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OPPORTUNITIES FOR PLANNING GROUPS AND DEVELOPERS

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# COHOUSING AND SUSTAINABILITY RATING SYSTEMS: OPPORTUNITIES FOR PLANNING GROUPS AND DEVELOPERS

By

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## ABSTRACT

COHOUSING AND SUSTAINABILITY RATING SYSTEMS:
OPPORTUNITIES FOR PLANNING GROUPS AND DEVELOPERS

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This study examined the level of importance various sustainability features have with the residents in cohousing communities that have been completed between the years 2000 and 2009. Sustainability features that are integral to the construction decisions are aligned with measurable sustainability rating systems available in the marketplace. Priorities of residents were identified and individual communities were examined to reveal the implementation of sustainable building practices to the completed community.

The findings in this study indicate that sustainability measures that can be incorporated into the design and construction of a cohousing community are important to those who live there, and are likely to be realized as features of the finished community. Respondents to this survey were most in favor of sustainability measures that can show a return on their investment. Where future cost savings can be planned for, the response to implementing sustainable features was very favorable.

The study further breaks down priorities of various age groups to identify any differences in priorities between those in their senior years, those preparing for senior years, and those in younger generations, as well as to clarify which generation of cohousing residents may emerge as a leader in making sustainable construction decisions in cohousing communities.

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# CHAPTER 1

## Introduction

Throughout all of life, being sheltered from the elements and from enemies or those who may cause harm is a necessity. Where that shelter is located and with whom the shelter is shared are choices made by those seeking a place that meets the physical, economic, and emotional needs associated with this necessity. There are many reasons that some choices can be eliminated when selecting an appropriate space and shelter. Occupants may be too young to make the choice of where and how to live, so must acclimate to the choices made by parents or guardians until they have grown into adulthood themselves. Economics narrow shelter options for the occupants with limits of locations and structures that are affordable. Employment of one or more of the occupants will influence the location selection of the shelter. Families and friends can influence the choice of where and how a person or persons will live and work. There are many factors that must be figured into the decision-making process of finding a place that can be called "home".

Choices are not limited to the location and affordability of a single dwelling. For those who become homeowners and make a financial commitment to a location, the choice of neighbors and neighborhoods can also be considered. When looking for a home to purchase or a location where a home can be built, a buyer will want to know if they will be in a place where neighbors will share their same values. Decisions of where and how homes are selected can be influenced

by the culture of the neighborhood and the values of the neighbors (Meltzer, 2005).

There is a small sector of the population whose decisions on where and how to live integrate site selection with neighbor and neighborhood selection. In this situation, a core group of people come together in order to create an intentional neighborhood that is composed of other like minded individuals. This neighborhood is conceptualized by the core group and presented to others who will, upon adoption of the concept, bring their own ideas and ideals to the group. The resulting community that evolves where neighbors and neighborhoods reflect a more supportive, sharing and caring relationship is a cohousing community.

There are over 225 cohousing communities completed, building, or forming in the United States alone (The Cohousing Association of the United States, 2009). These groups have created their own communities by building relationships among those who will be neighbors and arriving at decisions that affect the entire community by consensus of those who will be living there. An individual can make the choice to enter into this relationship, and from that point on, the choices of where and how to build a forming neighborhood must be done by the group. The value systems of those in a relationship where fundamental needs of shelter and safety must be met should have considerable similarities. The priorities of those who must arrive at decisions by consensus need to be enough alike to ensure that a project can be seen through to completion.

While some cohousing communities are built in existing neighborhoods and with existing structures, many are built as new construction where the participation of future cohousing residents in the design of the community is a mandatory part of the process. Each individual's vision of their "perfect" home may be compromised in order to reach consensus as a group on the design of the whole. The priorities of the group must be enough alike that building decisions and compromises can be met without sacrificing the greater goals of the community and the residents in that community.

The primary choice facing anyone considering a move into cohousing is one of living in a large social community (McCamant & Durrett, 1988). Cohousing residents must choose to be socially connected to their neighbors and to actively engage in supportive neighborly behavior. Each resident is responsible for participating in the governance, operations, and maintenance of their community. This social connectedness can also act as a support mechanism for all generations of cohousing residents. When residents are younger and beginning a family, the social structure of cohousing can help to focus on the children. As cohousing residents age, the social networks that are formed in the community can act as a support for the aging process. As the population of the United States is aging, the population of cohousing residents will also age and the length of life is extended even further through better medicines and healthier diets.

The majority of cohousing communities are multi-generational, with a population comprised of young families and small children all the way to residents aged 80 or greater (McCamant & Durrett, 1988). But there are a

growing number of communities that house only residents aged 50 or higher. These senior cohousing communities are built by people who have a shared priority to live in a community where the aging process is shared and supported by those in the community (Durrett, 2009).

Cohousing in the United States has been noted for its social sustainability as well as its environmental sustainability (Greenleaf, 2002; Meltzer, 2005; Durrett, 2009) based on the choices that have been made by groups entering into this relationship. The sharing of resources that occur between neighbors allows for a multitude of decisions to be made that can impact the economies of the community and the environment as a whole. For example, each household entering into the cohousing community could be coming from a suburban location where they each own and operate a gas-powered lawn mower and use it to mow the lawn once a week. By choosing to live in a cohousing community that has employed dense urban design features, the entire community can now share a single push mower to tend to the smaller lots of the new homes.

Socially and environmentally conscious decisions are a hallmark of the cohousing community. Choosing to participate in an intentionally constructed community can lead to many other environmentally responsible decisions. When a greater number of people choose to buy into a cohousing community, home sizes must be reduced in order to accommodate the number of residents being planned for. This compromise is offset by the inclusion of a shared common house on the site that is used by everyone and accommodates large group meals, meetings, recreation, laundry, storage, and group events. The smaller

home size, which can be less than 1000 square feet for some cohousing communities (McCamant & Durrett, 1988) then creates a situation where a family has fewer rooms in the home to furnish, and less square footage than the average new home in the United States (up to 2,265 square feet in the year 2000 according to the National Association of Home Builders) leads to a less materialistic lifestyle, as there are fewer places to store or display an accumulation of items. The design of the community can be based on a dense urban layout where homes share common walls which create more efficient spaces for heating and cooling purposes. Resources can be shared and most efficiently and effectively used in a larger scale building project, so the economies of scale when constructing 20 homes in a cohousing community is greater than that of building 20 single family homes in a suburban development.

People who choose to engage in the lifestyle offered by cohousing also make environmentally responsible decisions in the design and building of their community, even if those decisions will add some costs to the initial investment of the houses. The residents who choose cohousing because their priorities are to support social sustainability, also have environmental sustainability as a priority in their life.

The "green" building movement advocates for efficient use of all resources used in the building industry and for these buildings to operate at highly efficient levels throughout their life in order to conserve on the energy, water and natural resources required to keep the building functioning and comfortable. The United States Green Building Council (USGBC) has developed

a third party rating system that evaluates several different aspects of a building project and awards points for design, techniques and innovations that are considered by the organization to be sustainable. The rating system, known as Leadership in Energy and Environmental Design (LEED®) is a voluntary program that home-owners can choose to follow when designing and building their house. The design and construction process is evaluated and the completed home is tested for energy efficiency and indoor air quality before the structure can be rated. The USGBC can award one of four levels of certification based on the number of points earned through the rating process: Certified, Silver, Gold and Platinum (USGBC, 2008). The LEED program rewards the integration of sustainable decisions to a building project and gives owners, users, and the general public a recognized standard to identify sustainable buildings.

The LEED standard has only been in use since 1999 and has been primarily used for commercial buildings. This standard was adopted for home building and was introduced as a pilot study in 2005. The formal introduction of LEED for Homes came in 2008, but has already certified more than 2,500 homes in the United States (USGBC, 2010).

The design and planning decisions made by a cohousing group affects the overall efficiencies of the entire community. The priorities of the group must be enough alike to reach consensus on decisions that will lead to a home that is considered "sustainable" in the eyes of a rating system.

### *1.1 Purpose of the Study*

The purpose of this study was to identify specific priorities of existing cohousing residents with regard to sustainable building design and practice as outlined in the LEED for Homes design protocol. Priorities of those in their senior years (aged 65+) were compared to those who are approaching their senior years and to those who are in their family and career building years. This study illustrates generational changes in the priorities of integrating several measures of sustainability and those measures were cross-referenced to a sustainable rating system. The study shows whether choices made by younger cohousing residents differ significantly from those who are older; if the priorities of each generation are tied to the economics of the building of a structure or its operating costs; if energy or water conservation or indoor air quality is more important to any one generation; and if the ability to rate the sustainability of a dwelling is any more or less appealing to a generation. Having an understanding of the environmental priorities of each group will allow future cohousing residents and developers to focus on areas that are most appealing to those who choose to live in a socially connected community. Knowing that generations of users may have different priorities helps to target decision making within a group so that consensus can be reached.

### *1.2 Significance of the Study*

This study examined one aspect of cohousing community building, the sustainable criteria that proved most important to cohousing populations as they planned the building of their homes in cohousing neighborhoods. The

identification of generational needs will enhance opportunities to customize sustainable environments for the cohousing population. As cohousing grows and becomes less identified with the communal living experience of the communes and co-ops of the 60s and 70s, the positive life experiences that are associated with cohousing will begin to influence the general public (Greenleaf, 2002). Some of these positive life experiences may be a result of the environmental building priorities that are integrated into the design and construction of cohousing communities. Having an understanding of the environmental priorities of existing cohousing residents will help to identify where positive life experiences are generated and shared.

### *1.3 Outline of this Thesis*

Chapter 2 reviews the literature on cohousing, its origins and applications to living in the United States, and the specific design considerations of cohousing for an aging population. Sustainable building and sustainable rating systems are introduced and reviewed.

Chapter 3 discusses the methodology used to identify the sustainable building priorities of existing cohousing residents. Additional information on location, knowledge of sustainable rating systems, and level of knowledge of other participants is gathered to further identify environmentally sustainable priorities of the participants.

Chapter 4 reviews the results of the survey and aligns the priorities of the participants to the LEED for Homes design standard. Priorities are identified

generationally to clarify any changes in priorities from younger participants to senior residents of cohousing.

Chapter 5 concludes with a summary of the data and implications for the findings. The research objectives of identifying sustainable building priorities for cohousing residents in the United States are discussed and limitations of the present study are acknowledged with recommendations for future study presented.

# CHAPTER 2

## Literature Review

This chapter reviews cohousing in the United States with brief histories of its origins in Denmark and Sweden. Multi-generational cohousing is the focus for historical context, with additional information on the aging population in the United States and the impact that the aging demographic shift is likely to have on housing in the coming years. This is followed by a definition of sustainability and sustainable development along with a review of nationally recognized sustainability rating systems used in the residential building industry. Previous studies on the environmental awareness of cohousing communities will illustrate how these concepts are linked.

### *2.1 Cohousing in the United States*

There is growing awareness of intentional communities and the benefits of forming and nurturing a social contract with neighbors who care for each other throughout all of the stages of life. Cohousing is built from a concept that has been a part of our built society for centuries. Utopian communities were designed in the 16$^{th}$ century to foster a lifestyle that was in service to God (Kantsky, 1959) and collective housing experiments have been constructed in Europe and the Soviet Union before the 1930s (Vestbro, 2000). A Swedish service model of collective housing was created to reduce a woman's burden of housework so that they could pursue gainful employment outside the home. The Swedish experiment is credited with defeating the strong patriarchal resistance against collective housing in Sweden (Vestbro, 1992, 2000).

The concept of people coming together to share resources to create a lifestyle that alleviates some of the burdens of household maintenance and helps to build social benefits by living and working with others appeals to the human quest to improve our own lives. The one kitchen housing model can be traced back to an early Danish experiment where people of lower status would be in a situation to share the expenses of domestic servants by living in a building where individual kitchens in each residence were replaced with one central kitchen. Meals were then distributed to each resident with a series of dumbwaiters and the service staff would be located centrally in that shared kitchen space (Langkilde, 1970). Throughout northern Europe, different forms of collective housing have been constructed as experiments to creating better living environments and situations; however, many of these are planned and executed by government entities, rather than by the people who will be living there upon completion (Vestbro, 2000).

The idea of an intentional community that is formed, designed and occupied by a group of people with similar social goals began in Denmark in the 1960s with Bodil Graae, a social worker and anthropologist, and Jan Gudmand-Høyer, an architect. They were interested in creating a community that would embody the ideals of a supportive living environment that involved friends and family in an active and connected community life (McCamant, Durrett, & Milmanes, 2000). Since that time, the concept known in Denmark as *bofælleskaber* [1] has been translated to what we call *cohousing* in the United States.

[1] Bofælleskaber in Danish translates to "living community" in English

In Sweden, the collective housing units that share common facilities and a central kitchen are called a *kollektivhus*[2] where individual apartments have access to and connectivity with others in the housing units, while maintaining some privacy in their own space. One of the models of this type of housing includes a service staff that is employed by the group to maintain common spaces with the goal of reducing housework and enabling women to work and maintain family life. There is another model of collective housing that resembles cohousing in the United States where the residents themselves take on the tasks of meals and maintenance rather than hiring a service staff (Vestbro, 2000).

A third subset of Swedish collective housing caters to populations that may have special requirements that must be met in order to live comfortably and non-institutionally. In this category the Swedish cohousing will cater to students, the elderly, and those with various physical needs or dysfunctions (Linden, 1992; Vestbro 2000).

The concept of cohousing was introduced in the United States in the mid 1980s by the husband and wife team of Charles Durrett and Kathryn McCamant. Both are architects who had studied multi-generational cohousing in Denmark and were convinced that the concept could be brought back to the US to be developed for the needs and wants of a North American audience. They coined the phrase "cohousing" to mean a community with both shared and private spaces built according to the needs and wishes of the residents who will be living there (Lee, 2006; McCamant & Durrett, 1994, 1988).

The first community to adopt these concepts and embrace cohousing is

[2] Kollektivhus in Swedish means "collective housing unit"

Muir Commons in Davis, California. This first project brought together a developer who had already secured land, an architect who was familiar with the work that had been done by that developer previously, and an enthusiastic group of future residents. The relationship of the architect to the resident group became a learning laboratory for both parties as the participative design process that is a hallmark of the cohousing model can take much more time than conventionally built housing developments where the homes are constructed "per spec", which is a home built by a developer on speculation, without a specific buyer who will determine the style, amenities, and particulars of the house. Muir Commons residents pushed back on the developer and architect to ensure that their needs were met with the cohousing design, and the developer and architect did their best to hold firm to previous plans and cost estimates that had been established for the project. Eventually a third party facilitator was called in to work with both the resident group and the developer to meet the residents' needs and to communicate decisions to the developer and architect (McCamant & Durrett, 1988).

The lessons of Muir Commons have helped to develop and evolve the processes that can bring a group of individuals together who have an idea of community living and make these ideas a reality. Initial meetings and contacts with interested people can be facilitated to identify the pros and cons of cohousing for a diverse population. Facilitators can be helpful in moving a group of interested individuals from dreams to action by outlining an established process that has evolved since cohousing was introduced to the US. Experts and

specialists can be brought to a group of future residents to explain in finer detail aspects of the building process or the legal process involved in building a cohousing community. The short history of cohousing in the US has been rich in shared learning experiences and abundant in process content for future residents to learn from.

