was originally the Pilot Program), and he is responsible for ensuring that green features are incorporated into the project. He monitors the budget and the gap funding, keeping an eye on the higher costs of green building. He was thoughtful and flexible, and he did not fit with the typical state bureaucrat. He runs the
program single-handedly, and he builds close relations with team members, keeping them accountable while providing some flexibility in the program’s requirements.

Some of the other interviewees were involved in the beginning of the project as consultants or subcontractors. Jeff Allegretti, president of Pennrose’s service company that oversees property maintenance and repairs, has a lot of experience in energy efficiency and weatherization. He was the primary author of the project application to the Pilot Program. Peggy Huchet has just retired from administering the DCA’s Balanced Housing Program when the Department asked her to help start the Pilot Program, where she served as program coordinator until she retired. Although she had moved out of state, she showed a real interest in the outcome of the program and a willingness to share ideas and lessons learned along the way. Larry Weaner was the landscape architect with extensive experience in ecological landscape design.

Hap Haven works for the Energy Coordinating Agency, a non-profit that coordinates all low-income energy programs in Philadelphia. The agency was contracted to provide education to the residents on the green features of Eastampton. Hap is an ardent supporter of energy-efficiency, policy reform, and addressing energy issues from the standpoint of the most needy. He works primarily in Philadelphia, and he said, “You have to understand that Philadelphia is a million and a half people and a third of them are low-income… We have homeless prevention programs, food programs, renter programs, and we work through neighborhood organizations.” Andrew Shapiro from Vermont Energy Investment Corp (VEIC) was a consultant on the project, who reviewed the list of green features, helped troubleshoot issues with materials, worked on design with the
Figure 2 - The Eastamption Town Center Project Partners
architects, and helped builders implement design details. Brad Harrington was the project’s manager for DCA’s Balanced Housing Program, which allocates state funds for affordable housing projects. He said he followed the project closely because it was a pilot project. During the interview, he was meticulous in reviewing Eastampton’s finances and describing history that led up to the development of the project. He has a planning background and talked about the larger problems of planning in the state, including land-use laws and municipalities’ power of home rule. The general contractors did not respond to the request for an interview; therefore, they are not represented in the case study, although many people interviewed talked about their relationship with the contractors.

**Eastampton Town Center**

The Eastampton Town Center went through a competitive selection process for the Pilot Program. The Pilot Program application required developers to describe how they would meet the green design goals of the program. It established four categories that needed to address sustainability: site and building design, resource conservation, a comprehensive approach to energy and water efficiency, and health and safety. Ultimately, DCA sought developers interested in applying creative solutions that were available on the market, along with cutting edge. Pennrose was interested in trying new concepts, worked closely with consultants and development team members, pushed their comfort level on green building practices, and in the end learned from the final outcome of the project.
Green Building Features for the Eastampton Town Center

Eastampton Town Center incorporates a broad array of sustainability features. The first and most dramatic example was the change the developers made from a traditional suburban, car-focused site plan to a plan that emphasizes traditional neighborhood design. Traditional neighborhood design is a concept that has re-emerged in recent years, which de-emphasizes the car, facilitates better pedestrian ways, and orients housing to foster better neighbor relations (Kunstler 1996). Through these site plan changes, the project was able to reduce the amount impervious surfaces, create pedestrian friendly pathways, and reorient buildings to capitalize on passive solar gain. Pennrose also put aside a portion of the site for commercial real estate development, which will further serve the community and reduce car travel for simple service and amenity needs. Because Eastampton Town Center was a greenfield development on a large piece of land, the site plan changes were essential in order to show the true potential of developing from scratch. The Pilot Program advisory committee insisted on this approach for Pennrose to qualify for the gap funding and DCA’s support.

Eastampton Town Center also features some innovative resource efficient and environmentally sensitive technologies and materials. All the units exceed the state’s Energy Star Program criteria, and they are estimated to use 30 percent less energy than a home meeting the 1993 standards set by the Council of American Building Officials. This high efficiency was achieved through taking advantage of building orientation for passive solar gain, architectural overhangs, and glazed windows. The buildings were also well insulated with cellulose, used advanced air sealing techniques, and have a low energy ventilation fan. During construction, materials on site were recycled as much as possible.

---

9 See also Congress for a New Urbanism website for more details on traditional neighborhood design.
possible and mature trees were preserved when feasible. Material selection included upgrading to higher quality and less toxic options, such as fiber cement siding instead of vinyl siding, sustainable hardwood floors, linoleum flooring, and low Volatile Organic Compound (VOC) finishes. They also furnished the apartments with compact fluorescent lighting, energy star appliances, and a programmable thermostat. A unique aspect of these green buildings was the developer’s contract with an outside group to implement an education plan for residents to teach them about the care and maintenance of their units so that they could effectively use the energy and resource efficient technologies. The developers also included educational efforts to organize residents to use the community garden and rainwater cisterns.

These and other features are what help make the project stand out as a showcase for other projects. The developers and architects have taken what they learned from Eastampton and shared it with other professionals as well as incorporated the ideas into their on-going projects. Tim Henkel, the Pennrose development officer, reflected, “Because we are motivated by our own mission, we are motivated to keep it in our details and now our contractors are cool with it.” Considering that one of the Pilot Program’s main goals was to facilitate market transformation by

---

10 VOCs are a class of chemical compounds that can cause short-and long-term health problems.
exposing people to replicable green building techniques, the Eastampton project has
served this function well and helped shape DCA’s green building decision matrix and
funding objectives.

They are also applying the tested concepts and materials to their new projects where
appropriate. For example, Steve Schoch remarked:

I think the pilot program was very successful in that regard. It gave developers,
architects, and contractors all a different experience by which to test future
projects. I started this whole thing saying it is very experiential. It is not going to
go from 0 to 100 percent sustainable over night.

The project was comprehensive and offered team members a significant platform for both
learning and then teaching. Over the last three years, Steve Schoch and Charlie Lewis
have shared their insights at conferences and professional meetings, thus earning the
status of a demonstration project.

The success of the Eastampton Town Center as a demonstration project can be
attributed to both the financial incentives offered by the state and Pennrose’s openness to
try something new, outside their traditional developer model. Through Charlie Lewis, a
vice president at Pennrose, and Jeff Allegretti, the president of the Pennrose Service
Company, the company had the foresight and experience to push the concept of
sustainability in their application to DCA and the Pilot Program. The Pilot Program
funding was available to any affordable housing project, either new construction or
significant rehabilitation, that demonstrated a commitment and desire to apply green
building practices to their projects. The total cost of the Eastampton Town Center was
$13,546,277 ($135,463 per unit), and the additional subsidy for green items was $13,338
per unit. While funding may seem to carry the most significant weight in the success of
developing green, affordable housing, the developer’s vision and leadership cannot be
dismissed. Steve acknowledged this important aspect in regards to fulfilling their goals for the Eastampton Town Center:

In this case it was also tied to a vision on the part of the developer to something they really wanted to latch onto. I work with other developers who said – we looked at that, we decided that we are going to let someone else blaze the trail we will follow after.

This leadership can be tied to a variety of motivations including funding needs, marketing advantages, previous experience in energy efficiency, and an interest in doing the right thing. In the end, the developer needs a sustainability champion to maintain leadership and vision that helps drive the project forward, over inevitable hurdles, to become a demonstration project that meets the comprehensive goals for sustainability.

**Regulations Ultimately Dictate What Gets Built**

Developers are acutely aware that each project is subject to the scrutiny of the local municipality; therefore, they must heed the political climate of the area. While the atmosphere varies from antagonistic to congenial, the developers commented that there was a pervasive feeling of uncertainty regarding a township’s response to requests for variances and major changes. Thus, developers typically adhere to the zoning standards and build traditionally styled suburban developments to avoid the lengthy process involved in securing variances and zoning changes. Steve explained how zoning affects the planning process, “Zoning still has a major impact on the way these projects are conceived of. The process is not one that allows for open dialogue at the ground, at the initial concept level.” The concept of Eastampton started from this basis, following the written zoning and planning ordinances. However, several factors helped transform Eastampton into a green, affordable housing project. Specifically, there was pressure to
address affordable housing needs in the township; the township responded favorably to variances and site plan changes; and there was additional funding to support higher costs.

Eastampton Town Center, as an affordable housing development, would not have happened without the “Mt Laurel decisions” and the subsequent critical piece of New Jersey legislation – the NJ Fair Housing Act. New Jersey is well known for this legislation because it opened up a larger discussion across the nation around affordable housing and municipal regulations that restrict the development of such housing. In 1975 and 1983, the NJ Supreme Court set a precedent in land use law known as the “Mt. Laurel decisions”. They ruled that municipalities could not exclude affordable housing by using large lot zoning. The 1983 decision further ruled that a developer could go to court to seek building approval for housing if denied by a municipality, and that a developer could be awarded a density bonus to help build affordable units. This is referred to as the “builder’s remedy.” In 1985, the NJ legislature passed the Fair Housing Act, which replaced the judicial process with an administrative process. Eastampton Township was feeling developer pressure to provide opportunities to build affordable housing given the town’s proximity to Philadelphia. Toll Brothers, Inc. challenged the township of Eastampton in 1983 for rights to develop 720 market rate and 180 affordable housing units on a 367-acre site. This lawsuit opened Eastampton up to controversy and forced the township to negotiate. The land continued to change hands for various reasons until 1999 when Pennrose entered into an agreement with Rancocas Investments to develop 100 units on 25 acres.

Due to this pressure to comply with the law, the local government worked with Pennrose and the proposed changes. In fact, when the developers went back to the
township to request significant changes to the site plan, Pennrose was surprised at how quickly the township approved them. Peggy Huchet, the Pilot Program’s first coordinator, explained how the political conditions contributed to expedient results:

What they really did not want to do is bring this back to the public's attention and cause a controversy again about affordable housing. Once they get it settled, it is better not get it stirred up again. It gets the NIMBYs stirred up, and it is politically difficult for the people who are in office.

The original site plan was based on the state’s Residential Improvement Site Standards (RSIS), which included wide streets, specific curb heights and types, and oversized storm water management, all of which the consultants regarded as overkill. The new site plan was based on traditional neighborhood design criteria and did not follow any of the township’s rules. Steve described the new design:

Something that is sensitive to the solar orientation, something that is geared around pedestrians and not cars, something that creates a dialogue between buildings to create/ foster neighborliness and things like that. Those are all things that we eventually did achieve, but we had to break almost every rule in the zoning book.

Despite the fact that political conditions favored Pennrose, all of the proposed changes were subject to debate during their discussions with municipal and state officials. Overall, project participants that I interviewed saw regulations, and the inflexibility of relevant decision makers, as substantial barriers to being able to implement a number of innovative, green features. The following three issues – storm water management, landscape design, and a pedestrian-friendly neighborhood – illustrate how regulations, even when well-intentioned, impact the outcome of implementing green practices. The results of these issues were varied and included the preventing of innovation, adding time and uncertainty to the process, and unsatisfactory compromise.
First, all interviewees talked about their proposal for using “rain gardens” and their disappointment with the state’s storm water management and water quality regulations. The concept of the rain garden was to capture the storm water through well-landscaped areas that directed and absorbed water through a natural system rather than building a large retention pond. Jeff Allegretti explained:

“If we had had our druthers, we would have said we don’t need the retention pond; we don’t need all that infrastructure. We are going to let all that rainwater go back into the aquifer as God intended it instead of the way the engineers want it. I would say the planning board was not so flexible as to believe that. We needed that redundant system.

Because the township was unfamiliar with this natural approach and they could not be convinced that it was a time-proven technology, the township required the developers to build a backup storm water system (a large retention pond), which was not only redundant but also an additional cost. Building two systems increased the overall budget, and Pennrose had to cut spending on their landscaping needs. The plants and seeds designated for the rain gardens were expensive items, and several people commented that they felt this was one of the areas that suffered in terms of the final outcome of the project. In an effort to find middle ground, Pennrose requested to build a smaller retention pond to serve as the backup storm water system. Tim Henkel said, “We will never get it by the state, and we never did achieve the meeting of the minds where we were able to size a smaller pond to accommodate for actual storage off the site. So we have a big retention basin, but did it have to be that big?”

A second major design issue dealt with landscaping. Municipalities typically require trees to be planted along the street front, but Pennrose proposed utilizing trees for shading houses during the hot summer months, which would mean fewer trees on the
streets due to cost constraints. Larry Weaner pointed out how landscaping regulations are so prescriptive that there are few options for alternatives:

While regulations are well-intentioned, when you try to do something innovative they limit what you can do. For instance, the tree plantings are generally written in regulations to be planted along the street. We were trying to get away from this concept because we were looking for more of an ecological benefit and cultural benefit.

Pennrose had to receive permission from the township to plant trees by the houses rather than planting them close the streets. In this case, Pennrose succeeded in getting the necessary variance, but it required perseverance and additional time.

A third variance Pennrose requested was for the streets to have on-street, parallel parking, instead of the zoned requirement for angled street parking. Because the site plan was dramatically changed to be a model for traditional neighborhood design, the development team wanted to create a more pedestrian friendly environment through narrower streets, street parking, traffic clamping features, and changes in traffic circulation. The developers asked to narrow the street width and discovered that the town was less flexible with this request. While the township did grant some variances including the on-street, parallel parking, the developers needed to revert to the state standards set in RSI S in order to find a compromise in street width. The RSI S standards requires all new residential construction to apply a default set of street standards, which allows narrower streets than the township standards. On a pilot project that was trying to push the envelope, these regulations posed true stumbling blocks. Steve described his thoughts on this process: “Ultimately, we agreed to default to those standards, which were smaller than the town's standards but we went with the state standards as a middle ground.” He felt that many of the areas that needed a variance were subject to people’s
opinions and experiences rather than having decisions based on empirical data and research that have demonstrated the effectiveness of new technologies and design concepts.