Kathryn McCamant and Charles Durrett have worked with cohousing groups and documented some of the strategies used to develop these communities. With their experience and knowledge of both architecture and the cohousing model, they have outlined five phases involved in the formation, design and implementation of cohousing. These five phases as summarized by McCamant and Durrett (1988, 1994) and by Durrett (2005, 2009) are:

- Feasibility
- Information
- Study Group I
- Study Group II
- Study Group III

The Feasibility Phase brings together a small group of people who start with an idea and develop the initial understanding of the project. Ideas on the community's size, land availability in the targeted building areas, and zoning and variances for the property are reviewed and evaluated for the group. Groups who wish to build cohousing must understand any particular sensitivities for the community or surrounding neighbors which may include things such as noise pollution, light pollution, or the preservation of an existing green space, and of

course, budgets and market costs (Durrett, 2009).

The Information Phase clarifies the roles of the participants and allows for the decision to bring in a developer or not (and when). This phase allows for various possible development scenarios, explores the financial and legal aspects of cohousing, the project management and participatory design process, and brings the group dynamic into focus so that they can better work as a cohesive whole. This phase will help the core group of interested residents establish their identity as a cohousing community so that as they meet others who might be interested in the development they will be confident in accurately conveying the goals of the group, not just their own personal goals.

The Study Group I (group information) Phase of a cohousing project gets started after the feasibility of the cohousing is established and the core group begins to reach out to others in the community to develop interest in the project. This phase may involve an outside consultant working with the group to communicate the principles of mulit-generational cohousing or senior cohousing to a wider audience. They tell others what it might actually be like to live in a cohousing community, what the process will involve to complete the project, how to work as a group, and what it means to cooperate and function as an integrated community rather than individual households. This phase may take three months or more and will consist of classes, group discussions, presentations by guest speakers and perhaps by visiting other cohousing neighborhoods. For many of the participants in the group, this may be their first exposure to a cohousing neighborhood. Classes and practice sessions that teach conflict resolution and

effective communication are valuable resources that allow for a more smoothly functioning neighborhood and better decision making throughout the process of designing the project. A successful outcome at this stage is a strong group dynamic that will allow the following stages of design and policy creating to be completed with greater ease.

The first study group phase may consist of new people coming into the group and also dropping out of the group. Decisions by consensus, as is their nature, tend to take more time. Those wanting to move immediately into a designing or building phase upon entering the cohousing group will be disappointed at the pace of getting started. But for those who are patient through the learning process of getting to know others and who actively participate in the development of a group dynamic, this phase will teach the group how they can best reach decisions together and will help "weed out" those who wish to impose decisions on others for streamlined efficiency.

This first study group phase builds trust and establishes communication patterns among the residents which creates open and honest dialog addressing the specific needs of the cohousing population. These needs will be specific to the group that assembles for this project, but in general there are issues that may be of greater interest to younger members of the group, such as: safe play areas for children and the areas designated in the common house to young children and teenagers. When the specific group is comprised of an aging population, the specific needs that might get addressed include: what does it mean to age in place, what responsibility will residents have for neighbors as they age, and how

will the community handle bringing in outside help to care for residents as they age?

When participants have the opportunity to fully immerse themselves in the Study Group I Phase of the project, they have the ability to make life changing decisions that build upon all other decisions. This process helps to create a cohesive group with shared goals and priorities that can dedicate itself to the project as a fully formed and informed community willing to expend the time and energy required to reach decisions. This phase implements a thorough and deliberate development group process to make decisions and move ahead in the project.

Within the larger group of future residents, sub-committees may form to fully research and explore individual aspects of the planning such as finance, legal agreements, and public relations. These committees then work with the larger group to make decisions as a whole. Committees will be forming and dissolving throughout the process as required and this sets the stage for long term committee formation once the cohousing community is operational and functioning as a neighborhood. Implementing a group development process through Study Group I results in far better communication methods between residents that builds strong bonds among friends and neighbors. These bonds form the strength of the community and carry it through the long and arduous process necessary to create a foundation that supports everyone in the community. From this foundation social contracts become apparent between residents. Further communication about how individuals in households will care

for each other and how the community can care for the environment are brought out in the group and documented in each cohousing policy statement. Durrett notes that this is the stage where the participants begin to co-educate each other about issues that they individually care about and wish to share (Durrett, 2005). This is the stage where the group will identify their commitment to sustainable construction and their goals for incorporating sustainable design into the community.

The Study Group II (participatory design process) Phase is the physical design and planning of the community. As this stage requires professionals who will be responsible for the design and documentation of the site, the cohousing community must learn to communicate effectively with others outside their group to ensure that the goals and directives established in the first phase are carried through in their physical form. For example, if the community has collectively decided that a vegetable garden for community meals will be planted and maintained by residents, a location must be decided upon during this second phase and the area staked out for the future garden.

This design process phase is an opportunity to understand physical limitations of the residents and to design a house that will allow the occupants to thrive within their own homes. Designers may wish to create spaces that are equally accessible by young parents pushing a stroller, or by someone confined to a wheelchair, or by others who may have various physical challenges that impede ease of movement up and down stairs. Generally, the more accessible the site, the homes and the common house are, the greater the probability that

all areas will be valued and used by the residents. Universal Design, which is defined as "the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design" (Connell, et al., 2008, p. 97) can be introduced into the design process at this stage. Examples of Universal Design within the home include zero-step thresholds, single floor living, wider doors, easily accessible storage, multi-level work stations within the kitchen and home offices to accommodate standing work and sitting work, and other specifics as required by the home owners (Durrett, 2005). This planning in a multi-generational cohousing or senior cohousing development can make the difference between planning a home that is comfortable and user-friendly, even if mobility aids are required later in life – or designing a home that may become difficult to navigate or have areas of the home that are inaccessible if the owner grows to need a cane, walker, or wheelchair later in life.

The goal of all good cohousing design is to have all areas of the community accessible for all community members. Architects and designers realize that a well-designed neighborhood, building, or space is one that is used often and where people come together to create memories (see Figures 1A and 1B). This illustrates the difference between a 'space' and a 'place' – where 'space' merely exists, such as a room or a chair with no special meaning attached, a 'place' evokes memories and meaningful associations based on interactions between the environment and the occupants creating a sense of place (Allen, 2004; Lynch 1981 &

1972; Steele 1981; Tuan 1977).

Figure 1A Common House Between Events
Photo by the author

Figure 1B Common house During a Common Meal
http://www.artprize.org/venue/id/118

The design phase is also where the sustainability ideals will be incorporated into the building designs. What these sustainability factors are will be dependent upon the community's definition of sustainable and the priorities of the group as decided in the Study Group I Phase. Some aspects of sustainability that have been incorporated into previous cohousing projects include recycled blown cellulose insulation, specially treated "low E" windows that cut heat loss through the glass, high efficiency heating and cooling systems, low-flow water fixtures, and solar panels (McCamant & Durrett, 1994, 1988).

The design phase of this process is the making of a dream for many of the residents. The investment of time and energy to this point has already been extensive and the building phase has not even begun. For people who will be creating this neighborhood, the investment is considerable and the intent to stay in this community is clear. The design should accommodate the aging process well, as these communities may move from being a multi-generational cohousing neighborhood when they are first formed and built, into a naturally occurring retirement community (NORC) after a number of years of those same residents

aging in their homes. Unlike suburban neighborhoods where people will move in and move out, sometimes in a period of only two to five years, a cohousing community is built on the social contract of maintaining the relationships that are formed and working together for many years.

The last phase of building a cohousing community is called Study Group III where policies are defined and put into place that will maintain the community as the residents outlined in the previous stages of the project. This is where decisions on long-term sustainability will be implemented and community policies on issues such as recycling, local food production, and stewardship for the land are carried out by the group (Durrett, 2005). Policies go far beyond sustainability for the community. Groups must create policies for everything from routine operations of the common house and how or when updating and modernization will occur, to community garden development with planting schedules and vegetable selections.

The policy stage of developing a cohousing community will be ongoing as long as the community is active. New opportunities to participate in civic duties will always be plentiful and where the cohousing group is acting as a single entity, they will always need to define the best course of action for the whole community, not just for select individuals. New policies can help to move an entire community toward changes that will positively affect the environment or the greater surrounding neighborhoods, but those policies must be agreed to by all cohousing residents after a period of research and deliberation by the group.

Once a cohousing group is defined, the physical environment will embody

common elements or characteristics that all cohousing communities share:

1. Social contact design (SCD)[3] – the physical design encourages a strong sense of community.
2. Extensive common facilities – an integral part of the community common areas are designed for daily use, to supplement private living areas.
3. Resident involvement in the recruitment, design, production and operational processes.
4. Collaborative lifestyles offering inter-dependence, support networks, sociability and security (Williams, 2008; Durrett, 2005).

To these four common characteristics, in his handbook on senior cohousing, Durrett (2005) adds the following additional characteristics to define cohousing in the United States:

5. Non-hierarchal structure – leadership roles are not defined, but the responsibility for decisions is shared by the community's adults.
6. Separate income sources – the community and the residents are not dependent on each other for primary income as this will alter significantly the dynamic between neighbors.

Intentional communities or cohousing communities are generally formed

[3] The SCD principles include: provision of indoor and outdoor communal facilities; good visibility into all communal spaces, car parking outside the community or car-free communities, gradual transitions between public and private space, provision of semi-private outdoor spaces close to private units for socializing; positioning of key facilities and access points on walkways.

as a way of bringing together people who wish to support each other in a common cause or ideology. That cause could be to raise families and small children, or it may be to encourage and support spirituality and purpose of life. In any case, one of the strong bonds that keep a neighborhood connected is a common purpose and that could help explain the feelings of a greater sense of well-being among residents of cohousing communities (Williams, 2008).

The commitment that cohousing residents make in the creation of their community and collaborative lifestyle is what leads to a signature characteristic of cohousing: strong and vibrant communities. Previous research shows that mutual support networks as well as the project's social relationships are stronger and more developed in cohousing than in traditional residential areas (Meltzer, 2000; Brenton, 1998). The "second wave" of cohousing took place in the USA in the 1980s and 1990s. It followed the first wave that occurred in Northern Europe in the early 1970s, and preceded the third wave that took place along the Pacific rim beginning in the 1990s. This second wave of cohousing was embraced by Americans who were looking for greater community and social support as well as a focus on environmental factors (Williams, 2005). While there is no "rule" that cohousing communities must be environmentally responsible in their building and policy development, cohousing communities that have been developed in the US and who have published mission statements, consider themselves stewards of the earth and many identify their concerns for the environment in their mission statements (Meltzer, 2005).

### *2.2 Aging in Place.*

In Sweden, each municipality is required by law to help the senior population remain independent and live on their own (Rosenfeld, 2008). The government provides for health aides who can assist people in their homes, but if an elder wishes to move to a more community based care facility, the *servicehus*[4] concept allows seniors to live independently, while still having easy access to care as it is necessary. There are also new adult communities in Sweden that provide individual apartments around a central courtyard. These complexes are built in metropolitan areas to enable aging residents to remain a part of the community rather than isolated from the town (Rosenfeld, 2008).

The concerns of younger generations are not necessarily the same as those who are entering their senior years. Many couples and single individuals want to live in a community that has been developed with specific needs of health, mobility, and socialization for people who are of post child-rearing age. In a cohousing NORC, where established neighbors simply stay in the home they have built with their community and age in their homes, the cohousing community will become, by default, a senior cohousing community.

Over the past century in the United States the population of children under the age of 15 has shrunk from 34.5% of the population in 1900 down to 21.4% in 2000, while the proportion of people aged 65 and older has grown from only 4.1% of the population in 1900 to 12.4% in 2000 (Census, 2000). Hope Yen of

[4] Servicehus is a Swedish housing structure that allows older people to live independently in a studio flat while receiving care as they age

the Associated Press researched the number of 100-year-olds alive today, and discovered that in the 1950s only a few thousand people had reached the centennial age. Today there are more than 340,000 centenarians worldwide (Yen, 2009). An aging society needs a place to age with grace and dignity. Healthy and independent members of an aging society may wish to age in their homes. Homes that are part of a cohousing community have a network of support in the neighborhood that can help people remain independent for as long as possible.

Dan Buettner traveled to many countries searching for the proverbial fountain of youth in areas he designated as 'Blue Zones'[5]. A common denominator among the many centenarians was the support of family and community for a long, healthy, and rich, although not necessarily wealthy life. While diet and genetics will always be a part of aging, the involvement of family and community are keys to quantity as well as quality of life (Buettner, 2008). While a specific diet was not isolated within all four Blue Zones Buettner visited, one common finding was that healthy older people eat lots of fruits and vegetables, and many of these items are grown right in their own back yards (Buettner, 2008).

In Denmark in 1995, Henry Nielsen developed a comprehensive model for seniors creating a cohousing community. He worked with a non-profit organization, Quality of Living in Focus, and tailored the community building process to this target audience. He recognized that seniors have specific needs

[5] Blue Zones are locations in the world where higher percentages of the population live astoundingly long lives – residents are able to retain health and vitality well into their 80s, 90s, and 100s.

to be addressed when engaging in this planning. His is a participatory process, like multi-generational cohousing, but also incorporates issues of co-care, community size, and design considerations for aging residents (Durrett, 2009). Once a senior cohousing community is developed, the policies that get implemented over time may be more specific to the needs of aging individuals and will deal with the limits of healthcare that can be offered by neighbors, or the incorporation of home health-care workers into the community (Durrett, 2005; Durrett, 2009).

The aging population in the United States is growing as the first baby boomers[6] reach the age of 65 in 2009. Census data from the year 2000 lists the population of Americans aged 65 or higher at 35 million or approximately 12% of the population of the United States. This demographic is projected to increase to 72 million by the year 2050 thanks to the overwhelming size of the baby boom generation, which will put the population of Americans aged 65+ at approximately 20% of the total. The census estimates that as early as 2017, there will be more people aged 65 and over than children younger than five (Hobbs & Stoops, 2002). In order to provide living spaces that respect our natural resources and provide a healthy home as well as allow an aging population both independence and community support for as long as they want and need, the choices made by an aging population who are responsible for building their homes and communities should be evaluated.

The baby boom generation is noted for being not only the largest

[6]"Baby Boomers" is the name given to the generation of Americans who were born in a "baby boom" following World War II. This generation is generally categorized as those born between the years 1944 – 1964.

demographic group but also the wealthiest – with a real median household income of 35 to 53% more than their parents' generation, and is more educated with approximately 25 to 30% of this generation having four or more years of college (American Society of Interior Designers, 2001). AARP states that this group is more aware of the environmental benefits of using sustainable materials and "green" products and is expected to be more active and more involved in the community than previous generations (2007). Still, like all groups of this age (65+), they are considered to be at higher levels of vulnerability to airborne illnesses (e.g., influenza, colds, and other illnesses) due to the aging of the immune system, and they have the highest rate of asthma-related deaths as documented by the Center for Disease Control (Mennino, et al., 1998). Due to its size, buying power, and some understanding of environmental impacts, the aging baby boom generation will have more influence on the housing market than any previous generation.

The emergence of "ruppies", retired urban people, (Kleber, 2008) is changing a long-held stereotype of retirement living that included golf courses, porch swings, and assisted living. A newer and more active standard is being established for this aging population, and they are demanding that their options for housing accommodate their physical, psychological, ecological and social awareness.

In the United States, when asked where an aging individual or couple would like to spend the rest of their lives, the majority of the respondents want to stay in their current home (Greenwald, 2003, ASID, 2001); however, there is a

significant number of aging people who do want to move out of their current house and into a home that better fits their needs as they age. They may wish to downsize to a smaller home, or move to a place without stairs or away from a large yard that requires extensive maintenance and upkeep (Hansen, 2006).

In previous generations, the concept of filial piety[7] was the norm when it came time to care for aging relatives. The responsibility of caring for an aging parent fell to the wife of the eldest son, or to the eldest daughter. However, with today's working families and more and more women in the work force, the ability to expend the time and energy to care for an aging parent is diminishing, as is the desire of the aging parent to spend their retirement years feeling like a burden to their children (Durrett, 2009, Rosenfeld, 2008). The concept of a "retirement home" is changing rapidly as the baby boom generation ages. In previous generations, elders were given the option of either moving in with their children, or grown children moving home to care for them, or moving to an assisted living facility that provided skilled nursing care. Retirees and the current wave of retiring baby boomers have started to redefine how and where they wish to spend the rest of their lives. Some of the options available to this generation include active adult communities for college alumni located near their alma mater called "alma mater" housing (Kerkstra, 2006), luxury cruise ships housing seniors as they sail the seas, and corporate retirement villages established in Japan as living villages for tight-knit retired corporate workers that extend Japan's corporate culture beyond the traditional working life of the population.

[7] In many cultures, especially the traditional cultures of Asia, sons and daughters were supposed to take care of aging, widowed parents. In daily practice, this obligation rested on a daughter or daughter-in-law.

In the Netherlands, mixed use housing and commercial developments bring communities to the retirement village by combining living facilities with cyber cafes, health clubs, and retail space in a bustling metropolitan setting (Rosenfeld, 2008). Instead of isolating the aging population, the Dutch culture brings them into the mix so that socialization between people walking by and retirees relaxing or mingling in the commercial areas occurs easily and keeps all generations interactively involved (Gardiner, 2006).

In the United States, the emergence of continuing care retirement communities (CCRCs) brings retirees into a development or community to live independently while providing various services and amenities. These residents then receive the promise of a place to live for the rest of their lives whether independent or a move to assisted living or a skilled nursing care facility within the same community (AARP, 2004). This option involves a substantial upfront investment that is not feasible for many.

Technology is also bringing more connectivity to the senior population, as they continue to live on their own. With Internet connections to friends, family, and health care workers, living independently does not equate to isolation as it once did, and virtual communities can be built and maintained across cities, states, and even countries.

### *2.3 Sustainability*

Integral to a healthy and active lifestyle, is a healthy living environment. Identification of what constitutes a "healthy" or "unhealthy" environment has been a subject of controversy based on personal assessments of completed structures

and the impact of these structures on inhabitants of the space. In previous decades, a building would be termed "sick" only if the inhabitants of the space were adversely affected by the air quality or if the building itself were prone to problems such as mold growth or pests. The fact that the building was already constructed and in place presents an obvious dilemma, and going back to fix or retrofit an existing "sick" building is very costly and time consuming. Being able to better predict the "health" of a building by documenting and measuring the process of the design and construction of the structure represents a better indicator of the overall "health" of the building and its impact on inhabitants. This measurement process can then be used as an indicator of impact on the residents, as well as the impact on the planet, based on environmentally responsible design and construction techniques.

The concept of sustainability can be quite broad and range from an environmental approach aimed at restoring or protecting natural resources to a social policy that supports humanity and provides for adequate food and shelter for all. The *Merriam-Webster Dictionary* defines the word *sustainable* as:

> "1: capable of being sustained. And 2a: of, relating to, or being a method of harvesting or using a resource so that the resource is not depleted or permanently damaged. Or b: of or relating to a lifestyle involving the use of sustainable methods" (Merriam-Webster, 2009).

Generally, the concept of sustainability associated with health and sustainable development is often coupled with the health of people, the

planet and natural resources. In the 2002 Rio Declaration on Environment and Development human beings are "placed at the center of concern for sustainable development" and it is stated in the report that "all human beings are entitled to a healthy and productive life and that life should be in harmony with nature" (Nations, 2002, p. 39).

### *2.3.1 Sustainable Development*

The idea of sustainable development is generally credited to the World Commission on Environment and Development (WCED). Their 1987 report states:

> Humanity has the ability to make development sustainable – to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs. The concept of sustainable development does imply limits – not absolute limits but limitations imposed by the present state of technology and social organization on environmental resources and by the ability of the biosphere to absorb the effects of human activities. But technology and social organization can be both managed and improved to make way for a new era of economic growth (WCED, 1987, p. 8).

This report is referred to as the Brundtland Report in honor of the commission's chairperson, Gro Harlem Brundtland, from Norway. In this report, the commission defined the environment as the place "...where we all live" and indicated that development is "...what we all do in attempting to improve our lot

within that abode" (WCED, 1987, p. xi).

While people may have an idea of what a "green" building is, or a general understanding of "green design", sustainable development is a concept that goes beyond the traditionally accepted environmental arena. Sustainable development and design move society toward a cultural shift that involves our society, the natural environment, and the economics of our built environment (Winchip, 2007). Beyond simple involvement of these three elements, there must also be a balance that equally supports the environment, the economy, and society. These elements in balance are also known as the triple bottom line (Elkington,1994).

While sustainable development works to balance all three of the elements mentioned above, we will look more closely at only the environmental aspects of homebuilding with a brief review of nationally recognized sustainable home building measurement systems. These measurement systems include the NAHB Model Green Homebuilding Guidelines, ENERGY STAR®, and LEED for Homes.

### *2.3.2 Homebuilding Rating Systems*

***1)The NAHB Model Green Homebuilding Guidelines.*** This measurement tool was developed by the National Association of Home Builders (NAHB) as a set of green building guidelines that outlines principles for sustainable housing development. The guidelines focus in on the following areas:

1. Lot design – this category looks for resource efficient site design that can reduce the environmental impact of building the house on the site as well as improve the efficiency of the home with passive solar design strategies.

2. Resource efficiency – this category rewards the homebuilder for the selection and application of materials that maximize function while optimizing the use of natural resources.
3. Energy efficiency – this is a broad category that will focus on a whole systems approach that includes mechanical systems, door and window selection, insulation, building envelope integrity, and air and vapor barriers that are placed around the house.
4. Water efficiency – this category rewards the implementation of water conservation methods through the house.
5. Indoor environmental quality – this category rewards measures taken that can mitigate the effects of potential contaminants in the air.
6. Operation, maintenance and homeowner education – this requires that the builder provide the homeowner with a manual that explains proper operation and maintenance procedures for the systems in the house.
7. Site planning – rewards the builder for implementing low impact design (LID) strategies for a home or an entire subdivision.
8. Global impact – this category was developed to give greater visibility to measures that affect the sustainability of the home as well the sustainability of the planet. (NAHB, 2006).

These guidelines can direct the home builder and the home owner to a house that has lower cost energy bills, provides greater consistent comfort

through all seasons of the year, provides better indoor air quality by better controlling the moisture levels in the home, and provides materials and finishes that have greater durability for a longer life span.

The main purpose for these guidelines is to give mainstream home builders a framework to allow them to build homes that lessen the environmental impact made by the building and construction of new homes. In the year 2003 it was estimated that 1.85 million new homes were under construction (Yingchun, 2005).

The NAHB has developed these guidelines for use by a builder working in conjunction with a local green home building program. The local green home building program can guide and support mainstream home builders as they learn new techniques and building methods that support the guidelines. However, if a local green home building program does not exist, this program was developed so that the home builder can self-certify the green home by using the checklist and documenting the points received in each green principle (NAHB, 2006). This measurement system requires that the builder address all categories and design and build the home so that there are points accumulated in each category before certification can occur.

***2. ENERGY STAR.*** The United States Department of Energy (DOE) developed the ENERGY STAR program as an energy saving program that certifies homes meeting the guidelines for energy efficiency as determined by the US Environmental Protection Agency (EPA). By meeting this standard, homes are at least 15% more energy efficient than homes built to the 2004 International

Residential Code (IRC) (DOE, 2009). The energy-saving features of an ENERGY STAR rated home typically make the home 20-30% more efficient than standard construction homes. With the average electrical consumption of a home constructed between 1990 and 2001 being about 12,800kWh per year for space and water heating, cooling, lights and appliances, a 20 – 30% reduction can add up to significant cost savings for the occupant of the home, as well as reducing emissions from burning fossil fuels for power that contribute to global warming (NAHB, 2006).

Unlike the self-certification that can occur with the NAHB green guidelines, the ENERGY STAR rating for single family homes less than three stories, low-rise multi-family homes, manufactured homes, systems-built homes (structural insulated panel construction - SIP, insulated concrete forms - ICF, or modular), log homes, concrete homes, and existing homes that have been retrofitted must be determined by a third party energy rater who has been trained to test and inspect the energy efficiency measures that have been put in place. The energy rater will inspect the insulation, air tightness, and duct sealing details along with the doors and windows, heating and cooling systems, lighting, and appliances in the home. If the home is found to meet or exceed the 15% greater energy efficiency rating based on the current IRC building codes, the home will receive ENERGY STAR certification.

***3. LEED for Homes Rating System.*** The United States Green Building Council (USGBC) has developed a third party rated building system for many different types of buildings that all fall under the umbrella of Leadership in Energy

and Environmental Design (LEED). The USGBC was founded in 1993 around the idea that by working together, we can transform the way buildings are designed, built and operated. The USGBC identifies green buildings as environmentally responsible, profitable and healthy places to live and work (USGBC, 2007).

The USGBC has developed a third party rating system for the built environment that attempts to measure and calculate the high performance design, building methods, efficiency, and durability of buildings. This rating system identifies broad categories of measurement with various topics within each category that can be addressed and quantified within a rating system to accumulate points. The USGBC has developed LEED rating systems for various types of buildings with LEED for Homes being designed and written as a set of industry best practices guidelines for mainstream builders in the homebuilding trade (USGBC, 2008). The USGBC has identified high performance buildings as having attributes such as design strategies that maximize resources and use environmentally responsible and high performance materials and equipment. There is also a focus on construction practices to ensure best use of resources and optimal functioning of all installed equipment. As in the NAHB guidelines, points are accumulated through the design and construction of the home and when all points are added up, the building may be certified in any of four categories based on the number of points awarded: Certified, Silver, Gold, or Platinum.

The LEED for Homes rating system concentrates on eight categories within the process of building a home and 35 topics that are distributed among

those eight categories:

1. Innovation and design process - allows points for special design methods, use of unique regional resources, or optimizing performance levels in the home. This category emphasizes the importance of integrated design and design for durability.
2. Location and linkages – this category awards home building points for placement in socially and environmentally responsible ways in relation to the larger community.
3. Sustainable sites – like the NAHB Model Green Homebuilders Guidelines, this category will reward efforts to minimize the impact on the site by the home.
4. Water efficiency – this category encourages water-efficient strategies both inside and outside the home.
5. Energy and atmosphere – will reward efforts that maximize the heating and cooling systems efficiency levels as well as designs that result in a tight and highly efficient building envelope.
6. Materials and resources – looks for the highest and best use of materials, especially with regard to environmentally preferable materials and a minimization of waste through the construction of the home.
7. Indoor environmental quality – identifies ways of reducing the homeowner's exposure to pollutants through improved indoor air quality. Techniques used through the building process should retard

the opportunity for mold growth.

8. Awareness and education – this category will reward the homebuilder for creating a system of education for the homeowner or tenant that will ensure the efficient operation and maintenance of the home over time. Completion of this step will continue to keep the home a functioning "green" building (USGBC, 2008).

Unlike the NAHB guidelines, a homebuilder may receive zero points in any one of the above categories, and as long as all prerequisites are met, still attain certification of the home from the USGBC.

LEED is a nationally recognized brand that is attempting to guide homebuilders toward a national consistency in the definition of green homes. A builder anywhere in the country could measure and score their building to obtain a LEED rating and have it carry the same meaning in all regions.

### *2.4 Sustainability and Cohousing*

Previous studies of cohousing have touched on the sustainable aspects of the communities simply because that was a goal of the cohousing residents themselves. Incorporating sustainability measures into the design and building of the structures is a goal for those who are drawn to cohousing. Research on cohousing done by Meltzer (2005, 2000) and Williams (2005, 2008) also focuses on the social sustainability of the projects and their benefits to residents who might otherwise be in a situation where loneliness and isolation is the norm in a typical suburban neighborhood. Cohousing communities appear to have pulled together to support a triple bottom line (the balance of economic, ecological and

social needs as identified by Elkington in 1994) that supports the social health of the neighborhood by building a supportive network that consciously decides to participate in community events and personal interactions; the community supports ecological health by building with sustainable principles and drawing from many sustainable design theories such as Smart Growth and New Urbanism; and, the community fosters economic health by making efforts to keep the cohousing affordable and open to those who wish to participate. While creating an intentional community could lead to making it a gated or secured community, cohousing is not closed off from the greater community.

For sustainable design, cohousing design borrows from the philosophies of New Urbanism, as presented by the Congress for New Urbanism (CNU) which also embraces the concepts of informal meeting spaces and pedestrian friendly, compact neighborhoods. In their quest for healthier and more supportive cities, districts and neighborhoods, the CNU advocates for diversity, walkability, bikeability, respect for the history of the area, design for the climate of the location, and a range of green space around and through neighborhoods (CNU, 1996). This philosophy supports the social sustainability that cohousing is built around, and introduces environmental sustainability to the cohousing model.

A study done by Meltzer (2000) identified the cohousing lifestyle as one that can address environmental degradation in a meaningful way, not only because it exemplifies a conserver lifestyle with generally firm pro-environmental aspirations, but also because it is compatible with a mainstream orientation, therefore transferrable to the general society. Work by Marcus and Dovey (1991)

illustrates that cohousing is a good sustainable alternative to other housing options because it fulfills a number of sustainability objectives:

- Strong social networks and support systems
- Behavior that indicates a pro-environment lifestyle
- Minimized resource consumption, and less materialistic lifestyle
- A democratic design, one that is affordable to many income levels.

A strong social network is a foundation for the communities to not only share their resources, such as gardening tools, lawn mowers and books, but to also share their environmental concerns. When a group effort can be made to tackle larger issues, a sense of camaraderie between neighbors will help ensure that continued progress can be made toward environmental goals that the community may set. Meltzer (2000) notes in his study that the people he met in cohousing relied on their neighbors' behaviors to inform their own pro-environmental behavior, thereby moving the entire community to more sustainable practices.

In addition to the social network that can support individual practices of sustainability, such as regular recycling and reduced consumption, the economies of scale that a cohousing community can provide will help to reduce the material use and waste while constructing the site. The compact design of cohousing will reduce the land use that would typically be used when constructing new homes; and the shared common walls often found in cohousing design increase the integrity of the thermal envelope of the housing and will save on heating and cooling resources and costs (Williams, 2005; Meltzer, 2000;

Fromm, 1991).

The common house is often where residents will gather for meetings, meals, tasks or chores such as laundry, and for entertainment which can include movie or television viewing or music. When appliances are centrally located and used by many different residents, the individual costs of having those appliances or using the energy and water to run them in each household is greatly reduced. The cost savings for the individuals in energy and water bills and material or appliance purchases can help to encourage a low-impact lifestyle and increased resource conservation (Fromm, 1991; Marcus & Dovey, 1991).

Williams credits the design of the cohousing developments with the pro-environmental behavior that is exhibited by residents (2005). The design factors, however, are a result of the design process that, by cohousing's own definition, requires resident participation. To credit the design without crediting those who were integral in the development of that design does not give a complete picture of the determination cohousing residents bring to the planning process.