Zoning and regulations obviously play a huge role in the conceptualization and implementation of a project. The original site plan for Eastampton Town Center was entirely based on what the township regulations would allow. It is much safer to design and build what the township allows than go through a process of asking for variances and pushing new ideas. The impact of zoning and regulations is that it can restrict how the development team conceives of their project. In general, sustainable building requires that a development team, early in the process, set goals and begin an open discussion around the design. Instead, architects are told to play by the rules, even if they are old and obsolete, in order to avoid delays and extra costs. Jeff Allegretti explained, “Any new thing we did meant a potential delay. Any delay is a potential place they can lose money.” The Pilot Program money helped mitigate the financial burden of the extra planning necessary, but future projects are not guaranteed access to a similar amount of funding and support to negotiate some of the restrictive regulations. Eastampton Town Center also had the good fortune to be labeled as a “builder’s remedy”, which meant the township was open to changes and desirous of a successful affordable housing project. The township granted some variances in terms of overall site design, but restricted Pennrose in terms of implementing cutting edge technologies.
Financial Considerations and the Influence of Incentives

The financial aspect of a green, affordable housing project involves a number of factors. The amount of money available determines which materials can be purchased, how much technical assistance can be allocated to the project design, and how much time can be spent meeting with team members and seeking variances. Therefore, financial factors contribute to both the viability of the housing project and the ability to successfully meet the goals, in this case, of the Pilot Program. The factors that played a significant role in the outcome of the Eastampton Town Center were the sustainable development subsidy, the state’s flexibility with meeting the Program’s goals, and the technical support. Other financial factors that challenged the developer were juggling and applying for funding from multiple sources, balancing the budget in regards to sustainability concerns, and taking a critical look at the long-term benefits.

The Pilot Program was able to incorporate an extensive financial subsidy program through a variety of funding sources in order to meet the green standards and goals. First, the state provided approximately $3.8 million in funding through their Balanced Housing Program to build affordable housing. This money comes from New Jersey’s realty transfer tax and goes into a dedicated revolving trust fund. PSE&G provided financial incentives to subsidize the energy efficient upgrades for each unit through their 5 Star Program, paying between $1200 and $2500 per unit. The New Jersey Housing and Mortgage Finance Agency made up to $5 million available for low-interest single-family mortgages. The State Energy Office gave $43,000 to Eastampton to encourage the incorporation of passive and active solar technologies into the chosen developments.
Lastly, developers received a great amount of technical and logistical support through consultants and government agencies.

*The Pilot Program Is Transforming the Market*

Many participants admitted that the financial incentives involved in the pilot project were the primary motivation for building sustainably. Darren Port said financial incentives are: “certainly great in terms of providing a market transformation and getting folks to take a look at it. I don't think we would have been as successful with the pilot or affordable, green housing if we had not had financial incentives.” Similarly Steve Schoch observed how money, rather than values, drive the process: “I would say that money is a good incentive. Without the pilot program...we would not have built that first project. Nobody is going to build a sustainable project for what amounts to brownie points.” Overall, interviewees believe that these measures cost more upfront and cannot be implemented in an affordable housing development where the budget is tight. While this is true, the New Jersey Pilot Program is demonstrating that costs are lowered through market demand, that some methods once introduced actually are a cost savings, and some green measures simply cost less than conventional measures. In order to facilitate developers’ efforts to try new ideas and spur the necessary learning curve, the state determined that financial incentives were an important strategy for implementing green building strategies. Jeff Allegretti remarked:

The reality is there is going to be little incentive for a developer to participate if the costs are not fully or nearly fully born by additional funding. If the program is going to be successful long term, two things need to happen. One is that the things that you are not inclined to do - where the market does not provide you
with the incentive to do it – need to be subsidized to do it. It really is analogous to subsidized housing to begin with. Very few people would be doing it if there were not financial incentives to do it.

Eastampton received between $10,000 and $13,000 gap subsidy per unit to pay for the green features. The NJ Green Homes office granted $10,000 to Permrose to hire sustainability consultants for the initial design process. While these grants covered the additional costs, the developers were quick to point out that they financially gained nothing from the extra funding. Instead, they recognized their participation as a means to gain experience and a marketing advantage for future green projects.

The Pilot Program emphasized that each project would be different, from an urban rehabilitation project to a greenfield development. Therefore, there was a strong need for flexibility from the state’s Green Homes coordinator in terms of meeting sustainability goals. The only requirement of the program was that developers comply with the state’s Energy Star Program. Otherwise, the application simply had a list of options that addressed the goals and objectives of the Pilot Program for siting, land use, water efficiency, energy efficiency, material and resource efficiency, operations and maintenance. The advisory committee judged each project by the overall performance of the buildings rather than a prescribed list of add-on features. This flexibility extended to the on-site construction inspections. Darren Port of the NJ Green Homes Office, who was involved from the design process to the final open house celebration for Eastampon Town Center, recognized that remaining flexible was the core to finding balance between the green building goals and the constrained budgets of the developers. He referred to this practice as “horse trading”, and would use it when sitting in predevelopment meetings or inspecting sites. On one project, he recognized that energy efficiency would
be compromised if high efficiency windows were not installed. He made a concession with the developer and suggested that in order to upgrade the windows, the developer would be relieved of his obligation to purchase Forest Stewardship Council (FSC) certified hardwood\textsuperscript{11} flooring.

In practice, this Program required a higher level of technical support and on-site supervision. Interviewees commented that this oversight came from the funders as well as the architects and the developers. Team members informally assigned Eastampton special project status. People responded by requiring more frequent site visits, demanding a field report for tracking progress in sustainability, and working closely with the development team to resolve conflicts. Steve Schoch was vigilant in overseeing the construction, and an architect visited the project three to four times a week. Interviewees credited this attention for the higher quality of work achieved. Through this process, Darren Port was able to develop a matrix for future projects that would track the difference between a conventional item and a green item. He explained, “It is useful for me because when I get a project that comes in and there are some crazy numbers, I can look and say a similar project in your region did it for this amount, why are you saying it is going to cost this amount.” This matrix has continued to shape and inform the state’s approach to providing gap subsidy funding by analyzing the actual upfront cost differences. It is proving that there are some incremental costs for green building.

The success of the pilot is not only that affordable housing is incorporating green building principles but also that the developers and the construction industry are transforming the market and adopting new practices. The financial incentives are a

\textsuperscript{11} FSC certified wood is lumber that is certified by the Forest Stewardship Council and meets rigorous forest management standards to ensure the wood purchased meets environmentally appropriate, socially beneficial and economically viable management of the world’s forests.
strategy for getting developers to try new ideas. Through a process of trial and error, these developers actually learn what methods improve their projects and adopt some green building practices into other types of projects. As developers demand more from the construction industry, technologies and skills become more readily available, and in some instances these ideas become the accepted protocol. During the Eastampton project, the developers and the contractors were forced to build a foundation that the contractors were was unfamiliar with, and therefore hesitant to construct it. In the end, the contractor developed a solution that they now implement in their other projects. Jeff Allegretti described his perspective on how incentives work to change a builder’s practices:

Having been incentivized to do it, we discover a method that we might not have tried is affordable to do and we will continue to do it for the right reasons because it is not costing us much or any more money to do it. It makes the property more maintainable, which is a key element in our mind as sustainable.

As a result of their experience with Eastampton, Pennrose is more open to solar orientation, hardiplank, stacked optimal value engineer framing, careful air sealing and window flashing in the design of other projects. These developers now recognize how higher quality construction and green building features have benefits that pay back in the maintenance and performance of their housing developments.

Multiple Funding Sources and Their Requirements

The funding process is complicated in general for affordable housing, and funding was cited as the most difficult part of the housing project as was the case with Douglas Meadows. There is a period prior to securing all the funding that the developer has to prepare design documents and address predevelopment needs. These services have to be
paid upfront without knowing whether the project will be granted money by the various funding sources. Peggy Huchet explained the process in this way:

The private lender is not going to give you a loan until there is other funding in place and until they are assured that their loan is the superior loan\(^\text{12}\) on the job. That, I, as a state lender am not going to come in and make my loan superior to theirs. It is just a matter of getting all your ducks in a row – it is like trying to roll 50 marbles across the table all in the same direction.

This means that the developer must be able to take calculated risks and fund some of the predevelopment needs upfront in order to compete for the various funding available.

When the project does get funded, the developer has a limited amount of time to spend down the money, and there are incentives to rush through the process in order to meet the funder requirements. Finally, once they have secured funding and built the housing, there is an added burden of remaining in compliance with LIHTC for 15 or more years. Brad Harrington of DCA’s Balanced Housing acknowledged this added complication, “It is not simple, the closings on these requires a lot of paperwork. And then the monitoring requires a lot of paperwork. HMFA [Housing Mortgage Financing Agency] monitors compliance for 15 years after the project is placed in service.” The compliance paperwork for just one funding source, tax credits, involves getting tax documentation on the tenants, monitoring their incomes and the rents they pay, all of which need to be stored and available for audits for 21 years.

While the additional funding through the Pilot Program for green building features was essential to the success of Eastampton Town Center, the Pilot Program added yet another layer of complexity into the funding process. Pennrose applied to multiple funding sources, and the Pilot Program became an additional source that required an application and involved active monitoring and oversight. Each funding source

\(^{12}\) A superior loan is the loan that is paid back first if there are financial problems.
source was essential to complete the construction of Eastampton, and the processes of application and approval were separate but simultaneous and parallel. If one funding source decided to reject the project application then the other funders were obliged to turn down the application since the project cannot succeed without all the funding. In fact, New Jersey’s HMFA low-income tax credit program rejected Pennrose’s first application, which led in turn to a denial for funding from Balanced Housing as well. Brad Harrington related that during the second round, Pennrose succeeded, because “being a sustainable project helped them in terms of the HMFA review, but more importantly under the competitive criteria they faired better that they did in 1999. They were funded.”

**Budget Trade-Offs, Long-term Benefits, and Sustainability**

In order to secure funding, a developer must demonstrate an ability to put together an accurate, thorough budget, and the sustainability aspect requires even more sophistication to the budget process. There are higher upfront costs, such as putting in more insulation or installing hardwood floors; however, by investing upfront, the owner can recuperate the costs over the long-term because of improved durability or lower utility bills. Andrew Shapiro said, “You want to put a durable material in – it will cost you more money. You want to seal the duct work, that costs you more money … Every step costs more money.” The development team needed to be vigilant throughout the design and construction process to monitor spending, evaluate the cost versus return, recognize cost savings, and question the importance of meeting certain sustainability standards. Steve Schoch described this process of analysis:
Probably I would receive input from the building scientists and the Pilot Program judges on what they would like to see improved, strategize with the developer as to what an appropriate response might be. We would talk about the breadth of options there and they would first vet the options down.

Sometimes the higher cost simply prohibits the use of a certain material. For example, some people mentioned the use of vinyl windows as a disappointing compromise when looking at the cost versus the benefit.

As a pilot project, Eastampton Town Center was subject to a high level of scrutiny as well as support from the state. The state required the project to hire a sustainability consultant, Andrew Shapiro, to help sift through decisions and analyze cost trade-offs. He reviewed the list of green features suggested by the developer, and then worked with them to find a balance between cost and the characteristics of the green feature. He also kept track of all the specific issues, how they solved the problems, and the final decisions. One example Andrew Shapiro highlighted was when the development team had to decide whether to install solar hot water heaters for every unit. Not only was the labor cost prohibitive, but also they had not designed the buildings to accommodate the hot water system. The development team reached a compromise by installing the solar hot water heater on the community building, which serves the laundry facilities. He explained, “And then things like protecting habitat by choosing certified wood - that is way down their list. So, you have to choose features that are the intersection of sustainability and affordability for these folks and you have to be sensitive to that.”

In the end, the housing needed to be durable and energy efficient, and these things cost more money. While paying for Forest Stewardship Council (FSC) certified wood might not always make economic sense, hardwood floors are becoming a long-term solution to providing durable, non-toxic flooring. Eastampton Town Center actually
installed hardwood floors because the refinished floors can last up to 50 years, while carpeting typically has to be replaced almost every time a tenant moves out. Jeff Allegretti put it in these terms, “We spend three to four times the cost to put wood in over carpet, but it has arguably a 10-12 year pay back. When the construction can afford it, we do it.” The same is true when deciding between the more expensive installation of linoleum and the ubiquitous vinyl. Over the long run, the vinyl floors will require biannual wax and buff while linoleum does not require any of that. Through the extensive decision-making process, the developers were able to learn how to evaluate long-term costs and to discover the benefits of investing upfront in durable, quality materials.