The implementation of a sustainability rating system also requires resident participation. There are cohousing communities who have elected to rate the sustainability of specific buildings with the LEED rating system, and two of these: Nubanusit in Peterborough, New Hampshire and Eastern Village Cohousing in Silver Spring, Maryland actively employ their sustainable achievement in their identity and background information. There are many cohousing communities who have built their homes to be ENERGY STAR rated to identify themselves as being conservative with heating, cooling and energy costs in the homes. The

decisions that must be made through the resident participation of the design of cohousing will directly impact how the houses will perform with regard to heating and cooling costs, building thermal envelope, and energy use. The decision to identify these building techniques with a recognized sustainability rating system is also made by the residents as they work with the designer and developer.

# CHAPTER 3

## Methodology

The purpose of this study was to assess which sustainable building features were of greater importance to residents living in recently constructed (completed between 2000 and 2009) cohousing communities. This study further identifies any shift in priorities between those aged 35 to 50, aged 50 to 65, aged 65 to 75 and aged 75 or higher.

Previous studies have illustrated that sustainability is a shared value among residents of cohousing. However, the priorities of the residents in the specification of equipment, materials, or appliances that contribute to a sustainable environment have not been documented. Just as residents will choose who they wish to create and build a community with, they will make choices all through the design and build phase of the project that will determine the level of sustainability they will achieve. Sustainability, as rated by the USGBC's LEED for Homes rating system, can be evaluated on several levels. The survey instrument created for this study looked at areas of sustainability that affect energy efficiency, indoor air quality, material use, and amenities of location along with lifestyle information and demographics. The results of the survey were used to assess which of these features were most important to the residents of cohousing. The data was isolated further to indicate how selected communities assess sustainable features and how those priorities compare to the sustainability features the communities identify as part of their completed design.

To determine this information, existing cohousing residents were surveyed

to discover their priorities for building sustainable housing while planning their community, the influence of others on their concept of sustainability and their knowledge of the LEED for Homes rating system, the NAHB Model Green Home Building Guidelines, and the ENERGY STAR rating system. The survey also asked if they value the idea of a rating system for sustainability for their own homes as well as their community common house.

### *3.1 Data Collection*

To understand the importance of measurable sustainability factors as well as the survey instrument, a pilot study was conducted at an inter-generational cohousing development in Grand Rapids, Michigan. Residents there received this survey as a trial run. Due to minimal comments on clarity and length of the survey, this same instrument was then distributed to all other cohousing communities in the study.

Prior to data collection, the survey instrument was reviewed and approved by the Institutional Review Board (IRB) of Michigan State University. As advised by the IRB guidelines, participants were informed by the researcher that their participation was completely voluntary and that the results of their participation would remain anonymous, not to be released in any individually identifiable form. They were also infomed that their anonymity would be protected, and consent was given when the questionnaire was completed and returned to the researcher.

#### *3.1.1 Subjects*

Residents of 56 cohousing communities across the United States that

were completed between the years 2000 and 2009 were selected for this survey. This group was selected due to the recent completion of their communities and their ability to recall the planning process and the priorities in building their cohousing developments. The sustainable building movement began to gather momentum in the early years of the new millenium (USGBC, 2008), so the relevance of incorporating sustainable building protocols into the work should also be more evident in communities completed after the year 2000.

Residents over the age of 35 participated in the survey as they were generally thought to be of an age where this cohousing house would be a second or third home, having had a previous home or homes that may not have had any sustainable features built in. They were also thought to be at a stage in life where building decisions would be made with the intention of staying in that community for many years, so an investment in greater sustainability would have time to realize a return. Previously constructed conventionally built houses that they occupied before moving to cohousing may not have satisfied all of their goals for integrating sustainability into their lives, allowing cohousing to provide comparisons of previous non-sustainable homes to a new more sustainably built one in the community.

Cohousing communities that received the surveys are located on the west coast of the United States: California, Washington, Oregon, and Arizona; the mountain region: Colorado; the mid-west: Kansas, Minnesota, and Michigan; the southeast: Maryland, Washington DC, Virginia and North Carolina; and the northeast: Vermont, New York, New Hampshire, and Massachusetts.

### *3.1.2 Survey Procedure*

The survey was distributed on surveymonkey.com via e-mail to residents of cohousing developments. There are many advantages to using an Internet survey including the ability to cover large geographic areas faster and more easily; and the ease and lower cost of processing data (Hewson, Yule, Laurent & Vogel, 2003; Porter & Whitcomb, 2003). The on-line survey instrument (see Appendix A) went out via e-mail to 56 cohousing communities after an introductory post card mailing. A follow up reminder post card was sent one week after the e-mail survey was distributed. The final survey response rate was approximately 7.6% (N=95) of all targeted cohousing households with 45% of the communities being represented.

As stakeholders in the planning and design process of the cohousing community, their individual values as well as the community's collective values should emerge both implicitly and explicitly (Rudin, Simon, Volk, Tripathi, & Bates, 2009). Respondents also self-identified their own level of sustainable lifestyle and evaluated changes in this lifestyle since living in a cohousing community. Sustainable building questions are based on criteria outlined in the LEED for Homes check list from USGBC and cross referenced to the NAHB Model Green Home Building Guidelines. Respondents were also asked to identify existing health considerations and the importance of measuring the sustainability of their home and the shared common space. By employing a survey that also acted as a post-occupancy evaluation of the implementation of sustainability factors, lessons can be learned from the process and used to

improve current and future planning for cohousing developments (Meir, Garb, Jiao & Cicelsky, 2009).

### *3.1.3 Survey Contents*

The questionnaire for the survey consisted of six sections, with no open ended questions. Sections two and three of the survey paralleled many of the items on the LEED for Homes checklist and the NAHB Model Green Home Building Guidelines to identify if the sustainability factors that are measured with these rating systems are of significant importance to cohousing residents and to identify priorities of the cohousing residents for building sustainably. The survey instrument utilized a Likert type scale to examine the residents' decisions for building sustainably in order to determine the value of sustainable construction within the larger group context of building a neighborhood community. Section four of the survey identified lifestyle issues for the cohousing resident and their perception of others in the community. Section five of the survey identified possible areas of conflict with group decision making as it pertained to sustainability (see Table 1).

Table 1. Survey Contents

| Questsionaire Sections | Contents | Subcontents | Notes |
|---|---|---|---|
| Section 1 | Demographic information | Age, education level, knowledge of sustainability rating systems, location and home size | Categorical scale |
| Sections 2 and 3 | Opinions on sustainable construction and amenities that can facilitate sustainability ratings | Energy conservation methods, water conservation methods, materials, conditions that affect indoor air quality and location | Likert type scale: (1) Strongly disagree to (5) Strongly agree |
| Section 4 | Self-assessment on lifestyles and health | Personal reflections on sustainability and environmental issues that may affect health | Likert type scale: (1) Strongly disagree to (5) Strongly agree as well as yes/no |
| Section 5 | Group decision making | Education level of sustainable building practices and amenities | Likert type scale: (1) Strongly disagree to (5) Strongly agree |

### *3.2 Data Analysis*

Respondents to the survey can be broken down by age group to identify areas of greater interest for those aged 35 to 50, age 50 to 65, age 65 to 75, and age 75 or more. All communities and age groups were examined to understand the importance of integrating measureable sustainable elements into the common house and their own house to identify whether a sustainability rating system would be a beneficial guidepost for the construction of new or renovated cohousing communities in the future.

The strength of each respondent's commitment to sustainable building practices was measured on a five-point scale that ranged from "strongly

disagree" (1) to "strongly agree" (5). The survey assessed areas of sustainability following the sections outlined in the LEED for Homes rating system. Respondents identified areas of sustainable building that has been implemented in their own homes by identifying the use of renewable or sustainable materials and low or no-VOC (volitile organic compounds) paints in the home.

Finally the respondents were asked to self-assess their own sustainability and to reflect upon the sustainability and cost trade-offs that may have occurred in the process of moving to a cohousing community. Statements regarding current lifestyle and sustainability habits were measured with "yes", "no", "don't know", or "does not apply" answers. Statements regarding the respondent's awareness of sustainability over time were measured on a five-point scale that ranged from "strongly disagree" (1) to "strongly agree" (5).

Individual cohousing communities from the list of respondents were identified and researched for implemented sustainability practices. A comparison of the priorities of the respondents in that cohousing community to the completed community as they describe themselves in the Cohousing US organization and as they identify themselves on their own web-sites were made to understand the influence of the sustainability values that the residents brought to the community.

Respondents with higher sensitivities to environmental factors such as allergies or asthma were studied to determine their interest in incorporating sustainability measures that target higher indoor air quality. These same respondents were also examined for prior knowledge of sustainability rating systems and their enthusiasm for measuring their house and/or the community

common house level of sustainability.

# CHAPTER 4

## Results

This chapter will analyze and discuss the results of the surveys returned by the cohousing residents to identify the participants by age group, and the cohousing communities by demographic information which includes their location within the United States and urban, suburban, or rural designations. Findings are presented as they relate to the LEED for Homes rating system categories and comparisons of priorities between urban, suburban, and rural communities will be described. Key findings reveal differences of priorities between age groups if they exist and this information will be used to understand if age is a factor in the level of sustainability included in a cohousing project.

### *4.1 Subjects*

The survey was sent to a total of 56 multi-generational cohousing communities. Each survey introduction and web link was sent to a single point contact within the community and the single point contact e-mailed the introduction and web link to the community via personal e-mail accounts. A total of 25 communities participated in the survey with 95 respondents. Of these 95, seven respondents opted out of the survey before completion. A total of 88 participants completed the survey and are included in the data set.

Of the cohousing communities that participated, 14 are considered to be urban due to their proximity to business centers and walkability to other amenities. Five of the cohousing communities are considered to be suburban due to their proximity to the nearest town and access to green space or

wilderness within or adjacent to their community space. Six of the communities are considered to be rural due to their extensive acreage and agricultural and/or wilderness access within or adjacent to their community.

Respondents live in communites all across the United States and include three in Vermont, one in New Hampshire, two in Massachusetts, one in Maryland, one in Washington DC, two in North Carolina, one in Michigan, four in Colorado, two in Arizona, two in Washington, three in Oregon, and three in California (see Figure 2).

**Figure 2: Location Map for US Cohousing Communities That Participated in the Survey**

### *4.1.1 Respondents' demographics.*

Table 2 presents the frequency and percentage distribution for the demographic characteristic of the sample: age, education level, and urban, suburban, or rural location information, and tenure in the community. Of the 88

respondents, those who are approaching their senior years made up almost 40% of the population, while less than 10% were over the age of 65. Cohousing residents tend to be well educated with almost all respondents having a college degree and more than 60% having a Master's degree or higher. Over half are living in an urban community, just under one-quarter are in a suburban community and less than 20% of the respondents are living in a rural setting. The majority of the respondents have been in cohousing for at least one year, with over one-third of the respondents having lived in cohousing for more than six years. This tenure within the community in addition to the planning time it takes to form a community speaks to the successful nature of the social structure that comprises cohousing communities and their commitment to maintain these communities (see Table 2).

Table 2. Demographic Characteristics

| | Frequency (N) | Percentage of Total (%) |
|---|---|---|
| Age | | |
| 35-50 years | 31 | 35.2 |
| 50-65 years | 35 | 39.8 |
| 65-75 years | 16 | 18.2 |
| 75 years and over | 6 | 6.8 |
| TOTAL | 88 | 100 |
| Education Level | | |
| Some College | 3 | 3.4 |
| College Degree | 31 | 35.2 |
| Master's Degree or Higher | 54 | 61.4 |
| TOTAL | 88 | 100 |
| Location Designation | | |
| Urban | 49 | 56.3 |
| Suburban | 21 | 24.1 |
| Rural | 17 | 19.6 |
| TOTAL | 87 | 100 |
| Tenure in Cohousing | | |
| 1 year or less | 11 | 12.5 |
| 1 to 5 years | 43 | 48.9 |
| 6 to 10 years | 30 | 34.1 |
| More than 10 years | 4 | 4.5 |
| TOTAL | 88 | 100 |

#### *4.1.2 Respondents' knowledge level of sustainability rating systems.*

Table 3 presents the respondents' level of knowledge of some existing sustainability measurement tools in the current marketplace. ENERGY STAR was introduced in 1992 and has high recognition in the marketplace which is reflected in this study with a 97.7% recognition rate among the respondents. Although the LEED rating system has not been in the marketplace as long as ENERGY STAR, there is still a 78.4% recognition rate among these respondents. Only 50% had heard the term "NAHB Model Green Homebuilding Guidelines" in regard to building construction (see Table 3).

Table 3. Respondents' Knowledge Level of Sustainability Rating Systems

| | Frequency (N) | Percentage of Total (%) |
|---|---|---|
| Has heard the term "Energy Star" (United State Department of Energy Program) in regard to home building construction | | |
| Yes | 86 | 97.8 |
| No | 1 | 1.1 |
| Don't Know | 1 | 1.1 |
| TOTAL | 88 | 100 |
| Has heard the term "LEED" (Leadership in Energy and Environmental Design) in regard to building construction | | |
| Yes | 69 | 78.4 |
| No | 18 | 20.5 |
| Don't Know | 1 | 1.1 |
| TOTAL | 88 | 100 |
| Has heard the term "NAHB Model Green Homebuilding Guidelines" (National Association of Home Builders) in regard to building construction | | |
| Yes | 44 | 50 |
| No | 37 | 42 |
| Don't Know | 7 | 8 |
| TOTAL | 88 | 100 |

With this information, the analysis of the importance of building a home and community that aligns itself with aspects of the LEED for Homes rating system developed by theUSGBC is anticipated to be high.

### *4.2 Alignment of Responses to NAHB and LEED for Homes*

The NAHB Model Green Building Guidelines and LEED for Homes rating system recognizes building teams who work collaboratively to design and build sustainable environments for the homeowners and end-users. The interactive nature of developing a cohousing community also allows for groups to best meet their objectives for designing a sustainable community. The cohousing group evolves and brings their individual values and goals to the group. With this information exchange the level of desired sustainability can be clearly identified and objectives presented for the group to achieve. The cohousing community

can use this planning time to clarify the level of investment each resident is willing or able to make.

LEED for Homes rewards urban locations that maximize walkability, bikeability and public transportation use. Locations of cohousing communites, however, will depend on the individuals' needs or desires. Cohousing communities are located in rural, suburban and urban environments depending on the wishes of the inhabitants. Respondents to this survey who reside in a rural location had only 12.5% somewhat or strongly agree that their commununity be located in an urban location. This is compared to respondents who are located in an urban setting who had 90% somewhat or strongly agree that their community be located in an urban setting. This is reinforced by the information that only 16.7% of residents in a rural location walk or bike rather than drive their car, and 57.7% of urban residents walk or bike rather than drive their car.

An urban location might be a beneficial location for residents as they age. Proximity to public transportation if needed, walkability to city or town amenities such as physicians' offices or medical complexes, civic offices and events, local businesses, volunteer opportunities, and public parks for recreation and relaxation would be beneficial for aging residents and keep them connected with the greater community. The results of the survey found that those aged 35 to 50 had the greatest desire to be in an urban location with 83.9% of that age group strongly or somewhat agreed that their cohousing community must be located in an urban setting. Those aged 50 to 65 had the fewest number of residents somewhat or strongly agreed that the cohousing must be located in an urban

area with only 62.5%.

### *4.2.1 Water and Energy Savings*

Water and energy savings is a popular strategy for all home builders and homeowners. There are many design strategies and technologies that can be implemented to achieve these savings for the homeowner. More than 80% of the respondents to this survey somewhat or strongly agreed that energy and water saving technologies and strategies must be implemented into their common house (see Table 4).

Table 4. Water and Energy Saving Strategies for the Common House

| | Frequency (N) | Percentage of Total (%) |
|---|---|---|
| The common house must be planned with ENERGY STAR doors and windows | | |
| Strongly agree | 58 | 65.9 |
| Somewhat agree | 22 | 25 |
| TOTAL | 80 | 90.9 |
| The common house must be planned with ENERGY STAR appliances | | |
| Strongly agree | 49 | 55.7 |
| Somewhat agree | 30 | 34.1 |
| TOTAL | 79 | 89.8 |
| The common house must be planned with enhanced insulation | | |
| Strongly agree | 63 | 71.6 |
| Somewhat agree | 14 | 15.9 |
| TOTAL | 77 | 87.5 |
| The common house must be planned with energy saving technologies such as compact fluorescent lighting fixtures | | |
| Strongly agree | 57 | 64.8 |
| Somewhat agree | 20 | 22.7 |
| TOTAL | 77 | 87.5 |
| The common house must be planned with high efficiency water heaters | | |
| Strongly agree | 54 | 61.4 |
| Somewhat agree | 22 | 25 |
| TOTAL | 76 | 86.4 |
| The common house must be planned with water saving-technologies such as low-flow faucets and dual-flush toilets | | |
| Strongly agree | 49 | 55.7 |
| Somewhat agree | 23 | 26.1 |
| TOTAL | 72 | 81.8 |

Water and energy savings technologies and strategies for the home were almost as popular with more than 70% of the respondents to the survey somewhat or strongly agreed that these must be incorporated into their personal homes (see Table 5).

Table 5. Water and Energy Saving Strategies for Cohousing Homes

| | Frequency (N) | Percentage of Total (%) |
|---|---|---|
| My home must be planned with ENERGY STAR appliances | | |
| Strongly agree | 65 | 73.9 |
| Somewhat agree | 14 | 15.9 |
| TOTAL | 79 | 89.8 |
| My home must be planned with enhanced insulation | | |
| Strongly agree | 67 | 76.1 |
| Somewhat agree | 12 | 13.6 |
| TOTAL | 79 | 89.7 |
| My home must be planned with energy saving technologies such as compact fluorescent lighting fixtures | | |
| Strongly agree | 57 | 64.8 |
| Somewhat agree | 21 | 23.9 |
| TOTAL | 78 | 88.7 |
| My home must be planned with double or triple pane windows | | |
| Strongly agree | 64 | 72.7 |
| Somewhat agree | 13 | 14.8 |
| TOTAL | 77 | 87.5 |
| My home must be planned with water saving technologies such as low-flow faucets and dual-flush toilets | | |
| Strongly agree | 45 | 51.1 |
| Somewhat agree | 25 | 28.4 |
| TOTAL | 70 | 79.5 |
| My home must have access to enough sunlight to warm the house in cooler months | | |
| Strongly agree | 40 | 45.4 |
| Somewhat agree | 29 | 33 |
| TOTAL | 69 | 78.4 |
| My home must be planned with a high efficiency water heater | | |
| Strongly agree | 36 | 40.9 |
| Somewhat agree | 29 | 33 |
| TOTAL | 65 | 73.9 |
| My home must have a high efficiency heating and cooling system | | |
| Strongly agree | 34 | 38.6 |
| Somewhat agree | 30 | 34.1 |
| TOTAL | 64 | 72.7 |

Water and energy savings account for much of the return on investment for sustainable design. Ongoing savings in water and energy bills can entice homeowners into larger up front investments in newer technologies and more efficient equipment. The investments made in this building design can take years to recover depending on energy and water use, current and future costs for the natural resources, and environmental factors such as the impact of global warming in the form of greater temperature fluctuations or storm activity.

Planning for future years may influence the up front investments a resident is willing to make, and being at a point in life where an additional investment in this equipment is not a burden would also be a factor in the systems selections made in the planning process. The same information noted in Tables 3 and 4 have additionally been broken down by age group to understand the importance of these water and energy savings techniques by age group. No one age group distinguished itself as leading the others in advocacy of sustainable features and systems in the common house or in the individual house. Those aged 75 or higher tend to show more resistence in the incorporation of these systems, however, this age group is under-represented in this sample and further studies must be conducted to verify that these tendencies hold true. ENERGY STAR appliances are well recognized and endorsed by all age groups and ENERGY STAR doors and windows, as well as double or triple pane windows, not necessarily rated as ENERGY STAR, are very important in the common house and the individual homes. In many cases, residents aged 50 to 65 and aged 65 to 75 show a greater willingness to invest in energy and water savings

technologies. Where this notably changes is in the individual home where those aged 35 to 50 show a greater interest in having a high efficiency heating and cooling system installed. The information is broken down by the technologies used in the common house (see Table 6) and the individual cohousing home (see Table 7).

Table 6. Water and Energy Saving Strategies for the Common House by Age Group

| | 35 to 50 yrs old (n=31) | 50 to 65 yrs old (n=35) | 65 to 75 yrs old (n=16) | 75+ yrs Old (n=6) |
|---|---|---|---|---|
| | Percentage of Total (%) | Percentage of Total (%) | Percentage of Total (%) | Percentage of Total (%) |
| The common house must be planned with ENERGY STAR doors and windows | | | | |
| Strongly agree | 68 | 69 | 69 | 67 |
| Somewhat agree | 32 | 19 | 31 | 16 |
| TOTAL | **100** | 88 | **100** | 83 |
| The common house must be planned with ENERGY STAR appliances | | | | |
| Strongly agree | 55 | 71 | 50 | 33 |
| Somewhat agree | 42 | 19 | 50 | 50 |
| TOTAL | 97 | 90 | **100** | 83 |
| The common house must be planned with enhanced insulation | | | | |
| Strongly agree | 65 | 81 | 88 | 67 |
| Somewhat agree | 25 | 13 | 6 | 16 |
| TOTAL | 90 | **94** | **94** | 83 |
| The common house must be planned with energy saving technologies such as compact fluorescent lighting fixtures | | | | |
| Strongly agree | 61 | 77 | 69 | 50 |
| Somewhat agree | 33 | 13 | 25 | 33 |
| TOTAL | **94** | 90 | **94** | 83 |
| The common house must be planned with high efficiency water heaters | | | | |
| Strongly agree | 39 | 72 | 88 | 83 |
| Somewhat agree | 48 | 19 | 6 | 0 |
| TOTAL | 87 | 91 | **94** | 83 |
| The common house must be planned with water saving technologies such as low-flow faucets and dual-flush toilets | | | | |
| Strongly agree | 55 | 63 | 56 | 50 |
| Somewhat agree | 26 | 24 | 38 | 17 |
| TOTAL | 81 | 87 | **94** | 67 |

Table 7. Water and Energy Saving Strategies for Cohousing Homes by Age Group

| | 35 to 50 yrs old (n=31) | 50 to 65 yrs old (n=35) | 65 to 75 yrs old (n=16) | 75+ yrs Old (n=5) |
|---|---|---|---|---|
| | Percentage of Total (%) | Percentage of Total (%) | Percentage of Total (%) | Percentage of Total (%) |
| My home must be planned with ENERGY STAR appliances | | | | |
| Strongly agree | 84 | 81 | 67 | 60 |
| Somewhat agree | 13 | 16 | 26 | 20 |
| TOTAL | **97** | **97** | 93 | 80 |
| My home must be planned with enhanced insulation | | | | |
| Strongly agree | 81 | 88 | 73 | 60 |
| Somewhat agree | 13 | 9 | 20 | 40 |
| TOTAL | 94 | 97 | 93 | **100** |
| My home must be planned with energy saving technologies such as compact fluorescent lighting fixtures | | | | |
| Strongly agree | 77 | 72 | 53 | 40 |
| Somewhat agree | 20 | 22 | 40 | 40 |
| TOTAL | **97** | 94 | 93 | 80 |
| My home must be planned with double or triple pane windows | | | | |
| Strongly agree | 65 | 90 | 73 | 100 |
| Somewhat agree | 25 | 4 | 27 | 0 |
| TOTAL | 90 | 94 | **100** | **100** |
| My home must be planned with water saving technologoes such as low-flow faucets and dual-flush toilets | | | | |
| Strongly agree | 42 | 69 | 47 | 60 |
| Somewhat agree | 35 | 22 | 46 | 0 |
| TOTAL | 77 | 91 | **93** | 60 |
| My home must have access to enough sunlight to warm the house in cooler months | | | | |
| Strongly agree | 53 | 50 | 47 | 20 |
| Somewhat agree | 34 | 31 | 46 | 40 |
| TOTAL | 87 | 81 | **93** | 60 |
| My home must have a high efficiency water heater | | | | |
| Strongly agree | 45 | 48 | 40 | 20 |
| Somewhat agree | 36 | 36 | 33 | 40 |
| TOTAL | 81 | **84** | 73 | 60 |
| My home must have a high efficiency heating and cooling system | | | | |
| Strongly agree | 35 | 52 | 38 | 20 |
| Somewhat agree | 46 | 25 | 37 | 40 |
| TOTAL | **81** | 77 | 75 | 60 |

### *4.2.2 Energy Generation*

In addition to energy conservation, energy generation is also a way for communities to be sustainable. This would involve a substantial investment from the community and may take a great deal of effort to implement around local zoning ordinances and neighbors' objections. It may be easier to plan this feature into a community where more property can be secured for this purpose and the survey results show that 77.8% of those in rural communities strongly or somewhat agree that this feature must be included in their planning. Only 47.8% of those in suburban communities somewhat or strongly agree that this should be included, and 67.3% of urban cohousing community respondents felt this feature must be planned into their community. The idea of generating some of the community's power on site was very appealing to those aged 65 to 75 with 94% of respondents in that age group in agreement that this feature should be planned into the community. Of those aged 35 to 50 only 58% agree that this should be planned in; 66% of those aged 50 to 65 and 67% of those aged 75 or higher had a positive view of including some form of power generation in the community.

### *4.2.3 Materials*

Material selections are integral to determining a home's sustainability rating. The use of materials that contain recycled content as well as those that are rapidly renewable and local can save on clear-cutting of forests, and unnecessary transocianic transportation among other forms of waste. Cohousing residents who participated in this survey, however, did not feel that material

selection was as important as water or energy savings strategies. Less than half, 48.9% somewhat or strongly agreed that the common house must be built with materials found in their region (defined by LEED for Homes as within a 500 mile radius of the home) and just over half, 51.2% somewhat or strongly agreed that their own homes must be built with materials found in the region. Slightly more, 60.3%, somewhat or strongly agreed that recycled materials must be incorporated into the common house while only 51.1% somewhat or strongly agreed that recycled materials should be incorporated into their own homes. These lower numbers may reflect an expectation that the architect or developer will work to design the community with the best materials for the job rather than having the community demand that certain materials be used.

The respondents were much more in agreement about the durability of the materials that would be used for their community. Eighty-three percent of the respondents somewhat or strongly agreed that the materials used for the interior finishes of the common house must last a minumum of 10 years without replacement. In their own homes, 80.6% of the respondents somewhat or strongly agreed that finish materials used there must last a minimum of 20 years. Over half, 62.5% of the respondents already have sustainable flooring installed in their homes.

#### *4.2.4 Indoor Air Quality*

The NAHB Model Green Homebuilders Guidelines and LEED for Homes building protocol addresses the issue of indoor air quality with measures that ensure proper ventilation and exhaust through the home as well as control of

moisture and contaminants that might lead to indoor air pollution and mold. Poor indoor air quality can aggravate existing health issues that include asthma and allergies. This survey shows that those aged 65 to 75 had the highest percentage of respondents with allergies to airborne pollutants and asthma. Twenty percent of those aged 65 to 75 have asthma and 46.7% have allergies. This is a concern for a population that becomes more susceptible to airborne illnesses such as influenza and colds as their immune systems weaken with age. Almost all of the respondents, 93.2% somewhat or strongly agree that the common house should be a "no smoking" area to preserve air quality within shared spaces. Fresh air is also shown to be very important to the respondents with 92% of them somewhat or strongly agreed that windows in their homes should be able to open. Other measures to help improve indoor air quality were not shown to be priorities with only 40.9% somewhat or strongly agreeing that an air filtration system must be fitted onto the home's heating and cooling system. Only 39.8% somewhat or strongly agreeing that radon detectors and alarms must be installed in their common house. Even fewer, 37.5% were somewhat or strongly agreed that radon detectors must be installed in their own homes. Over half of the respondents, 62.5% have used a low or no-VOC paint in their home, which will contribute to higher indoor air quality for the resident.

The respondents in this study who reported having allergies or asthma did not differ greatly in their responses from the general population to measures that enhance indoor air quality, although 80% of the respondents with asthma have used low or no-VOC paints in their home compared to the 62.5% of the general

population. As allergies can sometimes be triggered by chemical reactions, this population was also examined to determine their agreement on the use of non-toxic pest control and found that 82.2% of respondents with allergies, somewhat or strongly agreed that all landscaping should use non-toxic pest control. This is compared to 79.5% of the general respondents who somewhat or strongly agree that non-toxic pest control must be used on the landscaping.

Mold can contribute to poor indoor air quality and affect peoples' health dramatically. The survey found 15.9% of the respondents have experienced this in their home previously. Almost three-quarters of this population, 71.4% have used low or no-VOC paint in their own homes, and half, 50% of these respondents somewhat or strongly agreed with the statement that an air filtration system must be installed on the home's heating and cooling equipment.

When a cohousing community forms, it builds its neighborhood through the collaborative work of the feasibility, Study Group I, Study Group II, and Study Group III phases. It is constantly educating itself, exchanging ideas, and researching technologies and strategies for building. As the group moves to the policy making sessions of the work, Study Group III, they must figure out the best ways to properly operate and maintain their new community. The collaboration that happens in cohousing allows for the co-education of all members in best practices for the community. The NAHB Model Green Homebuilding Guidelines and LEED for Homes rewards this type of ongoing planning and education for keeping the functioning buildings as sustainable as possible.

### *4.3 Community Comparisons*

The data was examined to understand areas of difference between selected communities. Communities with the largest response rate were selected to attain the best cross-section of information between a rural, suburban, urban, and senior cohousing community. Cobb Hill is a rural cohousing community located in Hartland, Vermont and has 23 units on 260 acres of land. Residents moved into Cobb Hill in 2002. When describing themselves on the cohousing directory web-site they state: "We formed an intentional community with a focus on finding ways to live sustainably, to support local farm enterprises, and to understand our impacts on the environment" (The Cohousing Association of the United States/directory, 2009). On their community web-site, they have a dedicated destination for their sustainability mission: "The farm, the houses, the work we do are all reflections of our desire to live as lightly on the earth as we possibly can" (cobhill.org/sustainability, para.1, 2009). The web-site also lists out the sustainability features included in the home construction that includes: composting toilets, good wall insulation, triple pane windows, innovative heating, waste heat recovery, ENERGY STAR appliances, and passive solar orientation. Table 8 shows how the implemented sustainability measures in the community are aligned with this community's responses to the survey.

Table 8. Alignment of Rural Survey Responses to Built Community

| Cobb Hill community | Percentage of responses that strongly agree with the statement |
|---|---|
| ENERGY STAR appliances must be used in the common house | 100% |
| ENERGY STAR appliances must be used in my own home | 100% |
| ENERGY STAR doors and windows must be used in the common house | 100% |
| Enhanced insulation must be used in the common house | 100% |
| Double or triple pane windows must be used in my own home | 100% |
| My home must have enough access to sunlight to warm the house in cooler months | 100% |
| Enhanced insulation must be used in my own home | 100% |
| Water saving technologies must be used in my own home | 87.5% |
| Water saving technologies must be used in the common house | 85.7% |
| A high efficiency heating and cooling system must be used in my own home | 71.4% |

Cascadia Commons in Portland, Oregon is a suburban cohousing community that was completed in 2001. They state on the cohousing directory web-site that "we share green values of caring for the earth and its creatures" (The Cohousing Association of the United States/directory, 2009). And on their community web-site they go further with their sustainability statement by adding: "At Cascadia Commons, we're trying to adopt a more sustainable lifestyle". Their efforts are creatively shown on their web-site (see Figure 3).