Pennrose struggled with how to implement their cutting edge storm water system without going over budget. As discussed above, the township required that the developer invest in the retention pond, rather than allow them to use rain gardens to handle storm water runoff. This requirement meant the developers had to double invest in the property’s storm water infrastructure. While Pennrose installed the rain garden system, many people interviewed commented that it was disappointing because the landscaping looked sparse despite the fact that they went over budget for seed and plants. While the landscaping and storm water management aspect of the project fell prey to inflexible regulations and insufficient funding, this was connected to the fact that Pennrose was not able to recapture the cost savings of replacing the retention pond with the rain gardens. Not only were they forced to build a redundant system; they invested time in working with city officials in an effort to convince them to try a new technology. Larry Weaner said:
The developer has to sit through meetings and presentations in order to get folks to understand the rationale behind certain new technologies. There should be a way to streamline the processes. The township regulations end up costing a lot of money as developers are trying to get through red tape.

In other instances, the green building design was a cost saving device that minimized inputs, and therefore allowed for additional investments in another area. For example, Pennrose reduced the setbacks of the houses, which shortened the necessary walkways. Simultaneously, they also reduced the width of walkways and roads. The effect of these measures was that the development needed less concrete and asphalt, which in turn meant they saved money. These savings were then invested in more expensive siding and mechanical systems that were necessary to meet the resource efficient design goals of the project. Overall, managing the budget for Eastampton required a holistic understanding of the potential costs, savings, and long-term benefits of each design decision. In order to be truly effective in this arena, there was a strong need for experienced consultants and collaborative planning to help evaluate decisions and offer suggestions for cost savings and material alternatives.

**Sustainability Requires Additional Collaboration**

Pennrose Properties is an experienced for-profit developer that has been building affordable housing for over 30 years. Their extensive work in this sector has built strong relationships and has helped them establish a solid reputation. The Eastampton Town Center started as a conventional, affordable housing project where the schematics and planning went through a routine pattern of developer, architect, and contractor piecing together the necessary components of the project. When the opportunity to submit an application to DCA to participate in the Pilot Program arose, the management team asked
Jeff Allegretti, who had a depth of experience in energy efficiency and weatherization, to put together the proposal. The Pilot Program advisors recognized the project’s potential and responded by demanding Pennrose hire more experienced consultants to help shape the proposed design and plans. By requiring these additional outside professionals, DCA added an extra level of collaborative planning that is not a generally a part of the process.

In order to qualify as a pilot project, Pennrose teamed up with a variety of consultants to redraw the site plan and work towards a more sustainable layout. This new group of players included a traditional neighborhood designer, a civil engineer, a landscape architect, a sustainability consultant, and the pilot project coordinator. Typically, this process would have started before anything was put on paper; instead, the new group had to work together to find ways to redesign a typical suburban development. Pennrose, as the developer, had to remain open to new ideas and be willing to change their existing township-approved plans. The developers’ amenable approach to site changes may have been influenced by the detailed oversight provided through the consultants and pilot project coordinator. Steve Schoch commented on negotiation with the state and local authorities and their advisors:

> The pieces that were not as collaborative were the program pieces that were a part of the pilot project and the local authorities because they have a certain approval process to go through...So, we would involve them in the way of saying, ‘we heard your comments in the next release of design update here is how we responded to your comments.’

Jeff Allegretti, who wrote the pilot project proposal, had enough background in sustainability that he understood the ideas and supported the changes. Andrew Shapiro attributed the success of working with such a large team to the existing leadership and knowledge at Pennrose. Hap Haven said of Jeff Allegretti, “[He] is very savvy. He
knows everything there has to do with heaters, he used to direct the local weatherization
program. He understands what it is like to deal with contractors.” Peggy Huchet
remarked on the experience of the vice president of Pennrose and lead developer, Charlie
Lewis, “He had the knowledge and the experience and the depth of management and the
financial wherewithal to participate in this project.” The experience of the established
development team helped generate the momentum necessary to work on site plan changes
that made sense and were within their base of knowledge. At the core of the
development team and its ability to collaborate were the established relationships and the
trust between new team members. Darren Port described the importance of gaining trust
from the contractor:

He was a contractor thinking beyond just getting this project in the ground and
moving on. That may also have a lot to do with [the sustainability consultant]
opening the door. He is a building scientist, but he is no holds barred in saying
what he needs to say and picking up a hammer and getting dirty. I think the
[architect] can appreciate him, but a contractor can also say he knows how to
build, he is not like an intellectual building science guy sitting at a desk telling us
what to do.

Once major revisions were made and new designs approved, the process returned
to the traditional working partnerships whereby the developers, contractors, and
architects met to discuss on-going construction issues. However, there was still some
oversight that involved back and forth discussions on construction issues. Jeff Allegretti
said,

Issues would come up, [the state agent] would deal if they were issues she knew
something about, or I [the consultant] would deal with others. The owners would
say ‘They are telling us to do this, do we really need to do this’ and I would say,
‘Well let me talk to them’ and then we would say, ‘Well, we really think this is
important or we can let that one go.’ So there was some back on forth on some
things.
The development team met every two weeks and reports were sent to the extended team who could not attend the frequent meetings. There were a lot of people participating in the process, including the consultants, DCA’s Green Homes Office, the township, and Pennrose. Several members of the development team felt that they themselves were the bridge or mediator that helped facilitate the decisions that had to be made. People contacted Jeff Allegretti, Darren Port, or Steve Schoch with questions regarding unresolved design and construction conflicts. Steve Schoch said of his role in the collaborative process as the following:

One of my jobs was to give bad news where bad news was to be given. ‘No, I am sorry we have looked at the issues from the cost and maintenance standpoint, and we do not believe that active photovoltaics for residential units is a viable option at this time and then there would be a caveat - unless you know of a funding source we don't know of.’

When dilemmas were laid out on the table, ultimately it was the developer who had to make the final decision. The collaborative nature of working together depends on whether the developer is genuinely interested in achieving the established sustainability goals.

Pennrose played a key role in working with the contractors and facilitating important decisions identified during the pre-development meetings. There were challenges working with the general contractor and his subcontractors that needed to be faced directly if the contractors were to adhere to the construction documents. The relationship with the contractor cannot be overlooked. Six people interviewed acknowledged the differences between the contractor, the architect, and the developer.

Fortunately, the developer and the contractor already had a previous working relationship, which meant the developer could ask the contractor to try some new ideas.
Jeff Allegretti remarked on the significance of this close relationship:

They are a part of our team – it isn't the public model where we put together construction documents and put it out for bid and the low bidder gets the job. The contractor is really us, the entity that is executing our vision in the field. They are really a part of the same team.

Peggy Huchet gave another point of view about this relationship and said, “That relationship between the developer and the contractor was very important because he [the developer] could get the contractor to do things that the contractor was somewhat reluctant to do. They had a trusting relationship.” The success of the relationship between the developer and the contractor was significant because what was learned and applied on the Eastampton project is carried over on their future projects, which eventually helps facilitate the desired market transformation of the construction industry.

The application of standard construction practices plays a significant role in the relationship between contractor and developer. Working with contractors on green building projects has consistently been noted as one of the more challenging aspects of the project. The reasons given by interviewees have focused on the industry’s reluctance to implement any significant changes to the standard construction practices. Several people mentioned that contractors are typically resistant to applying new techniques because learning new methods takes more time than using the well-known methods. Darren Port explained, “There is a great deal of inertia to get over in green building, affordable or otherwise. Folks are rooted in doing things in ways they have done it. I have had contractors say, ‘Well this is the way my grandfather has done it, this is the way I have done it.’” Over the course of several projects, the contractor also learns the quality and standards that the developer expects from him. In the case of Eastampton, the contractor was contacted when Pennrose was initially putting together its budget.
Together they calculated the cost of construction based on their past projects and made an implicit agreement that the contractor would work on the project for the budget established. Later, the contractor was told that there were some changes; instead of vinyl flooring, they needed to install linoleum; instead of vinyl siding, they needed to use hardiplank; instead of fiberglass insulation, they needed to use blown-in cellulose. These changes became additional costs to the contractor for several reasons: he needed to locate the materials and if they were unusual he may not have been able to use his established distributor; he needed to learn how to coordinate or install the new material or building technique, which required additional training time for his crew; and the cost of the material may have been higher than what he normally used.

It became very important for the architects and developers to communicate effectively with the contractor and maintain a high level of supervision on-site during construction. For instance, when it came to the cellulose insulation, the contractor had to understand the units needed to be empty, without other contractors like electricians working, in order to blow in wet cellulose. Additionally, the architect needed to be vigilant and inspect the construction work more often since the contractor sometimes made inappropriate substitutions. When it came to installing the windows, it was important explain the difference between typical vinyl windows compared with the high-efficiency windows that were selected to achieve the energy-efficient goals necessary for the pilot project. Jeff Allegretti explained, “If you are not there to catch them it could be a very expensive mistake. It required a much higher level of oversight in the field. Both from us and the architect.” If the developers and architects were not on-site to make corrections along the way and explain the reasons for certain features, then the contractor...
was free to use his tried and true methods, which would save him money and be easier to implement.

While team members discussed the difficulties of working with the contractors, they were also quick to point out that they were impressed with the eventual responsiveness of the contractor. In one instance, the team hit a roadblock regarding a foundation detail that was necessary for the Energy Star Program. It was an entirely new concept for the contractor, and he was hesitant to do something he felt might not work and could actually cause structural weakness. The team went back and forth trying to figure out how to solve this dilemma, and in the end the contractor proposed a solution. This solution is now a standard practice that the developer and the contractor use on all their projects. Thus, the Eastampton development facilitated an important learning curve. Because Pennrose had an existing relationship with the contractor and the contractor was willing to stick with the collaborative process, the team was able to work through construction issues. While described as “painful at times,” the result has been that the contractor, through the direction of the developer, now willingly applies these new skills and ideas on other projects.

Lessons Shared for Future Projects

Eastampton Town Center has been a leading pilot project because the developers embraced the challenge to use sustainable development features, changed their site plans dramatically, and completed the construction on time. Interviewees gave Pennrose credit for being a forward thinking developer and remaining committed to the mission of green building. Pennrose acknowledged that their interest in participating in the program was
multi-faceted, including previous knowledge in energy-efficiency, a desire to do right, financial incentives, and enhancing their marketing image as green builders. Darren Port from NJ’s Green Homes Office acknowledged that he believed Pennrose’s status as a for-profit developer with a dedicated contractor relationship strengthened their proposal:

   Larger for-profit developers have construction management in house so they can estimate all costs from the beginning. They can actually come into Balanced Housing with their initial obligation, pretty close to what that project is going to cost. They can estimate that a lot tighter than [another non-profit developer].

Interestingly, while everybody commented that there was a great need for financial subsidy to shoulder the burden of higher upfront costs, there was also a substantial amount of credit given to the vision and commitment of the developer.

   Eastampton Town Center provided developers, architects, and contractors the opportunity to learn during the process of how to build a successful, affordable, and green housing development. Several lessons for success emerged through this experiential process:

   1. In order to even begin to consider green building, a developer needs to have a champion on their staff who can push the mission.

   2. Planning must begin early in the design process in order to set goals and create a site plan that meshes with those goals.

   3. A sustainability consultant is an important person to include on the development team, and during early planning sessions he or she can give guidance on design, material availability, and distributors. “Being able to provide developers the expertise and hand holding when needed to get them over the hump, to get them started on this stuff was also critical. People just need help, they don't know what this stuff is,” as Andrew Shapiro explained.
4. A township or municipality needs to be open to working through changes in their zoning and regulations and provide flexibility to the developer’s request for variances.

5. There is an additional need for greater on-site supervision to ensure proper communication and to identify construction mistakes that can be remedied

The case of Eastampton Town Center also highlighted some areas that served as significant barriers. In the contractor world, there is an intense resistance to change. The business relies on using the same tried and true techniques and materials. By using the same methods, each project can be built fast and efficiently without extra construction management and training. When a new idea is introduced, more time is going to be involved in learning about the techniques, locating special materials, and supervising the workers, which adds up to a higher costs. This same critique of holding onto tradition can be applied to developers as well. Often, when they are conceiving of their project, they do not think beyond what is allowable by the township. Simply stated, any delay due to applying for variances and getting permits is lost money. Interestingly, many people pointed out that the financial incentives of the Pilot Program helped relieve these concerns and allowed developers and contractors go through a “learning curve” and apply new ideas to the construction process. In the end, some of these ideas have proven to be worth the effort, and Pennrose, along with its contractor, has started to implement these strategies in their current projects. Charlie Lewis, a vice president at Pennrose, is also taking his lessons learned and sharing them with other developers at professional meetings and conferences. Darren Port said of the developers:
I think they embraced the spirit of the pilot. Other developers saw it as a way of getting additional subsidy. Pennrose may have had that... If they did, they pretended well that they cared about the other issues as well. So, I think that was the difference. Everybody was committed.
The Gold Dust: Community Driven Design Process Supports Missoula’s Green Building Project

The Gold Dust apartments were built in Missoula, a small city in western Montana with a population of approximately 60,000. Missoula is the home of the University of Montana and is located in a conservative rural state. Over the last ten years, western Montana has been grappling with a high population growth rate, estimated at two percent annually, and an increasing gap between housing and affordability (Office of Planning and Grants 1999). A recent study called, “You Can’t Eat the View”, states that 58 percent of Missoulians cannot afford to buy a home and 28 percent cannot afford fair market rent (Halliday 2003). Furthermore, surveys of the largest property manager companies revealed that the vacancy rate for rentals has been consistently hovering between zero and three percent since 1999, far below the national average of five and six percent (DeCou 2002, OPG 1999). Housing issues, such as infill and affordability, have become the hottest topics in local politics. As Missoula continues to grow, the development of affordable housing will be a large determinant of long-term sustainability and community vitality.

The Gold Dust case study takes a close look at how an organization surmounted regulatory and financial barriers to create a sustainable housing development within the city infrastructure on a small infill lot. homeWORD, a non-profit community development organization (CHODO), was motivated to build the Gold Dust as a green model of infill development due to the group’s strong mission and vision statement to build with both the community and sustainability in mind. This case study demonstrates
that through vision and leadership, a proven track record, and strong partnerships and relationships, a non-profit can build affordable, green housing without the kinds of financial incentives or municipal guidelines that were evident in the other two case studies.

**Key Partners**

People interviewed for this case study shared their experiences with the project and offered a diverse array of perspectives. Each person provided a story behind the design and development of the Gold Dust. The six people interviewed come from a diverse spectrum of housing experiences including developer, architect, energy specialist, landscape architect, state funder, and private utility. (See Project Partners Chart below). Ren Essene, the Executive Director of homeWORD and primary developer, is a smart and passionate woman who helped found the organization 10 years ago. Her architecture background allows her to move easily within the construction industry, and she is also adept at working in the political arena. Housing organizations recognize her vision and leadership, and have invited her to speak at regional and national conferences. Don MacArthur is a principal architect at the MacArthur, Means, and Wells (MMW) architectural firm. He serves on the Missoula County Planning Board, and he has a keen interest in smart growth principles and designing buildings that enhance both the public and private realm in a neighborhood. James Pool, a landscape architect, works primarily as a sub-contractor to MMW. He was interested in being involved from the project’s inception and helped facilitate a working group during the design charrette. Dale Horton, an energy specialist, and was contracted to put together an energy audit for the Gold Dust
Figure 3

Figure 3 - The Gold Dust Apartments Project Partners
and then write the funding application to NorthWestern Energy. He is a strong advocate for holistic design, energy efficiency, and weatherization as a means to address the rising cost of energy. Dave Ryan is the renewable energy representative from NorthWestern Energy, which helped fund the energy upgrades and the solar panel installation. He is very knowledgeable about energy and renewables, and has been a supporter of homeWORD. Lastly, Julie Flynn, the program manager of the Home Investment Partnership Program (HOME) at the state’s Department of Commerce, was a part of the funding selection process. She travels all over the state of Montana to ensure state HOME dollars are being spent appropriately and quality housing is being built. Due to less government oversight and fewer funder requirements, there were fewer people on the development team and involved in the development process in this case compared with the other two case studies.

As a developer, homeWORD, offers a unique perspective in the housing arena. The non-profit grew out of another feminist organization called, Women’s Opportunity and Resource Development (WORD), which recognized that stable affordable housing was a cornerstone to helping women move towards self-sufficiency. homeWORD’s mission is to “develop affordable housing and asset-building strategies for those most in need through innovative, sustainable, and replicable methods.” homeWORD seeks community input for each project during the initial design workshop, and believes that thoughtfully designed housing creates homes that are “a source of dignity, pride, and empowerment” (homeWORD 2002, p.3). homeWORD strives for an inclusive design process in order to best reflect the needs of the residents and the surrounding community. homeWORD is also committed to green building practices, and their vision statement
includes a commitment to using the most environmentally friendly, energy-efficient methods on the market. This holistic approach to development came from “the simple notion that you can’t build for the future by destroying the environment” (homeWORD 2002, p.5).

The Gold Dust

The Gold Dust is homeWORD’s sixth housing project, and it involves the most extensive application of green building principles. The project began in 1999 with the acquisition of land and construction was completed in March 2003. It is an infill development, centrally located and close to downtown, near public transportation and other services. There are 18 apartments with one, two, and three bedroom units. The Gold Dust design came out of an intensive community design charrette that involved over
70 people, including neighbors, artists, professionals, and elected officials. During the weekend-long charrette, participants generated the following ideas which were incorporated into the design: a rooftop garden for community gathering; a desire to complement the historic neighborhood through historic design, materials, and scale; small alley houses; public art and a welcoming street front that can be used in a variety of ways; an emphasis on pedestrians over cars; and live/work spaces to encourage artist or home business opportunities.

The Application of Green Building Practices

homeWORD selected Missoula-based MacArthur, Means, and Wells (MMW), which has experience in green building and planning, to design the Gold Dust. homeWORD had worked with MMW on two earlier projects, Fireweed Court and Lenox Flats, and these projects helped establish their good working relationships. Having worked with homeWORD on previous projects, MMW understands homeWORD’s unique values and vision. In other words the Gold Dust drew upon past experience and growing knowledge in green building, as well as a solid partnership between homeWORD and MMW. The green features are comprehensive in approach, and span from energy-efficiency, to indoor air quality, to the use of alternative building materials.

The Gold Dust incorporates various technologies to increase energy efficiency. Radiant floor heating was installed in the main building and connected to a high-efficiency, gas fired boiler. Studies show that a radiant floor system can be set two to four degrees cooler than heating air because of the quality of the heat and approximately 20 percent on monthly heating bills over a forced air system (Department of Energy
Other measures include high-efficiency clothes dryers (gas) and other appliances, compact fluorescent lighting, cross ventilation, and shading devices to block summer sun. The most impressive feature is the photovoltaic installment on the rooftop. Currently, these solar panels are considered the largest grid inter-tied system in Montana, and provide an estimated one-third to half of the power needs of the residents.

Other goals of the project included providing a healthy indoor air environment, reducing waste, and using alternative materials. The installation of concrete radiant floors accomplished three goals: energy-efficiency, improved indoor air quality, and reduction in use of materials. By using concrete, the Gold Dust eliminates the use of carpeting in the majority of the apartments. Carpeting is resource intensive and often emits toxic gases either from the synthetic fibers or from the glue used during installation (Green-Rated 2002). It is actually considered one of the more wasteful materials used in conventional buildings because it needs to be replaced every five to seven years, and disposal of the carpeting poses additional questions regarding environmental impacts. The concrete mixture included fly ash, a Montana by-product of coal combustion, and thus further reduced the use of extracted resources. Although carpeting has significant impacts, the back alley houses used carpeting in the upstairs, so homeWORD used recycled content carpeting. Paint was another concern because of its potential for toxic off-gassing; therefore, all paint used had a low Volatile Organic Compound (VOC) chemical ratio. Wheatboard was used throughout the apartments for cabinets, as an alternative to plywood and plastic laminate cabinets. Wheatboard is made from an agricultural by-product and manufactured in North Dakota. Materials, such as metal
siding, were chosen because they are long lasting and durable, which reduces the production and transportation of new materials and, at the same time, saves costs associated with long-term maintenance and replacement. To further reduce the impact of construction, all waste on site was recycled, and the building used less wood during construction by framing 24 inches on center.

With all of these measures used during construction, it was still important to address sustainability in terms of the community impact and sustainable development. The Gold Dust was built close to the urban core, utilizing existing city infrastructure and offering proximity to services and amenities. To promote alternative forms of transportation and minimize the size of the parking lot, homeWORD reduced the parking to one space per unit, and reserved three apartments for residents who did not own cars (i.e. bike/ped units). All 18 units have access to sheltered bike storage next to the building.

The Gold Dust was also designed with the hope of supporting community interest in environmentally sound lifestyles. The rooftop supports a community garden that has both perennial plants and trees, as well as garden boxes for resident use. The garden boxes are dedicated to organic urban agriculture and allow residents to grow their own healthy, fresh vegetables. Open to all residents, the rooftop provides a great open space to enjoy vistas of the Missoula valley. Drip irrigation is used throughout the perennial plantings, and the permanent landscaping incorporates plants that can survive on low to moderate amounts of supplemental water. Lastly, since preserving the Missoula aquifer has become a concern for the community as the city continues to grow, an innovative solution was applied for catching and filtering roof and parking runoff before it goes into
the storm water system. Low flow plumbing fixtures were installed as well to reduce the consumption of water sourced from the Missoula aquifer. The green features on the whole addressed all areas of design: energy and resource efficiency, waste reduction, water conservation, smart land use, indoor air quality, and community sensitive design. The total cost of the project was $2,663,368 ($134,086 per unit), which includes a community room (1000 sq. ft.), a workshop laundry facility, and the rooftop gardens.

Photo 8 – Rooftop garden view of Missoula and the surrounding mountains.

Photo 9 – The first spring plantings.
Regulations and the Political Process

The Gold Dust was subject to city regulations and political review, which at times conflicted with the project’s overall goals. One goal was to build a higher density development that could help address the urgent need for affordable, rental housing. homeWORD decided that the best approach was to apply for a Planned Unit Development (PUD), which allows greater flexibility in planning and design. A PUD requires that the developer present her plans to the planning board and the city council to get approval for the detailed site plan. The developer is then obligated to not vary from the approved plan. While the PUD process grants some flexibility in overcoming rigid zoning and ordinances, it also adds length and uncertainty during the pre-development process. By going through the PUD process, the development team addressed zoning problems, worked with the governing bodies, and garnered community support. The development team also faced code issues and health department regulations. Currently, the governing bodies for the state of Montana and the city of Missoula do not have initiatives that require or encourage green building practices; it is therefore left to developers to determine their interest and commitment in sustainable development.

Zoning Problems

Zoning is a system by which land is designated for various uses, such as residential, commercial, or industrial, and it identifies specific details, including density and building setbacks. According to one interviewee, local government in Missoula often lacks the capacity or political will to make broad zoning changes that are necessary as the community faces a rapidly developing urban environment. Affordable housing
developers and advocates in Missoula are acutely aware of the need for zoning changes that allow for greater density if the city is to continue to house lower income people within the city limits. Land costs are escalating in Missoula, such that land prices increased 145 percent in the 1990s (Halliday 2003), and currently a city lot sells for about $60,000. With such high costs for land, housing density allows a developer to build more units per acre, reducing the cost of land per unit. As architect Don MacArthur said, “Most of the areas downtown or in the city have not been rezoned since they were originally zoned… There has been a problem with zoning from day one. There is not enough land with enough density.”

Zoning and other regulations can be rigid and unresponsive to changes in neighborhoods and the community at large; therefore, developers depend on getting variances and using tools like the PUD to accomplish sustainability goals. “A PUD process is where we go in and tell them what all the pieces would be and then we make a commitment to that,” explained Ren Essene, “We address design, and detail, and layout, and unit composition, bike/ped space, and a whole range of things that we commit to.”

homeWORD faced a couple of challenging zoning problems that required negotiation, persistence, and community support. These zoning problems included matching the historic setbacks that brought the building close to the street front and reducing parking.

homeWORD decided to apply for the PUD because “typical zoning does not allow you to build what already exists in the neighborhood,” according to Ren. The Gold Dust was built in a nationally-registered historic neighborhood, and the current zoning requirements conflicted with the historic buildings in the area. If homeWORD had followed the requirements for normal urban infill, Ren explained, there would have
been "huge setbacks and we would have not built within the historic character." The community members wanted infill that would compliment existing buildings and therefore preserve the character of their distinct neighborhood. (A few years earlier, homeWORD was awarded an historic preservation award for the strawbale demonstration homes that they built in the same neighborhood.) Don commented, "Pretty much everybody said that we should hold the street and do an urban building that will help the street frontage and matching the buildings that were down the street, like the Stensrud [an adjacent historic building]."

Unlike the historic patterns of neighborhood design, which de-emphasized the car, new regulations are often dominated by the need to create enough parking spaces for personal vehicles. homeWORD had to grapple with the inconsistency between the history of the place and the city’s desire to guarantee off-street parking for residents. When discussing regulation issues with Julie Flynn, the HOME program manager, the first example she gave of barriers to affordable housing was parking. She said, "I know on projects we often have grantees who are having to change designs because of parking issues — that always seems to be the one."

homeWORD wanted to reduce the number of parking spaces drastically from two spots per unit to one spot per unit and designate three units as car-free, thus no parking spot would be needed. Without the reduction in parking, the area behind the main Gold Dust building would have been entirely paved.
and the three outbuildings – two small townhouse units and the workshop/laundry facility
that were discussed during the community design charrette would have been eliminated.

Ren said,

I think parking is one of the regulatory issues in zoning that creates huge struggle.
Yes, we have have a growing dependence on cars, and we need to plan for cars. I
understand that, but it also is a serious limiting factor in creating quality housing.
It changes the patterns of historic neighborhoods, it changes the sense of scale and
landscape, and it is a real challenge to do well at the levels that they want the
parking.

homeWORD did some research and found that Seattle actually had a bike/ped ordinance
that allowed apartments to be restricted by the owner to tenants without a car.

homeWORD felt secure in asking for the one parking space per unit because they knew
their clientele, typically households with one car.13 “So we argued through with the
Council and were able to come up with some compromises that enabled us to eliminate
those spots,” said Don MacArthur. They succeeded and reduced the required parking
from 28 to 18 spots, including three guest spots.