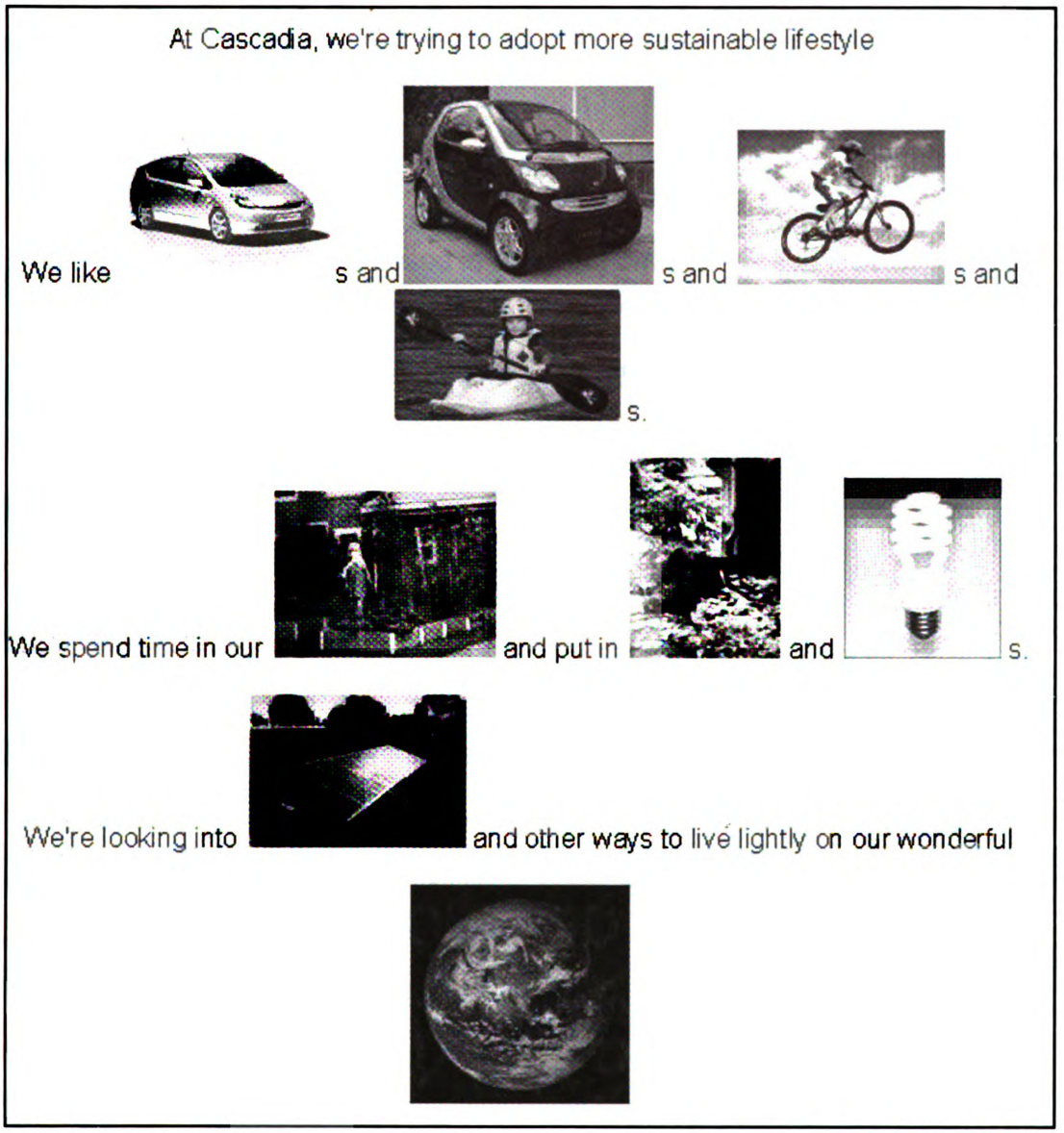


**Figure 3: Cascadia Commons Web Page Illustrating Their Commitment to the Environment (Source: http://www.cascadiacommons.com/greencascadia).**

Table 9 shows how the stated sustainability measures important to the community are aligned with responses to the survey for this community.

Table 9. Alignment of Suburban Survey Responses to Built Community

| | Percentage of responses that strongly agree with the statement |
|---|---|
| Double or triple pane windows must be used in my own home | 80% |
| Enhanced insulation must be used in my own home | 80% |
| The common house must use compact fluorescent lighting fixtures | 66.7% |
| My own home must use compact fluorescent lighting fixtures | 60% |
| ENERGY STAR appliances must be used in my own home | 60% |
| ENERGY STAR doors and windows must be used in the common house | 50% |
| Water saving technologies must be used in the common house | 50% |
| Water saving technologies must be used in my own home | 40% |
| I walk or bike rather than drive on a regular basis | 40% |
| ENERGY STAR appliances must be used in the common house | 33% |
| The landscaping in my community must use non-toxic pest control | 33.3% |
| My community must be able to generate some of its own power through renewable resources | 16.7% |

Newberry Place Neighborhood is an urban cohousing community located in Grand Rapids, Michigan and was completed in 2007. The home page on the web-site for this community states that they are a pedestrian friendly sustainable neighborhood with a dense urban housing design. Their homes are listed as green and energy efficient with the following features: solar hot water heaters, foam and cellulose insulation, natural ventilation systems, passive solar heating, bamboo and linoleum flooring, recycled fiber carpet, ENERGY STAR appliances, and recycling and composting areas in the neighborhood. Table 10 shows how the implemented sustainability measures in the community are aligned with

responses to the survey for this community.

Table 10. Alignment of Urban Survey Responses to Built Community

| | Percentage of responses that strongly agree with the statement |
|---|---|
| Enhanced insulation must be used for my own home | 90.9% |
| The windows in my home must be able to open to allow in fresh air | 90.9% |
| ENERGY STAR appliances must be used in my own home | 81.8% |
| I walk or bike on a regular basis rather than drive | 72.7% |
| ENERGY STAR doors and windows must be used in the common house | 70% |
| Enhanced insulation must be used for the common house | 60% |
| Double or triple pane windows must be used in my own home | 60% |
| ENERGY STAR appliances must be used in the common house | 54.5% |
| High efficiency water heating must be installed in my own home | 50% |
| My home must have enough access to sunlight to warm the house in cooler months | 36.4% |
| High efficiency water heating must be installed in the common house | 18.2% |
| Recycled content materials must be used in my own home | 18.2% |
| Recycled content materials must be used in the common house | 10% |

Silver Sage Village is an urban senior cohousing community in Boulder, Colorado which states on their web-site that their homes have been "Built Green" with further web links to a green homebuilding organization located in Colorado who is an ENERGY STAR partner, and another web link to an energy efficiency informational web-site in Colorado. Table 11 shows how the implemented sustainability measures in the community are aligned with responses to the

survey for this community.

Table 11. Alignment of Senior Urban Survey Responses to Built Community

| | Percentage of responses that strongly agree with the statement |
|---|---|
| Enhanced insulation must be used in the common house | 83.3% |
| Enhanced insulation must be used in my own home | 83.3% |
| Double or triple pane windows must be used in my own home | 83.3% |
| ENERGY STAR doors and windows must be used in the common house | 66.7% |
| ENERGY STAR appliances must be used in my own home | 66.7% |
| ENERGY STAR appliances must be used in the common house | 50% |

Table 12 illustrates how these four communities differ on issues of measurement of sustainability in their homes and communities, their thoughts on their own sustainability and whether or not they would incorporate the same sustainability into a stand alone home, and the sustainable materials they have incorporated into their own homes. While the rural community had the fewest number of members who have installed sustainable flooring, on average they strongly agree that they are more sustainable now than they were five years ago. They strongly agree that both their homes and the community should be measured for sustainability. The urban community had the highest average number of households with sustainable flooring, also strongly agreed that they are more sustainable now than they were five years ago, but only somewhat agreed that the houses and community should be measured for its sustainability. The suburban community had the longest tenure of residents, and in the senior

cohousing community all of the respondents to the survey agreed that they would have incorporated the same sustainability features they have in their cohousing home into a stand alone home (see Table 12).

Table 12. Differences Between Various Communities

| | Cobb Hill (rural) (n=9) | Cascadia Commons (suburban) (n=6) | Newberry Place (urban) (n=12) | Silver Sage Village (senior urban) (n=6) |
|---|---|---|---|---|
| Lifestyle is sustainable | 12.5% Strongly agree | 0% Stongly agree – (80% somewhat agree) | 9% Strongly agree – (64% somewhat agree) | 0% Strongly agree – (50% somewhat agree) |
| More sustainable now than five yrs ago | 75% Strongly agree | 40% Strongly agree | 73% Strongly agree | 40% Strongly agree |
| Living in cohousing has made me more aware of sustainability | 75% Strongly agree | 40% Strongly agree | 45% Strongly agree | 17% Strongly agree |
| Would have built a home with the same sustainability features as the cohousing house | 62.5% agree | 60% agree | 45% agree | 100% agree |
| The community should have the sustainability measured | 71% Strongly agree | 40% Strongly agree | 9% Strongly agree | 0% Strongly agree – (67% Somewhat agree) |
| The homes in the community should have the sustainability measured | 57% Strongly agree | 40% Strongly agree | 9% Strongly agree | 0% Strongly agree – (50% Somewhat agree) |
| Has used sustainable flooring in their home | 28.6% | 83.3% | 91.7% | 50% |
| Has used low VOC paints in their home | 88.9% | 33.3% | 50% | 100% |
| Average tenure in the community | 1-5 yrs | 6-10 yrs | 1-5 yrs | 1-5 yrs |

### *4.4 Community Influences*

Cohousing is a process of learning how to communicate with and understand those who may soon become neighbors and friends. People come together to share experiences and knowledge. From these, there will be changes and growth in all of their lives. The survey asked if there had been changes in the respondents' view of their own sustainability over time and found that when looking at all age groups together, 62.5% of the respondents somewhat or strongly agree that they are living a sustainable lifestyle. Over half, 56.8% somewhat or strongly agree that they are more sustainable now than they were one year ago and 77.3% somewhat or strongly agree that they are more sustainable now than they were five years ago. Almost three-quarters, 74.9% of all respondents in all age groups somewhat or strongly agreed that living in cohousing had made them more aware of sustainability.

Table 13 illustrates this lifestyle change for various age groups that participated in the survey. It finds that a higher percentage of 65 to 75 year olds somewhat or strongly agree that they are more sustainable now than they were one or five years ago, but a higher percentage of 50 to 65 year olds somewhat or strongly agree that their increased awareness of sustainability is due to living in cohousing (see Table 13).

Table 13. Sustainable Lifestyles

| | 35-50 yrs Old (n=31) | 50-65 yrs Old (n=35) | 65-75 yrs Old (n=16) | 75+ yrs Old (n=5) |
|---|---|---|---|---|
| | Percentage of Total (%) | Percentage of Total (%) | Percentage of Total (%) | Percentage of Total (%) |
| My lifestyle is sustainable | | | | |
| Strongly agree | 9.7 | 0 | 12.5 | 40 |
| Somewhat agree | 51.6 | 65.6 | 56.3 | 40 |
| TOTAL | 61.3 | 65.6 | 68.8 | 80 |
| My lifestyle now is more sustainble than it was one year ago | | | | |
| Strongly agree | 12.9 | 12.9 | 26.7 | 0 |
| Somewhat agree | 45.2 | 41.9 | 60 | 40 |
| TOTAL | 58.1 | 54.8 | 86.7 | 40 |
| My lifestyle now is more sustainable than it was five years ago | | | | |
| Strongly agree | 38.7 | 58.1 | 46.7 | 0 |
| Somewhat agree | 41.9 | 25.8 | 53.3 | 40 |
| TOTAL | 80.6 | 83.9 | 100 | 40 |
| Living in cohousing has made me more aware of sustainability | | | | |
| Strongly agree | 54.8 | 37.5 | 40 | 40 |
| Somewhat agree | 22.6 | 50 | 33.3 | 20 |
| TOTAL | 77.4 | 87.5 | 73.3 | 60 |

When asked if other members of the cohousing planning group brought more information on sustainability to the planning process, in most age groups more than half of the respondents somewhat or strongly agreed that this was the case. Only the 65 to 75 years olds had fewer than half of the respondents somewhat or strongly agreed that others had more information on sustainability than they did. The 50 to 65 years olds and the 65 to 75 years olds groups had the highest percentage of respondents who believe that they would have built the same sustainability factors into a stand alone house as was incorporated into their cohousing home (see Table 14).

Table 14. Sustainable Information Exchange

| | 35-50 yrs old (n=31) | 50-65 yrs old (n=35) | 65-75 yrs old (n=16) | 75+ yrs old (n=5) |
|---|---|---|---|---|
| | Percentage of Total (%) | Percentage of Total (%) | Percentage of Total (%) | Percentage of Total (%) |
| Other members of the cohousing planning group had more information about sustainability than I did | | | | |
| Strongly agree | 30 | 30 | 18.8 | 20 |
| Somewhat agree | 30 | 36.7 | 25 | 40 |
| TOTAL | 60 | 66.7 | **43.8** | 60 |
| If you had not moved into cohousing, would you have designed the same sustainability features into a stand alone house? | | | | |
| Yes | 48.4 | 62.4 | **62.5** | 40 |
| No | 35.5 | 18.8 | 12.5 | 20 |
| Don't know | 16.1 | 18.8 | 25 | 40 |
| TOTAL | 100 | 100 | 100 | 100 |

Finally, respondents were asked if they felt that they had given up some opportunities to save costs in order to attain some measure of sustainability, and if they were forced to accept some costs they did not want so that the group vision for sustainability in the community could be achieved. They were also asked about the importance of measuring the level of sustainability they may have achieved with their community and with their own homes. Over half of all respondents, 59.1% felt that they traded cost savings for sustainability, however, 69.3% did not feel that they were forced to accept additional costs for sustainability they did not feel was necessary. When examined by age group, 20% of the respondents aged 75 years old or older agree they were forced to accept additional costs for sustainability they did not feel was necessary. Of those aged 65 to 75 only 13.3% felt they were forced to accept additional costs; 6.3% of 50 to 65 year olds felt they were forced to accept additional costs, and 12.9% of those aged 35 to 50 felt they were forced to accept additional costs.

This data would indicate that while some respondents felt that belonging to a cohousing community meant accepting additional unwanted costs for sustainability, for most the cost differential was an acceptable trade off to get the community they wanted and the sustainable features they felt were necessary.

There was some enthusiasm for measuring the level of sustainability achieved, though not overwhelming. Only 20.5% of all respondents strongly agreed that it was important to measure their home's sustainability, however, just under half, 48.9% somewhat agreed that this would be important for a 69.4% positive response. These figures are about the same when asked if measuring their community's level of sustainability was important with 21.5% of all respondents strongly agreeing that it was, and 48.9% somewhat agreeing to that statement for a 70.4% positive response.