Pre-Development Phase and Municipal Decisions

Regulatory issues, such as those discussed above, arise during the pre-
development phase of a project. This phase is often high risk due to the initial
investments required without a guarantee that the project will go through. The
municipality’s ability and political will to respond to these issues gives them undeniable
authority in the final outcome of the project. As Don explained, “One of the hazards of
this kind of project from the developer’s end is that often, in order to keep the project
rolling, you have to take a lot of risks on the rezoning portion of it.” While flexibility in

13 Typical zoning for parking is one parking spot for an efficiency, one and a half for one to two bedroom
units, and two spots for a three-bedroom unit.
zoning and regulations gives developers the opportunity to implement new ideas and model innovative solutions, the time involved in securing the approval leaves developers vulnerable. They continue to work on project designs and site plans all the while waiting to hear whether the project can be built. Therefore, unless developers follow the existing regulations, which are too often based on archaic planning concepts, they are forced to go through a process with an unknown outcome. Many developers are not willing to incur these additional risks, as Don explained further,

One of the reasons that projects like the Gold Dust are not done every day or even every year is the barrier in the form of PUD. If you look at the commitment and the resources it takes to go through that PUD process no for-profit developer, or very few for-profit developers, are going to take those risks.

The neighborhood support is what helped the Gold Dust project through the tenuous variance process. In fact, Ren said homeWORD received 100 percent support from neighbors who testified at the city council saying, “we love it; it fits our neighborhood vision and goals and neighborhood plan.”

Regulations That Would Not Budge

Interviewees reported that regulations regarding air quality and building accessibility posed a challenge when developers and designers wanted to try some new approaches at the Gold Dust. The Health Department oversees the regulations that protect air quality. The Building Department at the Office of Planning and Grants reviews accessibility issues.

Missoula has worked to overcome years of poor air quality due to inversion and other factors, including unpaved roads and pulp mill emissions. James Pool, the landscape architect, wanted to use an alternate paving system to facilitate water
percolation at the Gold Dust. He pointed out that “the Missoula Health Department has some pretty strict regulations.” Indeed, as a result of regulations governing paving alleys, parking lots, and roads, Missoula has been able to reduce particulate matter in town. However, these regulations make it extremely difficult to introduce an alternative to asphalt or concrete for paving. Don commented on this predicament, “There is no way to use methodologies that have not already been approved by the state. It takes several years to get approved. You are not going to get an answer by the time you finish your project.” Developers do not have the time to go through this approval process, and there is no organization working to prove the validity of other approaches or advocating for new building or landscaping materials.

There were also design challenges to in assuring the building’s accessibility for people with disabilities. The development team had wanted to include elevated porches in front of the apartments to create a sense of private space outdoors that was delineated from outdoor space. Don commented that the code is gray, and they spent a lot of time trying to resolve their different interpretations of the code. The units are accessible from the building’s front entrance, but the Building Department felt that the code required that all doors needed to be accessible. The development team relented and removed the elevated porches.

The Gold Dust project faced regulatory challenges due to conflicts with zoning, pre-development risks, and inflexible codes. The Gold Dust development team answered these challenges by working with the city and the neighborhood to find appropriate solutions for the site. While the flexibility in the PUD process gave homeWORD the chance to design an excellent project, the unknown outcome made it a risky venture. Don
MacArthur mentioned that some developers would rather build in the county to avoid these lengthy, unknown processes, “There is very little advantage to develop in the city. The city council is much harder. There is more vagary. With the County Commission, you can have a pretty good idea.” Ren Essene also said:

I think you are going to discourage folks from developing at all if you make the process unknown - the reason why - and yes we have PUDs and every project could be done by PUDs and meet the needs of the neighborhood, but it is a risky process. Developers are constantly trying to find ways to limit their risk.”

Financial Factors in a State with Limited Resources

homeWORD was responsible for raising the necessary funds to build the Gold Dust. Since it was an affordable housing project, they juggled a variety of government funding sources aimed at providing housing for low-income households. Unlike the other two case studies, homeWORD did not have state or municipal guidelines and supplemental government funding to support their green goals. In fact, state agencies in Montana minimize their requirements in order to streamline the work involved in overseeing the project, and they play a limited role in the design and construction of the project. Because government agencies do not prioritize green, affordable housing, the success of the Gold Dust relied on Ren’s resourcefulness and skill as the primary developer to find supplemental money. Additional funds were necessary to support the increased upfront costs associated with certain features and hiring outside technical support. Ren also used creative solutions to allocate money saved in one area to fund another component that needed extra money. Overall, she needed to be vigilant and dedicated to the green goals in order to manage the complex funding streams, higher costs, and a dearth of funding dedicated specifically to green building.
The Gold Dust received funding from the public and private sector. The initial funding that enabled the purchase of the land came from the U.S. Department of Housing and Urban Development (HUD) as a Special Purpose grant. homeWORD received this grant of $1,000,000 in 1995 and set it aside for land acquisition, understanding that funding for buying land is often the most difficult to obtain as a non-profit developer. Low-Income Housing Tax Credits (LIHTC), which is administered by the Montana Board of Housing, gave a large portion of the funding for project. The Board of Housing also provided a low-interest loan from the Revolving Loan Account. The Housing Division of the Montana Department of Commerce provided a HOME grant, which helped fund construction and long-term affordability of the apartments. From the private sector, homeWORD received financing from the Norwest Bank, which helped provide interim financing, and First Security Bank, which provided construction financing. NorthWestern Energy provided a key grant for energy upgrades, including photovoltaics, compact florescent lighting, and insulation and window upgrades. The “1% for Public Art” program, which enabled two public art installations on the property, received separate support from The Allen Foundation for the Arts, A Territory Resource, Smith Barney - Missoula Branch, and other community donors.

**Multiple Funding Sources**

Any affordable housing developer ends up spending a lot of time writing multiple grants and then managing the allocated funding. A couple of people I interviewed noted that this was a challenging and frustrating process since these funders have different compliance regulations. Additionally, sometimes the agency’s funding priorities shift,
making it difficult or impossible to qualify for that pool of money. Julie Flynn explained that there is a national council for state housing agencies, called the National Council of State Housing Agencies, that lobbies at the federal level to resolve conflicts between LIHTC, HOME, and HUD funding requirements. She said,

> It is really frustrating for everyone involved. It does impact the financing because if you want to keep it simple, you are going to use fewer of those resources. But in order to keep the rents affordable you need to have as much subsidized money as you can. I guess that is the catch 22.

Ren Essene pointed out that one of her challenges is overseeing the different funding sources and balancing the regulations. Each funding source requires compliance for meeting affordability goals - the years it remains affordable and the household incomes that qualify for units. Auditors from each funding source monitor compliance on an annual basis. She felt that the ways of funding make it difficult for small non-profit organizations to break into the affordable housing sector: “I think it’s daunting and very challenging. What we have seen in our state is a reduction in CHODOs [Community Housing Development Organizations].” She relates the loss of these CHODOs to the increasing complexity of managing multiple funding sources and felt that it was important to train people in the organizations to do that work. Lastly, the Affordable Housing Project (AHP) money that is allocated by the Federal Home Loan Bank of Seattle changed their requirements such that Montana can no longer compete fairly for the funding. They required the CHODO to work at a certain level of housing units and then commit as well to special housing, such as homeless housing.
Montana Lacks Funding for Green Building Initiatives

In Montana, there is only one financial incentive program that targets developers to build more sustainably. NorthWestern Energy has a program that uses the federally mandated Universal Systems Benefit (USB) money to support energy upgrades and renewable energy projects. This program, however, places some important limits on its. First, it is only available for electrical savings and cannot be used for gas savings. Second, if a developer is applying for a new construction project, NorthWestern Energy will only help pay for measures that go beyond standard practice. As Dale Horton, the energy specialist, explained there is no definition of what constitutes standard practice; therefore, there is a gray area that is left open to debate. “What it creates is gamesmanship in the grant writing process,” he said, “you pretend you are going to start with a very inefficient, poorly designed building because that maximizes your chance of getting funding.” Dale was hired specifically to do an energy model and to write the grant to NorthWestern Energy, demonstrating the energy savings possible with all the featured green measures. Don MacArthur also commented on this system, “They use a baseline [that] they are measuring your ideas on. You have to go in and sell them that you are going to do a really crappy building and that you will build a moderately efficient building.” Dale is a passionate advocate for weatherization and energy efficiency measures, and he believes that the primary problem is that funders and government do not give any preference or fund green building efforts. Typically, funders review projects whether they are green or conventional as the same. Dale would like to see funders reward and support projects that are energy and resource efficient.

Despite these challenges, NorthWestern Energy was an important source of funding for energy upgrades and photovoltaic panels at the Gold Dust. homeWORD got
money for lighting fixtures, energy efficient appliances, and switching to automatic sensors for lighting; however, homeWORD only got a third of the funding they requested for these energy upgrades (i.e. $20,000 rather than $60,000). Northwestern could not fund awnings to shade the west facing windows and radiant floor heating because they were not electrical related. Conversely, Northwestern Energy was able to actually offer substantial funding for the photovoltaic system ($100,000). Dave Ryan, the renewable energy representative from Northwestern Energy, talked about their program and explained that they set aside $100,000 for low-income projects. He explained that the advisory committee selected the project because “USBF is looking for more than one benefit - not only are they providing a renewable energy source, but also they were providing a way to lower the utility bill for low-income folks. It was a nice demonstration project!”

Paying for Higher Upfront Costs

Beyond paying for energy upgrades and renewable energy, green buildings incur other higher upfront costs. First, Dale pointed out that the “design process costs more money” because ensuring a well-designed, thoughtfully engineered building requires extra time and effort. For example, architects and other consultants must allot extra time for drawing up detailed specifications and doing on-site inspections. Dale explained further, “Energy efficient buildings are going to cost more upfront with a pay off down the road, but resource efficient buildings cost more up front and never pay off.” In other words, the developer/owner must be willing to spend more initially, not necessarily because rewards from future savings (as is the case with energy efficiency measures), but
rather because of a commitment to the environmental benefits. homeWORD's understanding of these principles was the basis for a successful project.

During the bidding process and then throughout the construction of the Gold Dust, the development team monitored their expenses and evaluated costs and benefits of preferred materials and building systems. According to Don, when the bids came in from the various contractors, they were a bit higher than they had anticipated. The project went on hold while homeWORD and MMW discussed how to bring down costs, and while homeWORD also sought more funding. For example, when the team started talking about the building shell, they realized that although the R-control panels\textsuperscript{14} were energy efficient, they did not fit the overall design of the building. In order to meet fire code, these panels needed to be a quarter inch longer. Without that extra length, the building would need extra sheathing and materials, which in fact is more resource intensive. The team figured out that by building a stick frame, using optimal value engineer framing\textsuperscript{15}, they could reinvest some of the savings into the rooftop garden, the landscaping, and add color to the building. “We actually had that as a strategy early on so we could know what the different pieces would cost us.” Ren explained. homeWORD and MMW had about 11 or 12 alternates, they asked contractors to bid the cost for variations on work and material choices. One decision was to eliminate the bedroom closet doors to save money.

homeWORD not only found additional funding, like the NorthWestern Energy grant, but they also juggled their budget to fit the green building priorities set during the

\textsuperscript{14} R-Control panels are also referred to as Structural insulated building panels (SIPs). They are custom cut walls (and roof systems) made of rigid insulation sandwiched between wood composite board. They have excellent air sealing and insulation properties, and they also use less wood and save installation time.

\textsuperscript{15} Optimal Value Engineering is a set of efficient framing practices, reducing the amount of materials used without sacrificing structural performance.
design charrette process. Dale, Don, and Julie were all impressed with homeWORD’s ability to raise money and manage expenses. “The sophistication of the organization to be able to pull all the different funding sources together, not all non-profits in Montana can do that and make it fly,” Julie Flynn remarked. homeWORD feels good about the end product as Ren explained, “we help to pay for those higher costs because we are going to get a better quality for a longer period of time.”

The Gold Dust project is noteworthy because it rises above the norms of conventional building and utilizes green practices, but without the driving force of financial incentive programs or funder requirements. While Montana lacks abundant supplemental green funding or a funding priority system that considers sustainability, homeWORD set and achieved high goals. Through strong partnerships with NorthWestern Energy and MMW, homeWORD was able to negotiate various green building practices and meet the budget. They were creative and resourceful in their approach to fundraising and evaluating the cost and benefit of materials and building systems. Many would say that their success in dealing with a challenging budget was based on their commitment to energy-efficiency and addressing environmental issues. Ren was dogged in her approach to developing housing that is an asset to the community, held firm to the identified goals, and analyzed the environmental impact of the overall project.

Many Faces of Collaboration

The green building industry promotes collaboration as a key component of holistic design; however, collaboration is a concept used to describe a variety of the
processes applied to developing housing. Housing development is typically achieved by working with a group of professionals, each individual contributing his or her specific skills and knowledge to the project. A traditional development team is comprised of the owner, architects, engineers, and general contractors. Roles are clearly defined by the professional expectations set by the established industry. While the owner is the primary decision-maker, each person involved has opportunities to offer advice and input from his or her perspective. In the case of the Gold Dust, funding played a role in homeWORD’s approach to collaboration. As a development team, they accomplished their ambitious goals because one, they planned early in the process and facilitated a meaningful design charrette; two, they had great relationships with their partners; and three, homeWORD’s reputation helped work through some of the challenges that arose.

The Gold Dust project was built through a traditional development team process infused with some holistic design elements. In addition, the strongest working relationship was between homeWORD and MMW. homeWORD valued early planning and goal setting, and placed a lot of emphasis on the charrette process as well as involving consultants to help design or inform aspects of the project. Still, consultants, such as James Pool and Dale Horton, recognized that they reported directly to MMW as sub-contractors and played less of a role in the development team decision-making process.

*The Community Design Charrette*

Use of the design charrette (an uninhibited brainstorming session) is a hallmark of homeWORD’s projects in which they gather community input at the beginning, leading to housing that is sensitive to community needs and that become an asset to the
neighborhood. By earning a reputation for listening to participants, homeWORD gained incredible support that helped the Gold Dust get through the political process. James Pool, the landscape architect, asked to be a part of the charrette because he was interested in better understanding the vision of the project. Now, he reflects that homeWORD is: “not just going through the motions. They are seriously trying to question how are things done so I think that kind of permeated the whole project.” Ren described the charrette as an “enlightening process because we always have some ideas going in, but that design process really helps us shape our perspectives about the site.” In fact, Ren used the charrette goals to help guide certain decisions, such as installing the rooftop gardens, which she insisted on maintaining during construction and budget reviews.

Five out of six people interviewed were impressed with the success of the community process. Julie Flynn of HOME said, “they got a lot of community input upfront,” and she felt this was an enormous benefit to quell people’s fear around building affordable housing. Don MacArthur said, “I think certainly, the commitment of the community played a large part in helping us get to a good project.” The design charrette was a critical component of homeWORD’s collaborative process since it guided early goal setting and garnered essential support. The combination of the community support and the innovative ideas gave the Gold Dust a unique standing in Missoula as an unusual project modeling sustainability and community involvement.

_Reputation and Relationships Foster Successful Collaboration_

Having a solid reputation and established relationships with a variety of partners contributed to the non-profit’s success with the Gold Dust. Ren described the
development team as experienced and highlighted the importance of meeting early to establish the project’s goals. Consultants, Tracy Mumma and Steve Loken, from the Center for Resourceful Building Technology/National Center for Appropriate Technology, helped them walk through each aspect of the project and be clear about their goals. Ren also pointed out the importance of building strong partnerships with all the different groups involved and included funders, NorthWestern Energy, local banks, the Museum of Art, and MMW. Partners noted that the process was successful due to the ease of working with homeWORD. Dave Ryan from NorthWestern Energy characterized homeWORD as “flexible” and having “an open mind.” Similarly, James Pool, the landscape architect, said “the whole process seemed to be nicely open and inclusive and flexible to accommodate things that came up.” This perspective from partners outside the immediate development team highlights the collaborative approach homeWORD brought to the process.

The actual collaboration occurred between the developer and the architects. homeWORD’s approach to collaboration was based on collective knowledge and experience in building affordable housing utilizing some green building techniques. Ren credited the opportunity to work with the architects from MMW as strength to the collaborative process because they could build from their past experiences together. “We are fortunate that we used an architect that we had used on two previous projects, and they had gotten used to working with us,” she reflected. In fact, MMW really put in extra effort by monitoring the construction closely, spending time checking on regulations, and working with different government agencies.
Another part of relationship building is establishing a solid reputation as a developer in the community. Through their past record of successful projects, homeWORD was able to ask for additional support from local banks, HOME, and the city council. Approving the bike/ped units and reduction in parking spots was a real stretch for the city. Both Don and Ren felt that homeWORD succeeded in this request due to their reputation. Don remarked, “But with Ren and homeWORD’s track record of managing projects and being responsive to complaints over time the City Council was willing to go out on a limb and take that risk as a way to compromise and try to make the project work.” In terms of securing funding, homeWORD’s solid track record allowed government agencies and banks to be somewhat flexible in their approach to loans. For example, homeWORD worked closely with the HOME program and the Board of Housing’s LIHTC program to find a way to build live/work spaces (a goal established during the design charrette). The Board of Housing was concerned with the issue of double tax relief and asked that homeWORD monitor the tenant’s tax returns in regards to claiming workspace. The HOME program believes that rooms need to be occupied by a person and not used as work space. During the lease up period, they asked homeWORD to not lease to people interested in live/work space until they reviewed their housing priorities. In the end, homeWORD worked with HOME to explain how they would monitor and administer the work/live units, and HOME responded by allowing the Gold Dust to accommodate artists and self-employed tenants.
Barriers to Green Collaboration

While homeWORD certainly incorporated some of the philosophy behind green collaboration, the Gold Dust project was limited by funding, its location in a rural state, and the contractor’s limited experience with green building technologies. Dale Horton’s opinion on collaboration in the project was significantly different than Ren or Don’s perspectives. Feeling somewhat like an outsider, Dale was frank in saying that he was hired specifically to address NorthWestern Energy’s request for an energy audit. He explained,

When I was brought into the Gold Dust, the architect already had a very clear idea of what they wanted to do, and basically it was a matter of could we justify requesting utility funding for some aspect of the project. So I would say as a collaborative from my standpoint my experience wasn't all that collaborative.

Dale also recognized that the cost of holistic, collaborative design was significantly higher and that the design fees for architects in Montana were not high enough to meet these demands. He added that, “most architects in Montana are not familiar with those concepts, so it is not surprising that those ideas are somewhat foreign.” Architects in Montana receive lower wages and are not surrounded by cutting edge technologies and sustainability discussions, as are professionals in both Oregon and New Jersey. Dale claims it is an isolated environment that hinders the housing industry in Montana from learning and then implementing new aspects of their trade.

In terms of working collaboratively, perhaps, the area most encumbered was the relationship with the contractors. For the Gold Dust, homeWORD selected the contractors during a bidding process (and homeWORD was required by its funders to choose the lowest bidder). Since homeWORD had to go through a bidding process, the plans and drawings were completed prior to going out to bid; therefore, the contractor
missed all the early planning and pre-development decisions. One of the challenges Ren mentioned was “having experienced contractors to bid it out and believe that they were going to have to labor cost savings.” The whole relationship with the general contractor revolved around money and most decisions came down to the budget. Don described this aspect, “The collaborative part is when we sit down together and ask Ed what do you think. ‘Can we get some money out of this? There might be a little over here, what about that, there might be some there?’” They sat down together, reviewed a list of costs, and figured out how to balance the budget and get the most energy-efficient, environmental building possible.

The hardest part was that the contractor did not always want to do something different or understand the reasons behind a decision. Don felt that trying to work on a project as a design-build (working with the contractor from the beginning) would not work and said, “I think in Montana we are still a little bit behind the curve allowing people to do design-build kind of services. We have had mixed results with having the contractor involved early on.” Typically, interviewees noted that there is a resistance on the part of contractors and architects to work together, and this has been attributed to differences in professional culture. Because the contractor missed two appointments to be interviewed for this study, it is impossible to present their perspective on the project and their views on the impediment to building stronger relationships. Dale Horton, the energy specialist (who is also a licensed architect), believed that builders, in general, tend to stick with what they know. He explained, “If you didn't ask specifically for it, then they will take the approach for all other projects, and they will do it like the last project. ‘Hey, it was good enough for the last one - it was quick, it was easy.’ So, it’s absolutely critical
to establish what they [the developer and architect] want out of the project.” In regards to green features, Don MacArthur added, “The hard part is if the contractor is not buying into them, then you are going to have a hard time trying to meet them anyway.” His firm assigned an architect to be on-site regularly during construction to monitor and ensure the contractors met specifications. In general, the architect/owner feel a lack of understanding and trust with the general contractor regarding the overall green goals that are critical to the project.

The key elements of collaboration included the development of strong partnerships including community partners, the shared trust and flexibility between homeWORD, MMW and key partners, and homeWORD’s reputation as excellent developers. Don said, “I think part of it is that we have developed trust and relationships with the folks involved so we are able to know probable goals and move faster and move farther.” A barrier during the collaborative process was that the contractors were hired through a bidding process and were not involved in the early planning stages of the Gold Dust. Therefore, the contractor was less motivated by and familiar with the green goals. Ren made construction decisions restricted by the confines of the contractor’s bid and homeWORD’s budget.

**Conclusion: A Successful Project**

The primary factors that contributed to the success of the Gold Dust boil down to three basic elements: strong vision and leadership, a proven track record, and strong partnerships. Interviewees credited homeWORD with vision and commitment to meeting high standards for green building and community driven design. Dale Horton stated, “I
give 100 percent credit to homeWORD. I believe they are the ones who set the standard, and this is what most clients don't understand.” While homeWORD recognized their commitment to green building, the organization also attributed much of its success to the strong partnerships it formed with funders, architects, and the community.

The community charrette process enabled homeWORD to establish important neighborhood support, and unlike the other two projects, this proved to be a unique aspect of the project. Ren ascribed the community design charrette as foundational for setting project goals and guiding project decisions:

A community-based process that helped us set those goals was actually very important because that is actually where I wasn't going to give on the roof garden was based on the neighborhood design charrette, where people saw it as one of the highest values of the project. Hmm, we could get rid of closet doors or we could have a rooftop garden, in our value chart the rooftop garden was very high.

Julie Flynn of HOME also recognized that homeWORD goes beyond the norm by “reaching out to the community” without additional assistance from funders. By attracting community support and having a proven track-record, homeWORD secured political approval when the organization applied for the PUD and negotiated for bike/ped units. Neighbors testified at the City Council hearing for homeWORD’s PUD approval. Don MacArthur also felt that homeWORD’s reputation was key to the team’s success in asking for such unusual variances as the bike/ped units. He said the City Council was willing to “go out on a limb” because they had seen that homeWORD was “worth their word.”

Through homeWORD partnerships and vision, homeWORD funded a green, affordable housing development. Ren acknowledged the importance of the grant from NorthWestern Energy for energy upgrades and photovoltaic panels and HOME’s
willingness to provide grant funding that ensures lower rents and long-term affordability. Juggling funding and meeting funder requirements are challenges a non-profit must face. Ren has skill and experience that helps her fundraise and manage the variety of funding. One aspect of funding that interviewees identified as particularly difficult was the pre-development phase. Don said, “The way that projects time out and are funded...it is very difficult to do these projects without putting yourself out on the line as a developer financially.” homeWORD carried the project through this tenuous period, and interviewees credited strong relationships based upon trust and prior experience.

The Gold Dust apartments are the exception to the norm of affordable housing in Missoula. The aesthetic value of the buildings is considered an asset to the surrounding community. Dale attested, “It’s eye catching. It accomplishes a community need, it improved the community by where it was located.” The Gold Dust has attracted attention both locally, as well as nationally, for its energy efficient design and green features, and it is featured on two different websites: NorthWestern Energy and Homes Across America. homeWORD, as the non-profit developer, was responsible for fundraising and leading the collaborative process, and they set high standards for sustainability and community involvement. What homeWORD achieved in terms of sustainability and community driven design was accomplished without regulatory motivation or financial incentives. Ren drove home the developer’s commitment when she said, “We just hold that so strongly in house because of our mission, because we have built sustainability as part of our mission, as part of our impact statement that really gives me the room to say – ‘no, this is absolutely going to go in the project.’”
Green, affordable housing brings together two important issues our society must address - environmental degradation and social justice – in a holistic manner that promises to help support vital, healthy communities. Because of housing’s impact on our natural resources, its inherent use of energy, its ability to create strong communities, and its influence on the local economy, the construction and rehabilitation of affordable housing using green building principles has the potential to make a significant contribution to our nation’s security and well-being. Similarly, affordable housing is a basic human need that cannot be neglected if we are to continue to build a civil society. These case studies demonstrate the promise of combining green building practices with affordable housing.

There is a consistent demand for affordable housing that contributes to the strength of the housing industry. The production of housing plays a crucial role in our economy and accounts for approximately 14 percent of the nation’s Gross Domestic Product. Contrary to the general decline in investments in 2001, the production of housing actually grew at a rate between 2.4 and 8.5 percent (National Association of Home Builders 2002). Sadly, paying for housing has increasingly become a burden on working families. In 1999, a quarter of this country’s population, over 28 million people, reported spending more on housing than the federal government considers affordable, spending over 30 percent of the household’s income (Millennial Housing Commission 2002). In fact, in 1999 it was calculated that there was a gap of 1.8 million units of
affordable housing available to the poorest households (Millennial Housing Commission 2002). As more research indicates the benefits of green building, there is a growing interest in bringing these benefits to the affordable housing arena.

These case studies are newly constructed developments in which residents moved into their apartments in the spring of 2003. As these projects mature over the next five to ten years, a post evaluation would offer insight into the desired outcomes of building green, affordable housing. By interviewing residents at each site, research could expose whether tenants realize the financial and health benefits of green housing. Does this benefit translate into a stronger demand for green features? Are their convictions regarding environmental issues stronger? Research could also evaluate whether the estimated energy savings and long-term durability had a substantial pay back for the owners. Did the different amenities, such as gardens, rain cisterns, and community rooms, change the residents’ daily lives or create a stronger social fabric in the community? An ex-post analysis would be an important step in revealing additional lessons that could further guide the development of effective green, affordable housing.

As leading examples of green, affordable housing, the case studies presented in this research provide excellent illustrations of the opportunities and barriers to developing such projects. Green building is a holistic approach to building housing that combines resource and energy conservation, water conservation, waste reduction, indoor air quality, and community sensitive design together to address environmental and social impacts of the construction industry. Each case study looked closely at three key factors that influence the application of green building principles to affordable housing projects during development and construction - the effect of zoning and regulations, the impact of
financing, and the influence of the collaborative process. I examined how these factors influenced the outcome of each project. First, zoning and regulations are determined at a local level and at a state level. They set limitations on land use as well as define a community’s density levels, transportation priorities, and building design standards. Second, affordable housing relies on funding from a variety of sources including government agencies, foundations, and private lenders. Local and state government agencies have tremendous influence on these projects through prescribing specific funding requirements for their low-interest loans and grants. Finally, the development team influences the outcome of a green, affordable housing project by combining each member’s specialized skill and expertise to design and construct the site and buildings.