When respondents who had heard of LEED were separated out from the general response population, a slightly smaller percentage felt that measurement of the home and community was necessary. Of those who had heard of LEED, only 45% somewhat agreed that measuring the home's sustainability was important but 21.7% strongly agreed that this should be done for a 66.7% positive response. When asked about measuring their community's sustainability, again 45% somewhat agreed that this was important, and only 17.4% strongly agreed that this step should be taken for a 62.4% positive response.

When looking at all 25 of the responding communities to the survey, 24 of them have community web-sites and all of those 24 with web-sites have some reference to the sustainability factors of their neighborhood. Clearly sustainability

is a value that all of these communities have chosen to incorporate into their building project. It is a prominent value that they want to be recognized for as they present themselves to the world.

# CHAPTER 5

## Summary and Conclusions

This chapter begins with a discussion of the findings, followed by conclusions and theoretical implications from the findings. Finally, limitations of the present study and recommendations for future study are presented.

### *5.1 Discussion*

The issue of sustainability is a shared value in cohousing communities and a priority for the residents in the planning and design of the cohousing site. The social sustainability of the construct of cohousing may lend itself to attract those who are also concerned with environmental sustainability, and the priorities of those who come together to build this new community may be very compatible from the moment the group begins to form. It may be that those who are not interested in building a sustainable home and community are not attracted to the concept of cohousing, or may find at early planning stages that cohousing is not a good fit and they drop out of the group. For this reason, the results of this study cannot be projected beyond a cohousing community's construct. However, the consensus of those who have come together to build cohousing communities within the first decade of the 21st century is that many design features, mechanical systems, and energy saving technologies that can contribute to the overall sustainability rating of a home or common house is of great importance to those who will live there.

The number or amount of sustainability values, priorities and issues that a cohousing community must deal with in creating a community lends itself to

being a fluid and adaptive system. The group as a whole must work together to preserve the priorities and goals that are developed as the planning and design process takes place. The outcomes of the collaborative decision making and shared implementation must be evident and in alignment with the stated goals of the participants to justify the time and energy invested by the group.

The process of gathering people who have an interest in developing a cohousing community and then educating these participants in the steps it takes to create a community result in the formation of a group of people who wish to pursue this process through to a completed building project. A successful cohousing group must share many common goals and values in order to produce a completed cohousing community and then sustain the momentum and cohesion of the group for many years. Cohousing groups make decisions by consensus as there is no hierarchy within the group, so personal and group goals must be presented and agreed upon before they can move forward. This transparency in the process helps the residents learn to live in a cooperative social context.

Achieving decisions by consensus requires that the communication skills of the group be strong and transparent. Being able to negotiate decisions also indicates a strong shared belief system with regard to priorities in where and how to live. The findings in this study indicate that sustainability measures that can be incorporated into the design and construction of a cohousing community are a shared value and a high priority to people who live there and this justifies further research.

The findings indicate that many sustainability measures the participating communities self-identify with are also of high priority in the survey. While the investment in real estate will continue to be centered around location, and the first priority of cohousing will continue to be the building of a socially viable community, the environmental sustainability factors are of such a high priority to those who will live there that they should be introduced in the early stages of community development, either during the feasibility phase or in the Study Group I phase. This will help to establish an achievable level of ecological sustainability that the community can commit to. This discussion should not be delayed to the Study Group II participatory design phase.

This study evaluates the priorities of those already living in a cohousing community, although the information can be projected out from the younger respondents as to possible priorities that these groups will have if or when they consider moving from a multi-generational cohousing community to a senior cohousing community. And if the age groups of 35 to 50 and 50 to 65 plan to live out the rest of their lives in their current cohousing community, the choices made must support them as they progress through the aging process. Planning considerations for high indoor air quality and free access to all areas of the house without barriers of stairs or undersized doors must be a part of the planning process with a consensus of all neighbors that these design decisions are worth the investment.

Most participants in this study agree that they are living a more sustainable lifestyle now than they were five years ago, and that this is due to

living in a cohousing community. The survey also indicated that some indoor air quality issues were important to them but they were most concerned with the common house and its status as a "no-smoking" area. The anti-smoking campaign and years of research that has proven smoking and second-hand smoke contribute to many illnesses, including cancer, have made this issue highly visible to all Americans. Cohousing residents have incorporated that into their own value system and directly relate a non-smoking area to cleaner air and higher air quality.

Testing for radon is far less important to the respondents, but has not had the visibility or the public support that the anti-smoking campaign has enjoyed for the past decades. Considering the education level of most residents of cohousing, as more information and results of studies become known and distributed, the testing for radon gas could prove itself to be of higher importance over time. It may also be that many of the residents who participated in this survey have researched the radon levels in their geographical area and based on their existing knowledge base do not feel that additional testing is required. Further studies and more public awareness campaigns could make this a more urgent need for future cohousing residents.

Creating a higher indoor air quality for communities who have a multi-generational population or for those who have the intention of aging in place can begin with those in their younger years who can make planning decisions that help keep contaminants that might cause colds or influenza out of their homes now and as they progress to their senior years. However, less than half of the

respondents favored an air filtration system being added to their heating and cooling system. As a consensus decision that would be made by cohousing communities, this may not help to enhance the environment for the very young who are still developing their immune systems and an aging population who will contend with a higher risk for asthma related death as they age. Higher indoor air quality decisions may extend the health of those in the community now and those who will age in the community over future generations.

Respondents to this survey were most in favor of sustainability measures that can show a return on their investment. Where future cost savings can be planned on, the response to implementing sustainable features was very favorable. Where sustainability measures are not immediately associated with a return for the investment made, the response was less favorable. This can be seen in the less enthusiastic response to using local materials or materials with recycled content. Where a sustainability measure is associated with an established standard, such as ENERGY STAR, a brand that implies greater cost savings for future energy bills, the response is extremely favorable. Given this information, if the LEED for Homes standard establishes itself well and proves to the market that the return on investment to achieve a LEED for Homes rating is high, the cohousing communities will incorporate this into their planning and design of the community as they have done with the ENERGY STAR products and ratings.

There are some minor differences of priorities in various age groups for the sustainability measures of high importance in both the common house and

their own individual houses. The 50 to 65 year olds who responded to this survey show themselves to lead the other age groups and prioritize more of the sustainability measures discussed. The 50 to 65 year old group had more respondents strongly agree that water saving technology and ENERGY STAR appliances be used in the common house. This age group also had more residents strongly agree that water saving technologies, enhanced insulation, high efficiency water heaters and high efficiency heating and cooling equipment must be used in their own home. Those aged 75 or higher prioritized using double or triple pane windows in their home, and the 35 to 50 year olds were most concerned with using ENERGY STAR appliances in their homes. The 50 to 65 year olds and the 65 to 75 year olds are leaders in prioritizing many sustainability measures that are part of established sustainability rating systems in the marketplace today.

All age groups felt that there was some trade-off between cost savings and sustainability in the design and construction of their cohousing community; the 50 to 65 year olds, as apparent drivers of many of the sustainability measures implemented, were least likely to feel that they were forced into accepting sustainability measures they did not want. Almost three-quarters of the 50 to 65 year olds and the 35 to 50 year olds responded positively to the idea of measuring their home's sustainability, however, the 50 to 65 year olds were most enthusiastic about measuring their community's sustainability. It appears that the older age groups are more concerned for the sustainability measures implemented and the rating of the community space and less concerned about

these issues in their own individual spaces. This age group appears to want to lead by putting the community first, perhaps with the understanding that the individual homes will follow suit. It may also be generational that those who are aged 50 to 65 were raised in a less "me" social structure where the emphasis is put on individual accomplishments typically associated with the 1970s and 1980s, and have a more positive association with a "we" social structure that emphasizes the success of a generational movement typically associated with the 1960s. This attitude may also contribute to their ability to drive many of the consensus based decisions of the group toward a sustainable priority for them.

The longest lived sustainability measurement system, ENERGY STAR was recognized by almost all of those who participated in the survey. The enthusiasm for incorporating sustainability measures directly related to the ENERGY STAR label was also high, with nearly all of the respondents having a positive view of using ENERGY STAR appliances in the common house and in their own homes. The marketing efforts made by the Department of Energy in tagging products that can contribute to a higher energy efficiency level appears to be very successful with the respondents of this group, especially those aged 35 to 50. As our society has grown to recognize and look for labels that can signify quality or universal availability, the tagging of products with the ENERGY STAR label apears to resonate with younger cohousing residents. As this group ages and as cohousing grows to accommodate our aging society, the ability to reach a consensus decision in the group by associating buying decisions with a known entity's tag or logo may expedite the process of selecting products that

can enhance a community's and a home's energy efficiency and overall sustainability.

The level of education achieved by this group of respondents may contribute to the willingness to invest in sustainable systems and design. With more than half of the respondents having a Master's degree or higher, the enthusiasm to research the features and benefits of sustainable systems should be high. Research would also include studies on climate change, global warming and carbon footprints that can be affected by the decisions made when planning a construction project. As the study indicates, this groups' priorities include environmental concerns and the efforts that can be made to decrease their carbon footprint through a better built environment.

As other rating systems grow in popularity and recognition, it is expected that the same enthusiasm that accompanies the ENERGY STAR rating methods will also grow to encompass a broader scope of sustainability that is covered in the NAHB Model Green Homebuilders Guidelines and LEED for Homes design protocol. This is an encouraging indicator that sustainable building features are a worthwhile investment and in the future will contribute to lower energy bills, less energy waste and a smaller carbon footprint for all cohousing residents. As with the ENERGY STAR rating system, having a known and proven entity to help identify a comprehensive rating system may attract younger cohousing residents who can reach consensus decisions based on criteria that meets an established standard. As LEED for Homes builds its recognition in the field of design and construction, this will become the tag that can drive planning decisions, just as

the ENERGY STAR tag drives decisions today.

One reason that cohousing communities may not measure or rate the sustainability of their cohousing could be the investment that is required for the process. The community would need to agree that they should allocate funds to register the project, and then hire the additional professionals required to assist with the integrated planning and design of the project as well as perform the testing upon completion of the project. These costs can push a family building budget beyond the "typical" costs to design and build a single family home in the suburbs. Additional costs for measuring and rating the sustainability of a community must be seen as a worthwhile investment by all of those who will live in the community. Currently the data that documents the return on investment of this rating process is limited, but as more home-owners are able to use the LEED for Homes certification as a measure of sustainability and energy savings the way that ENERGY STAR is able to, the more demand there will be for LEED certified homes.

Rating systems may soon be used to identify sectors of the market that have higher resale values and attract a buyer who is specifically looking for the attributes of a sustainably designed and constructed home. However, with the audience of a cohousing community, the rating of a home or community may not have the same impact as it does on a stand alone home in a city or suburb. Those who would be attracted to living in a cohousing community would be committing to the social fabric that makes up the community first. They may also have environmental priorities that they are looking to meet with the home and

common space, but it would not be of a higher priority than the neighborhood connections. An exception may be the senior residents who, as they move into their later years and awareness of rating systems continues to increase, may desire a sustainability rating as a legacy left for future home owners in the community.

The marketing power of a LEED rating in the homebuilding industry is not fully tested. There are currently fewer than 4000 homes that have been certified by LEED (USGBC, 2009) out of the approximately 1.85 million homes that get built every year (NAHB, 2003). The demand for a LEED Certified home is currently driven in large part by the owner of the home, so the marketing value of selling a LEED Certified home has not been documented. When looking at a cohousing community, many are fully occupied by the time construction is complete because they have been formed and designed by a group of like-minded individuals who do grass roots marketing to other home buyers looking for a more intentional community in which to live. The location and social networking will continue to be the biggest factors in helping home buyers decide where to purchase, but as seniors move to a fixed income status, proving cost savings through energy and water conservation, durability of the home through intelligent material choices, and even lower energy consumption from commercial carriers due to on-site power generation, the sustainability factors may be a key incentive for home buying within a demographic that is moving to a fixed income status.

The current senior population in this study show themselves to be aware

of sustainability with nearly three-quarters of respondents aged 65 and over viewing their lifestyle as sustainable. They also believe themselves to be fairly well educated in sustainability with less than half of this group agreed that others in their planning group had more information on sustainability than they did. And more than half of those respondents aged 65 or older felt that they would have designed the same amount of sustainability into a stand alone house as they have in their current cohousing home.

This group has been through the energy crisis of the 1970s and may have been involved in environmental awareness campaigns that began in the 1960s. They bring with them not just current knowledge of environmental impacts, but a lived history of how the development of an industrial society can impact the natural environment. This history may be the building block that this age group is starting from in developing their priorities for sustainable building. They may also bring with them a rich history of the building practices that have been employed for generations so they are well versed in identifying practices that are truly new and innovative in the planning and design process. This bank of knowledge can help inform others in the cohousing communities of more ineffective building methods of the past that can be replaced with newer designs and techniques considered sustainable.

The awareness of sustainability would indicate that this has the attention of a senior audience and to be able to purchase a home that can help them save money on energy bills would be of great interest to them. These numbers increase for respondents who will be moving into their senior years in the next

decade with over half of those aged 50 to 65 saying that they would design in the same sustainability features to a stand alone house as they incorporated into their cohousing home. Less than half of respondents aged 35 to 50 feel that they would have the same sustainability features designed into a stand alone house, but this group is currently in the process of building careers and growing families and may have other priorities when building their homes. As this group ages in their homes and experiences rising fuel costs, their desire for cost-saving efficiencies are likely to increase.

This study found that many of the priorities identified by representative communities were followed through to construction. This is most evident in the Cobb Hill community where 100% of the respondents strongly agreed that the following sustainability features must be included in their homes and community: enhanced insulation in the common house, enhanced insulation in the home, ENERGY STAR doors and windows in the common house, double or triple pane windows in the home, ENERGY STAR appliances in the common house, ENERGY STAR appliances in the home, and a passive solar orientation on the site. The importance of these features is underscored by the description of their sustainability features on their community web-site that states all of these features are included in their cohousing project. Other sampling communities for suburban, urban and senior cohousing had strong ties from intention to include sustainable measures through to the construction, though not as strong as Cobb Hill's.

This would suggest that environmental priorities play a key role in whether

an individual stays with a cohousing community as it evolves and develops. The cohousing community's embrace of sustainability would appear to be a key indicator of the strength of the cohesiveness of this group and if individuals feel strongly about the sustainability measures they'd like to see, that will continue to influence the group dynamic and which measures will make it through to the final design and construction of the project.

### *5.2 Implications*

The current study offers both theoretical and practical implications. A cohousing community requires that future residents come to the community with a goal of embracing and enhancing the social sustainability factors that will be incorporated into a final community project. Studies of existing cohousing communities show that these residents also embrace environmental sustainability and that this is reinforced through the community experience (Meltzer, 2005). When cohousing begins at the assembly of a handful of like-minded people, one of the shared characteristics of the group is a focus on environmental sustainability. To this point in time, residents have brought their own choices and priorities to the group where consensus is then reached on the implementation of specific measures. The current study illustrates the high level of acceptance of many of the measures that comprise the LEED for Homes design protocol and the NAHB Model Green Homebuilding Guidelines. Both of these measurement systems incorporate the ENERGY STAR rating system as part of their more comprehensive sustainable building rating system. Understanding that cohousing groups already show themselves to be concerned

about making sustainable choices that can be measured and rated should make the introduction of a formal rating system to the group planning sessions easier. The groups' high recognition of the ENERGY STAR label also indicates that as the LEED for Homes label becomes more recognized in the field of home construction, the more likely cohousing residents will be to gravitate toward using this as a measure of sustainability.

This study has shown that many environmental building strategies are significant to those planning a cohousing community and that they should be included in the Study Group I sessions for those forming a community. This lesson should apply to both multi-generational communities and senior communities. Specific health issues that are impacted by indoor air quality should be discussed with all generations planning cohousing, for current needs and for future needs as the residents age-in-place.