In reviewing these case studies, there are some striking lessons to be shared regarding the similarities and differences presented in the findings.

**The Effect of Regulations**

Each case study was subject to their locality’s zoning and regulations, and while these rules differed, the three case studies shared similar perspectives on the effect of regulations on developing green, affordable housing. The flexibility of city offices to accommodate variances and site plan changes played a significant role in the outcome of the projects. All three projects revealed challenges around parking regulations and their impact on site plans. Generally, zoning ordinances require an inordinate amount of parking on-site, therefore restricting landscaping and other site improvements. While cars have become a dominant feature in how we design for housing, less attention is given to alternative modes of transportation, thus compounding the dependence on cars.
Similarly, there is a lack of recognition that not all housing needs to accommodate such high numbers of cars. In fact, some affordable housing providers, including homeWORD, would argue that their constituents own fewer vehicles per household than other populations. Because parking has a big impact on site design and layout, it is very important for cities to have flexibility in enforcing this regulation.

Each case study referred to the municipality’s flexibility as an essential aspect to developing green housing. Without variances in the cases of Douglas Meadows and Eastamton and an approved PUD in the case of the Gold Dust, each project would have been severely limited in their ability to meet their sustainability goals. For the Eastamton Town Center, the development team made extensive changes to the site plan in terms of building orientation, road width, connected pathways, and parking, which all required township approval. The Gold Dust project team asked for changes in setbacks to match the historic street frontage, a reduction in parking spots, and permission to build accessory dwelling units by the alley. Douglas Meadows needed reduced on-site parking and introduced the rain handler system instead of gutters. For all the projects, the variance process was time consuming and left the developer vulnerable to changing political will and possible rejection. While these case studies highlighted the importance of flexibility, they also illustrated that such a process with an unknown outcome is an inherent risk to developers, and developers are adverse additional risks. As long as the added risk factor remains a part of seeking variances, there will be a limited number of developers willing to push green building ideas.
Regulations: A Double Edged Sword

Zoning and regulations play an important role in providing standards for housing and controlling land use. Regulations protect neighborhood integrity and human health and safety. Additionally, zoning determines a community’s growth patterns and densities. The three case studies demonstrated a need for flexibility in managing zoning and regulations. Without acquiring variances, the projects would not have met all their green building goals. This juxtaposition between the need for regulations and the need for more flexibility poses a quandary in how communities can best facilitate the construction of green affordable housing.

These case studies point out that standards can limit innovation through outright denial of a variance or simply by dictating a conceptual framework in which projects are built. Only a few developers are willing to push innovative ideas since it requires additional time and risk. We need to find ways to review and evaluate standards that best address our current growth rate and housing needs, and then create solutions that take into account the long-term effects of building. Municipalities need to conduct a thorough evaluation of their mechanisms in place to identify ways to encourage innovation and, at the same time, maintain appropriate standards. These projects provide some insight into areas that should be addressed.

Demonstration Projects

Developers that provide demonstration projects influence future regulations and ordinances, and by doing so they facilitate change that other developers follow. Innovative housing projects that establish reasonable and well-intentioned goals can act
as models, showcasing the city process and the implementation and outcome of green goals. For example, the rain handler system is successful on the Douglas Meadows project, the city will consider its approval for multi-family residences. Eastampton established new standards for greenfield development, creating a site design modeled on traditional neighborhood design that sets a precedent for future suburban developments in New Jersey. The Gold Dust is modeling the use of bike/ped units, which offers an alternative for infill development with limited on-site parking. The success of these model developments may spark the interest of other developers and city planners, and thus help support the continued approval of such alternatives. Developers willing to take risks by going through the variance process act as leaders for the rest of the community demonstrating new solutions for urban planning and design.

Douglas Meadows and Eastampton Town Center demonstrated that government policies can have a significant role in promoting sustainability. Embedded in Portland’s governing bodies is a value for sustainable development. Through the city’s progressive land use planning, the city has established a core of regulations that support sustainable housing. Furthermore, the city council created an Office of Sustainable Development to develop policies and offer technical assistance to advance the city’s mission to be the greenest city in the country. By setting high standards for affordable housing applicants, Portland is ensuring that green building principles are adopted on a larger scale throughout the city. New Jersey established the Green Homes Office through the Department of Community Affair’s Balanced Housing Program. Leaders at DCA decided to create the office to support, through financial subsidy, the implementation of green building principles into the affordable housing arena. Although NJ and Portland
played a different role in encouraging green building, the case studies demonstrated that
government can facilitate green building through its regulations and policies, as well as
through its funding streams.

Lessons for future projects

There are several lessons from the experiences of these projects that can be
applied to improve future projects. Interviewees discussed the need for higher density
zoning and flexibility in providing off-site parking. However, a broader discussion
around transportation permeated the interviews. It is important in addressing green
building that planners and policy makers do not overlook the necessity for good
transportation planning. Housing needs to be built with an emphasis on community
connectedness and should be linked to viable transportation alternatives. Government
policies lay the foundation for sustainable development, and local governing agencies
need to respond by reviewing and changing their regulations. Interviewees
acknowledged the importance of flexibility in zoning in order to apply innovative
solutions that are often site specific. The evaluation of zoning and regulations pose
interesting issues that practitioners must begin to deal with. Future research should
investigate mechanisms of evaluation for variances that would reduce developer risk and
promote green building. Participants argued that by making the outcome known or by
streamlining the permitting process, developers would be more receptive to implementing
green building concepts.
Financing the Projects

All three case studies highlighted that securing funding was by the far the most challenging aspect of the project. The financial aspect of the case studies can be broken into four categories: pre-development, multiple funding streams, higher upfront costs, and developer experience. All three projects were dependent on outside funding, subject to tight budget constraints, and required a commitment from the developer. In one case, the state’s ability to offset high costs through subsidy attracted a wider audience of developers. In the two other cases, the developers persisted by searching for additional funding and looking at alternative solutions for budget shortfalls.

All three projects revealed that the pre-development stage was a vulnerable period. Funding was not secure, yet developers needed to pull together a team to produce the first drawings and plans, and secure variances. Lack of deep reserves upon which to rely posed an extra challenge for the non-profit developers. Instead, they depended on their deep commitment to mission and their past experiences and partnerships to negotiate the pre-development demands. Human Solutions gave $26,000 of their developer fee to ensure that the green goals were met. homeWORD worked closely with MMW to establish higher standards for green features than on their previous projects. homeWORD and Human Solutions met this challenge by stopping the development process, searching for additional funding, and making creative budget changes, but they never wavered in their pursuit for the highest quality affordable housing.

While putting together pre-development schematics, the developer is also searching for funding. It is well known that affordable housing projects require multiple funding sources, including funding from LIHTC, HOME, and HUD. Often times, the
developer must apply several times, which makes the application process lengthy and frustrating. Sometimes a developer uses as many as eight different sources of funding. At the same time, each funding source may have conflicting requirements and an onerous compliance process. The funding challenges require that a developer have sophistication and knowledge to juggle the multiple funding sources.

On top of managing multiple funding sources, a developer must find additional money and analyze the project’s budget. All three projects attested to some concerns around higher upfront costs of green building. The extra design time, additional consultants, and material costs were all listed as areas of increased cost, but there were several ways that the developers were able to offset these concerns. Through a creative approach to budgeting, homeWORD was able to identify areas of the budget, such as closet doors, that could be cut in order to augment money for other features. Interviewees cited durability and energy-efficiency as important aspects to include in a project because their cost would be recuperated over a span of years through savings in maintenance and utility bills. Interviewees also placed significant emphasis on the importance of identifying long-term strategies in design and construction that address environmental concerns and support economic viability. The use of concrete floors by homeWORD and Human Solutions provided a good example of long-term thinking. Concrete floors replace carpet installation, which reduces the need to replace carpet frequently and provides a benefit of improved indoor air quality.

Lastly, New Jersey’s Pilot Program demonstrated that financial incentives were an effective mechanism for attracting developer interest and supporting the application of cutting-edge technologies and concepts. By using financial incentives, New Jersey
impacted a broader range of participants over a short span of time. Both the architect and the developer presented the Eastampton project at professional meetings and conferences, sharing their lessons learned and encouraging practitioners to implement green building strategies. While gap subsidy for the project covered higher costs, some of these costs can be attributed to the “learning curve” necessary to gain new skills and find the best resources. In fact, some of the green features used for Eastampton have been incorporated into Pennrose’s other projects because they are so cost effective. Interviewees considered the financial incentives an important aspect of Eastampton’s success because they contributed to the motivation of the developers and provided support for trying new ideas. Unlike the other cases, the NJ Pilot Program attracted a developer who may not have done a green building project otherwise.

*Future Financing: What needs to happen?*

How can governments, private lenders, and foundations encourage sustainable building? First, while many green building experts argue that the application of green building principles should not cost more (RMI 1998), the reality is that in the affordable housing sector there is an increased cost. Some of this may be due simply to the time required to meet with team members, for learning a new method, or for coordinating with sub-contractors. While commercial projects can typically recuperate these costs, an affordable housing projects operates on a much more limited budget.

Funders should offer financial incentives that offset higher costs, understanding that higher upfront costs limit affordable housing developers. The two non-profit developers demonstrated creative and dedicated approaches to funding these additional
costs. The Gold Dust sacrificed some areas to maintain other priorities, such as the roof
top garden. The project also received additional funding from foundations and partners
to support its “1 % for Art” project and a large grant from NorthWestern Energy to
purchase photovoltaic panels. Douglas Meadows received support from all the
development team members through volunteer time, materials, and money in order to
defray the additional costs and ensure the successful application of the green building
goals.

Funders need to recognize that these innovative type projects are going to cost
more upfront. Subsidy funding attracts a broad participation in applying green building
and supports the “learning curve” that will impact future projects. Since often times state
funders want to see the municipality’s support of affordable housing projects through
granted funding, local funders should recognize they have power to set green building
priorities in their RFP process. However, a caveat to creating additional requirements is
that the multiple government agencies need to better coordinate their application
processes to reduce funder conflict. While financial incentives certainly encourage a
broad adoption of green building practices in the industry, homeWORD proved that
green, affordable housing is possible without extensive external factors, such as
government funding, technical support, and progressive regulations.

While the total project cost was noted for each case study, these costs were not
analyzed in complete detail. Because each site was located in different geographic areas,
the budgets reflected variations in cost for wages, materials, and types of buildings. Each
budget also displayed their itemized costs and overall budget in different ways. The Gold
Dust budget indicated the costs of syndication required for Low-Income Housing Tax
Credit financing, a notable cost to the project. The Eastampton Town Center budget documented costs for the green features. These kinds of costs need further exploration in order to better understand the final expenditure for a project as well as the long-term payback for upfront investment in energy efficiency and low maintenance features. Future research could explore detailed cost analysis for the application of green building principles to affordable housing.

**Collaboration in Action**

The collaborative aspect of each project differed due to various circumstances; however, there were shared lessons that emerged during the analysis. Affordable housing projects generally rely on collaboration and partnerships between the developers, architects, and contractors. Green building requires an extra layer of collaboration, which includes early planning, additional consultants, and more frequent meetings. Green building advocates emphasize the need for a collaborative approach to the design and construction of a project, including not only the developer, architect, and general contractor, but also a landscape architect, an energy specialist, a sustainability consultant, engineers, and community stakeholders (RMI 1998). Each project recognized the need to foster a collaborative approach and identified their strengths in making this happen as well as the barriers they encountered during the process.

**Early Planning**

Early planning is essential in order to identify goals and create a vision for the project. For example, the Gold Dust presented a strong case for the importance of a
community design charrette. This early brainstorming session provided the foundation for some key features that made the project an asset to the neighborhood. It also helped strengthen community support and buy-in since the neighborhood was given a voice during the visioning process, which helped during the PUD application process. Human Solutions established green goals for Douglas Meadows during the early meetings with Sustainable Communities Northwest. The organization’s ability to set a vision early in the process helped shape the development team’s approach to planning and design.

Many interviewees noted the developer’s leadership and commitment to the green building goals. Participants gave accolades to the developers of Douglas Meadows and homeWORD for their persistence and tenacity in achieving each project’s initial vision. The Douglas Meadows project highlighted the most effective collaborative process compared to the other two case studies. Douglas Meadows team members acknowledged team cohesion as their strength to solving problems and overcoming substantial hurdles, such as the budget crisis. Interviewees recognized Ren Essene, the Executive Director of homeWORD, as a key force behind the success of the Gold Dust. Each project also required frequent development team meetings and intensive on-site project management. In the case of Eastampton, the development team met diligently every two weeks and sent out detailed notes to extended team members. In addition at the request of New Jersey’s Green Homes Office, the architects at Kitchen and Associates created a green building progress tracking report to monitor the work as it unfolded.

*Vision for Green Building*
Many of the interviewees discussed the relationship between developer and general contractor, and each project handled this aspect of collaboration in different ways. This critical relationship translates the developer vision and applies it to the construction process. The Douglas Meadows project demonstrated the strength of a negotiated bid process whereby the contractor enters into a partnership early on, instead of bidding the project after plans are created. The contractor works more closely with the developer to address building issues and resolve problems as they arise. Seabold Construction showed an interest and background in green building, which further solidified their ability to participate on the collaborative level with the developer and extended team. Other team members displayed commitment to the collaborative process by donating extra time and working together through the tough times when funding was short and problems arose.

General contractors at times pose a significant challenge when they are not included in the first planning stages. If a contractor does not believe in the green building mission or specific features, he or she can deviate from the plans and return to the methods used frequently on earlier projects. Eastampton was unique in that Pennrose had a longstanding partnership with the general contractor whereby project contracts were implicit from the beginning. When they had differences of opinion, Pennrose worked with the contractor to solve problems from team perspective. Through some trials and tribulations, Pennrose and the contractor discovered new methods and ideas that they now apply to other housing projects. By contrast, the Gold Dust illustrated a relationship between developer and contractor that relies basically on money. homeWORD and the contractor worked out a list of items that could be added or subtracted in order to stay on
budget. Without a strong commitment to the Gold Dust’s vision and green building, the contractor becomes an entity to be closely managed.

Participants noted that establishing a vision for green building at the beginning created a shared understanding of the goals to be met. Douglas Meadows started with a strong vision to be the leading green, affordable housing project in the area. The development team set high standards and received support from some key green building specialists. The team members also had extensive knowledge in green building and collaboration. homeWORD as well established strong goals and a project vision upfront. Specifically, the Gold Dust highlighted the importance of extending the concept of collaboration to the community. The community design charrette helped build neighborhood support and momentum behind the project, which likely influenced homeWORD's success in gaining PUD approval. Similarly, developing strong partnerships led to better collaboration. Interviewees commented that trusted relationships and the developer’s reputation facilitated smoother transactions, variance approvals, and securing additional funding. Collaboration takes many forms, but these projects revealed some essential lessons that can be applied across the board.

*Future Collaborative Efforts*

No matter what kind of housing project is being developed, some aspect of collaboration is involved. However, there are specific ways to incorporate collaborative efforts on a broader scale that will contribute to the success of the project. These three case studies illustrated some fundamental pieces that should be included in all green, affordable, housing projects. The developer plays a critical role in providing leadership,
establishing strong partnerships, and committing him or herself to green building principles. The developer should also prioritize early planning, set green goals, and help create a vision or shared understanding that guides the project. This may involve a community design charrette in order to include neighborhood concerns and ideas. The development team needs to meet often and establish a method for communication. If possible, developers should select general contractors based on their commitment and understanding of green building principles. In terms of the collaborative process when budgets are limited, the core team members should include the developer/owner, the architect, and the general contractor. However, the case of Douglas Meadows indicated that it was beneficial to also include a green building specialist, a landscape architect, and a person knowledgeable on energy systems. In fact, all three case studies revealed that the projects needed an energy specialist to be truly effective in achieving energy goals. In general, a green, collaborative approach to design requires upfront additional time and money, which poses challenges to affordable housing developers.

There is a growing body of literature that discusses the benefits and application of green building principles; yet, there is still little written about the application of green building principles to affordable housing projects. This thesis explores cutting-edge projects that married affordability with sustainability in innovative and replicable ways. The research offers insight into what three projects accomplished on the ground, how they overcame various obstacles, and what facilitated their successes. Each project offers a unique perspective on the opportunities and barriers to building green, affordable housing. The data revealed key factors that facilitated the success of each project. These
factors include: a strong shared vision and established goals, a firm commitment from the developer to sustainability, extra time for design meetings and to negotiate variances, and regulative flexibility and ease to foster innovative solutions. Douglas Meadows, Eastampton Town Center, and the Gold Dust apartments demonstrate not only that green, affordable housing is a good idea whose time has come but also that it can be done successfully.
Appendix A

Interview Script

Thank you for agreeing to talk with me. As I explained briefly in our earlier conversation, I am conducting case study research on affordable, sustainable housing. I have selected three projects for my research and have focused my study on the regulatory, financial, and collaborative aspects of each project. The reason I want to talk with you today is because these sorts of projects require the involvement of many individuals. I am interested in capturing a broad array of perspectives regarding _____________. (Before we get started, I need you to read over and sign this informed consent form, which is required since this research is being done through the University of Montana.) I would be happy to answer any questions or concerns you have in regards to the study and your participation in it.

Great! I appreciate you understanding the importance of this formal agreement. Is it OK if I tape record the interview so that I can refer back to this conversation if I need more clarity or want to use an exact quote in my paper?

I plan to cover five areas during the interview:
1. A general overview and history of the project.
2. Zoning and regulations
3. Finances
4. Process and collaboration
5. Concluding remarks and advise

Overview - I would like to start by getting a better understanding of the project history.

1. Can you describe your role in the project?
   a. Were you involved from the beginning, middle, end?
   b. Tell me more about what that means?
   c. Can you give me an example of the kind of things you did?

2. What led to the incorporation of sustainable building goals in the ________ project?
   a. Who proposed adding the sustainable elements to the project?
   b. What was the reaction?
   c. What was your approach to integrating green building in the project?
   d. How did you balance green building with other project needs?

3. What do you think worked well for this housing development?
   a. You mentioned __________, what about …
   b. Sustainability
   c. Collaboration
   d. Education
e. Affordability  
f. Modeling  
g. Working with city planners, contractors, state agencies…

4. What do you think did not work well?  
   a. You mentioned __________, what about …  
   b. Sustainability  
   c. Collaboration  
   d. Education  
   e. Affordability  
   f. Modeling  
   g. Working with city planners, contractors, state agencies…

**Zoning** - Every city develops its own set of ordinances and regulations. I would like to learn more about the influence these play in the outcome of the project and its overall goals.

1. What was the role of zoning in the project development?  
   a. Did it help facilitate the project’s goals?  
   b. Did it hinder the project in anyway?  
   c. What about roads and parking?

2. What are the implications for other affordable, green housing projects?

3. Are there any other regulations or ordinances that played a significant role in the outcome of this project?  
   a. Can you describe the effect of this regulation/ordinance?  
   b. Did this change how you approached developing this project?

**Finances** – No housing can be built without financial support, so I am interested in taking a closer look at the influence and effect of financing.

1. I know this project required a variety of financing including tax breaks, grants, conventional loans, and low-interest loans.  
   a. Which form of financial support played the most significant role? Why?  
   b. What are the strengths of this __________?  
   c. What are the weaknesses?

2. In your opinion, what financial programs provide the best incentive to use green building practices?

**Process** – Due to the application of sustainable building principles, this project required a significant amount of collaboration between different groups, such as professional consultants, planners, architects and builders.
1. Could you describe the process that was used to involve all the different groups or individuals?
   a. Was this process different than a conventional project? If so, how was it different?
   b. Did you meet together as a group? How often? Where?
   c. How were decisions made?

2. How would you describe your role in this group process?

3. How well does this project stand up to the initial project goals for sustainability?
   a. What were the determining factors for its success/ these gaps?

**Concluding thoughts** - As we wrap up this interview, I am interested in hearing your thoughts and ideas for future sustainable, affordable housing.

1. If you had to choose one aspect from the regulations, financing, or group process that made this project a successful green building endeavor, what would that be?

2. Based on your experience from this project, is there any advise you would give to other groups that wish to embark on a similar project?
Appendix B

Informed Consent Form

I ask that you read this document and ask any questions you may have before agreeing to be in the study.

TITLE: Can Affordable Housing Be Green? A Closer Look at the Opportunities and Obstacles.

INVESTIGATOR and FACULTY SUPERVISOR:

Betsy Hands
1337 Sherwood Street
Missoula, MT 59802
406-721-3881
everhands@yahoo.com

Thesis Committee Chair:
Neva Hassanein
University of Montana
Janette Rankin Hall – EVST
Missoula, MT 59812
406-243-5271

Purpose

The purpose of this research study is to learn about the opportunities and barriers presented in green affordable housing through in-depth case studies. By analyzing the experiences of and knowledge gained from these projects, I will highlight what makes these projects work and how to better facilitate the integration of sustainable building practices into affordable housing developments.

Procedures

If you agree to take part in this study, you will be asked to participate in an hour interview, a follow-up phone interview, and to provide documents relevant to the identified project.

Voluntary Nature of the Study

Your participation in this research is voluntary, and there is no compensation for your time.

Confidentiality
Due to the nature and size of this study, I cannot guarantee your anonymity. I will record the interview only to ensure accuracy in my notes. These tapes will not be released publicly.

Risks and Benefits of Being in the Study

Because you may be identified in papers and documents that emerge from this research, your organization may receive national recognition.

Compensation for Injury

Although I do not foresee any risk in taking part in this study, the following liability statement is required in all University of Montana consent forms.

In the event that you are injured as a result of this research you should individually seek appropriate medical treatment. If the injury is caused by the negligence of the University or any of its employees, you may be entitled to reimbursement or compensation pursuant to the Comprehensive State Insurance Plan established by the Department of Administration under the authority of M.C.A., Title 2, Chapter 9. In the event of a claim for such injury, further information may be obtained from the University's Claims representative or University Legal Counsel.

Questions

If you have any questions, you may ask them now or later. If you decide to participate, you are free to withdraw at any time without affecting any relationships. Feel free to contact me or my faculty supervisor later if you have any future questions.

Subject's Statement of Consent

I have read the above description of this research study. I have been informed of the risks and benefits involved, and all my questions have been answered to my satisfaction. Furthermore, I have been assured that any future questions I may have will also be answered by the investigator or faculty supervisor listed above. I voluntarily agree to take part in this study. I understand I will receive a copy of this consent form.

Printed Name of Participant __________________________

Signature of Participant _______________________________ Date ____________

Signature of Investigator _______________________________ Date ____________
Appendix C

Ten Shades of Green

For more than 100 years the Architectural League of New York has helped architects, artists, and the public enrich their understanding of the purposes and importance of architecture. The League has remained remarkably consistent in its goals over the years, always focused on the understanding and development of the aesthetic, cultural, and social concerns of the discipline. Through its exhibitions, competitions, design studies, publications, and public programs the League has a national and international impact, in addition to its prominent role in New York artistic and civic life.

ARCHITECTURE ALONE CANNOT CREATE A SUSTAINABLE CULTURE. It can, however, make a major contribution to the pressing quest to devise ways of life that are less taxing on the earth's resources and capacities for regeneration. Buildings account for nearly half the energy consumption of developed countries, and therefore are the major cause of global warming, the most tangibly urgent of environmental problems.

But green design is not only about energy efficiency, and it is not purely a technical matter. Instead it involves a whole nexus of interrelated issues, the social, cultural, psychological and economic dimensions of which are as important as the technical and ecological--thus the 'ten shades' of this exhibition's deliberately ambiguous title. Ten shades refers to ten key issues that need to be considered to create a fully green architecture: low energy/high performance, replenishable sources; recycling; embodied energy; long life, loose fit; total life cycle costing; embedded in place; access and urban context; health and happiness; and community and connection. It refers as well to the built schemes that are the exhibition's focus, and to their various degrees of 'greenness.'

AS A GROUP, THE BUILDINGS PRESENTED MAKE SEVERAL CRUCIAL POINTS:

* There is no such thing as a green architecture or a green aesthetic. Instead there are countless ways design can address and synthesize green issues.

* Green design is not merely a matter of add-ons or product specification. It involves more than insulation, low-emissivity glass, non-polluting paints, and water-conserving toilets. Rather, it influences the form of the whole building and is one of its major generators from the first moments of the design process.

* As a corollary, pursuing a green agenda is no constraint on creativity but instead a major stimulus towards an architecture that is innovative, significant, and relevant.

* Greenness is not incompatible with the highest levels of architectural excellence. Europe's leading architects are also among its best exponents of green design.
Green design acknowledges the dynamic interaction of buildings with their immediate natural setting and ambient forces. It is these interactions on which the design process focuses as much as on the resultant form of the building. This way of working draws on and parallels the most up to date insights from science.

Many green buildings represent the leading edge of engineering design. In particular, the design of buildings such as Commerzbank or the Jubilee Campus is the product of predictive modeling techniques. Their functioning depends on neural network software and a myriad of sensors. Such buildings, which are produced through close collaboration with engineers from the first moments of design, need to be far more precisely engineered than conventional buildings.

The majority of the buildings presented come from Europe. There, individual governments have enacted stringent environmental standards for new buildings. The European Union has fostered green design by sponsoring applied research combining innovative technology and design. Clients, attracted by the economic advantages of green buildings, along with architects and engineers, have risen to the challenge of producing high performance buildings designed for long-term use.

The United States is far behind, and American architects will have to work very hard, very fast to catch up. Among the many challenges this poses, several stand out. Clients and architects will have to learn to think long term, rather than short term. They will have to rethink their measures of the impacts and profitability of a building, and consider its legacy to future generations. Architects and engineers will have to learn to work more collaboratively. They will also need to reopen themselves to understanding of, and respect for, the functioning of the natural world--an understanding that was once an expected part of an architect's knowledge and is currently the locus of cutting edge discovery and invention in other fields.

The challenges are significant, but the potential rewards are immense: an architecture consonant with, rather than destructive of, the natural world; an architecture that supports community; an architecture that offers much richer sensual experience of the environment and an intensified sense of place; an architecture, in short, that increases the quality of life.


Concrete Network. “Benefits of Radiant Floor Heating.”


New Jersey Pilot Program. 1998. *Sustainable Development/Affordable Housing Pilot*