Sustainability influences group structures and continues to impact the group dynamic through the planning, design and construction of the project as well as on-going policy development. A more in-depth study of the lengths that future residents will go to before dropping out of the cohousing community would enhance the understanding of a group dynamic to the variables of cost and sustainability in the building project.

### *5.3 Limitations and Future Research*

This present study was an attempt to identify sustainability choices as an influencing factor in the formation and construction of cohousing communities, although several limitations remain. This section discusses some of these

limitations and provides several suggestions for further research.

First, although this study showed that sustainability measures are of significant importance to current cohousing communities, it did not find any co-dependence between cohousing and sustainability. The traits that would attract a person to the lifestyle that cohousing offers have not been proven to have any causal relationship with the desire for sustainability, although this link is worth studying. Understanding if there is a connection between social sustainability and environmentally sustainable building techniques could identify opportunities for developers who wish to cater to home-buyers looking for a community in which to live.

Second, the limits of cost as a trade off for sustainability have not been identified or measured. This study shows that cost trade offs for sustainability are made and residents accept cost increases for sustainability. However, an optimal formula that identifies a balance of costs and sustainability has not been developed. This could be a study in conjunction with the levels of education on sustainability rating systems each participant has when they arrive at the early phases of cohousing development. Future studies can observe the values brought to the group and the lengths these future residents are willing to go to see these values adopted by the community and completed into a project. The study of the co-education process between cohousing residents with knowledge of sustainability rating systems and those without could help determine the influencing factors that will instigate change in the planning and development phases. The observation and measurement of adaptive change among residents

should help to identify the tipping point where sustainability measures are adopted by the group.

Third, a wider variety of cohousing communities should be studied, and cohousing communities that are forming now should be studied to clarify priorities and differences in groups that have an increasing awareness of sustainability rating systems in the marketplace. As knowledge of sustainability increases with familiarity and through government and media exposure, the variation of sustainability incorporated into each community can be measured and identified against education levels and regional applications. This study can be further advanced by looking at the impact this knowledge has on different age groups of residents. The influencing factors for those just starting careers and families may be very different from those preparing for retirement. Differences should be identified so that future housing for an aging population will meet the expectations this group may have, and choices made by those not yet seniors will allow them to age in a healthy environment.

Fourth, perceived benefits from the inclusion of sustainability measures should be tested and verified. Measures that have quantifiable pay back periods and tangible benefits should be documented and shared among advisors and participants working to develop other communities and projects. Information should be widely available to all residents working to bring this data to an active system. The timing of the introduction of this knowledge should be observed as well as the degree of influence this information has on the choices made by the residents involved in the community to verify the rate of adoption and the

processes that may lead to the tipping point of embracing more efficient and sustainable solutions in the planning and building process.

These studies can be taken beyond the borders of the United States to understand the global implications of sustainability rating systems and the adoption rate of sustainability measures in different parts of the globe. The values introduced by various residents in different cultures may push for greater or less integration of sustainability measures. Concerns for environmental building practices that target specific savings can also be documented; Australia may be more concerned with building communities that are extremely water efficient, while Sweden may be more concerned with the energy efficiencies incorporated into the buildings.

Finally, this study could include those not in cohousing to determine if there are significant differences in the level of importance that sustainability measures carry. For those not moving into a cohousing community, the priorities for building and construction should be studied and compared for differences and similarities to cohousing communities. The impact of group learning through co-education that may make the cohousing community more sustainable must be studied to determine if it could be translated to the general home-buying public. Health differences should be measured between those living in a sustainably built environment and those who are not.

### *5.4 Conclusion*

The purpose of this study, to identify the sustainable building priorities for cohousing residents in the United States, looked at several sustainability factors

that could be incorporated into a cohousing community and home. The findings suggest there are several measures that cohousing residents agree must be included in the construction of their home and they are willing to make cost trade-offs for these measures. A higher percentage of the senior population in this study felt that they traded cost savings for sustainability, indicating that as people age and the restrictions that may come from a fixed income are factored into the building process, sustainability issues are associated with cost issues. The senior population was not measurably more interested in higher indoor air quality, although the aging immune system would benefit from greater attention to this aspect of building. Current seniors felt that they brought a great deal of sustainability knowledge to the planning group and that they were knowledgeable enough about sustainability that over half of the 65 and older population of the study would bring those same measures to a home they planned themselves, not with a group. Two-thirds of those aged 65 and older had heard of the LEED rating system in regard to building structures, compared to greater than three-quarters of those aged 35 to 50 and 50 to 65. As the population ages and moves into its senior years from here, the awareness level of sustainability should increase and bring the sustainability levels of the homes built even higher.

The transition from simply being an aging senior to being an elder with wisdom and experience to share can be facilitated by the open nature of the cohousing community. Those who are approaching their senior years are more enthusiastic about many of the sustainability features that can be planned into a home than any other age group. These residents can push those who have

already reached their senior years to embrace a higher level of sustainability than they might otherwise, and they can pull younger residents of cohousing into investing for long term returns with higher efficiency mechanical equipment and better thermal envelopes for the homes and community spaces. As cohousing residents age they have a great deal to share with the group on sustainability, not only knowledge of sustainability rating systems, but previous experience in past homes have given this population a level of understanding of building construction and material use that will benefit the community in their planning. As new measures and technologies to address energy conservation or carbon footprints are brought to the marketplace, the cohousing community can review and evaluate the tool then co-educate each other on risks and benefits before finally making consensus decisions on implementation options. This process should allow a cohousing community to adapt, change, and grow in their commitment to overall environmental sustainability, and provide an aging population an opportunity to leave a legacy of environmental awareness in their home.

## APPENDIX A

September 28, 2009

Dear Cohousing Resident:

I am a graduate student at Michigan State University working on my Master of Arts degree in Environmental Design. As part of my thesis I am requesting that you participate in a research study regarding sustainable building construction within cohousing communities. Participants should be 35 years old or older. The purpose of this study is to investigate the importance of sustainable building choices as cohousing communities are planned and designed. The questionnaire can be completed in approximately twenty to thirty minutes.

Your answers will remain anonymous. Your privacy will be protected to the maximum extent permitted by law. Your participation is completely voluntary and you may choose not to participate at all, or you may refuse to answer certain questions or discontinue your participation at any time without consequence.

If you have concerns or questions about this study, please contact Lee Davis (davislee@msu.edu) or my major advisor, Dr. April Allen (allenapr@msu.edu). If you have any questions or concerns about your role and rights as a research participant, or would like to register a complaint about this survey, you may contact, anonymously if you wish, MSU's Human Research Protection Program, MSU, 207 Olds Hall, East Lansing, MI 48824, phone (517) 355-2180, fax (517) 432-4503, or e-mail irb@msu.edu.

If you would like to receive information regarding the results of this study, please indicate that on page 6 of the survey and results will be e-mailed to you at the completion of the study.

Thank you very much for your time and participation in this study. By completing and submitting the questionnaire, you are indicating your voluntary participation.

The survey can be linked at:
https://www.surveymonkey.com/s.aspx?sm=sEYcHfVVzelqZNRB8bZiNA_3d_3d

Sincerely

Lee Davis
Master of Art Candidate

April D. Allen, Ph.D.
Assistant Professor

**ON LINE SURVEY TAKEN BY COHOUSING RESIDENTS**

## Section 1.
## Please answer the following questions about yourself.

1. Please select the cohousing community where you live, or where you will soon be living

___ Bartimaeus Community at Meadow Wood Condominium

___ Bellingham Cohousing

___ Blueberry Hill

___ Burlington Cohousing East Village

___ Camelot Cohousing

___ Casa Verde Commons

___ Cascadia Commons

___ Champlain Valley Cohousing

___ Cobb Hill

___ CoHo Ecovillage

___ Columbia Ecovillage

___ Cornerstone Village Cohousing

___ Delaware Street Commons

___ Duwamish Cohousing

___ Eastern Village Cohousing

___ EcoVillage at Ithaca

___ ElderGrace

___ ElderSpirit

___ Eno Commons

___ Frog Song

___ Glacier Circle

___ Great Oak Cohousing

___ Hearthstone

___ Heartwood Cohousing

___ Hidden Creek Cohousing

___ Island Cohousing

___ Jackson Place Cohousing

___ Jamaica Plain Cohousing

___ Mariposa Grove

___ Maxwelton Creek Cohousing

___ Milagro Cohousing

___ Nevada City Cohousing

___ Newberry Place

___ Nubanusit Neighborhood & Farm

___ Oak Creek Commons

___ Pacifica

___ Pathways Cohousing

___ Peninsula Park Commons

___ Pleasant Hill Cohousing

___ River Rock Commons

___ Rose Wind Cohousing

___ Shadow Lake Village

___ Silver Sage Village

___ Solterra

___ Songaia Cohousing Community

___ Sonora Cohousing

___ Stone Curves Cohousing

___ Swan's Market Cohousing

___ Takoma Village Cohousing

___ Tamarack Knoll Community

___ Temescal Commons Cohousing

___ Ten Stones

___ Wild Sage Cohousing

___ Wolf Creek

___ Yulupa Cohousing

___ Zephyr Valley Community Co-op

___ Other

2. Your current age is

___ 18-35

___ 35-50

___ 50-65

___ 65-75

___ 75-85

___ 85+

3. Your highest education level is

___ some high school, no degree

___ high school graduate (or equivalent)

___ some college, no degree

___ college degree

___ graduate degree or higher

4. Have you heard the term "LEED" (Leadership in Energy and Environmental Design) in regard to buidling construction?

___ yes

___ no

___ don't know

5. Have you heard the term "NAHB (National Association of Home Builders) Green Building Guidelines" in regard to building construction?

___ yes

___ no

___ don't know

6. Have you heard the term "Energy Star" (United States Department of Energy program) in regard to home building construction?

___ yes

___ no

___ don't know

7. How long have you lived in cohousing?

___ have not moved in yet

___ 1 year or less

___1 to 5 years

___6 to 10 years

___more than 10 years

8. Do you have sustainable flooring in your cohousing home (bamboo flooring, cork flooring, or linoleum)?

___ yes

___ no

___ don't know

9. Is the paint used for the interior of your home low or no VOC (volatile organic compound) content?

___ yes

___ no

___ don't know

10. how many bedrooms in your cohousing home?

___ none

___ 1

___ 2

___ 3

___ 4

11. How many bathrooms in your cohousing home?

___ 1

___ 1-1/2

___ 2

___ 2-1/2

___ 3

___more

12. Your cohousing home is how many square feet (finished and livable square feet, do not include unfinshed space)?

___ under 1000

___ between 1000 and 1500

___ between 1500 and 2000

___ between 2000 and 2500

___ between 2500 and 3000

___ over 3000

___ don't know

## Section 2.
## The following questions refer to your cohousing common space

As you were planning your cohousing community, rate the following in terms of their importance for your new community:

1. My cohousing community must be located in an urban area where I can meet most daily commuting needs by walking, biking, or with public transportation.

___1 - strongly disagree

___ 2 – somewhat disagree

___ 3 – neither agree nor disagree

___ 4 – somewhat agree

___ 5 – strongly agree

2. An open green space (public square or park) must be within walking distance of my home.

___1 - strongly disagree

___ 2 – somewhat disagree

___ 3 – neither agree nor disagree

___ 4 – somewhat agree

___ 5 – strongly agree

3. All landscaping must use non-toxic pest control.

___1 - strongly disagree

___ 2 – somewhat disagree

___ 3 – neither agree nor disagree

___ 4 – somewhat agree

___ 5 – strongly agree

4. The common house must be planned with water saving-technologies such as low-flow faucets and dual-flush toilets.

___1 - strongly disagree

___ 2 – somewhat disagree

___ 3 – neither agree nor disagree

___ 4 – somewhat agree

___ 5 – strongly agree

5. The common house must be planned with energy saving technologies such as compact fluorescent lighting fixtures.

___1 - strongly disagree

___ 2 – somewhat disagree

___ 3 – neither agree nor disagree

___ 4 – somewhat agree

___ 5 – strongly agree

6. The common house must be planned with energy saving technologies such as "ENERGY STAR" appliances.

___1 - strongly disagree

___ 2 – somewhat disagree

___ 3 – neither agree nor disagree

___ 4 – somewhat agree

___ 5 – strongly agree

7. The common house must be planned with energy saving technologies such as "ENERGY STAR" doors and windows.

___1 - strongly disagree

___ 2 – somewhat disagree

___ 3 – neither agree nor disagree

___ 4 – somewhat agree

___ 5 – strongly agree

8. The common house must be planned with energy saving technologies such as enhanced insulation.

___1 - strongly disagree

___ 2 – somewhat disagree

___ 3 – neither agree nor disagree

___ 4 – somewhat agree

___ 5 – strongly agree

9. The common house must be planned with energy saving technologies such as high efficiency water heaters.

___1 - strongly disagree

___ 2 – somewhat disagree

___ 3 – neither agree nor disagree

___ 4 – somewhat agree

___ 5 – strongly agree

10. The common house must be built with some materials (specific woods or stones) that are found in my local region, within a 500 mile radius of my home.

___1 - strongly disagree

___ 2 – somewhat disagree

___ 3 – neither agree nor disagree

___ 4 – somewhat agree

___ 5 – strongly agree

11. The common house must incorporate recycled content materials (recycled wood decking, recycled content carpet, etc).

___1 - strongly disagree

___ 2 – somewhat disagree

___ 3 – neither agree nor disagree

___ 4 – somewhat agree

___ 5 – strongly agree

12. The common house must be built with interior finish materials (flooring, cabinets, furniture, etc.) that will last a minimum of 10 years without replacement.

___1 - strongly disagree

___ 2 – somewhat disagree

___ 3 – neither agree nor disagree

___ 4 – somewhat agree

___ 5 – strongly agree

13. The common house must be a "no-smoking" area.

____1 - strongly disagree

___ 2 – somewhat disagree

___ 3 – neither agree nor disagree

___ 4 – somewhat agree

___ 5 – strongly agree

14. The common house must have radon detectors and alarms.

____1 - strongly disagree

___ 2 – somewhat disagree

___ 3 – neither agree nor disagree

___ 4 – somewhat agree

___ 5 – strongly agree

15. The cohousing community must be able to generate some of its own power through renewable sources such as sun or wind.

____1 - strongly disagree

___ 2 – somewhat disagree

___ 3 – neither agree nor disagree

___ 4 – somewhat agree

___ 5 – strongly agree

## Section 3.
## The following questions refer to your personal home

As you were planning your own home within the cohousing community, rate the following in terms of importance for your own home:

1. My own home must have its own yard that I can landscape as I choose.

___1 – strongly disagree

___ 2 – somewhat disagree

___ 3 – neither agree nor disagree

___ 4 – somewhat agree

___ 5 – strongly agree

2. My home must be designed to reduce my own personal water used (based on water use in my previous home) with low-flow fixtures and dual flush toilets, for example.

___1 – strongly disagree

___ 2 – somewhat disagree

___ 3 – neither agree nor disagree

___ 4 – somewhat agree

___ 5 – strongly agree

3. My home must have a high efficiency heating and cooling system installed (this may include ground source heat pumps, commonly referred to as "geo-thermal" heating and cooling).

___1 – strongly disagree

___ 2 – somewhat disagree

___ 3 – neither agree nor disagree

___ 4 – somewhat agree

___ 5 – strongly agree

4. My home must have a high efficiency water heater (this may include an "on-demand" water heating system).

___1 - strongly disagree

___ 2 – somewhat disagree

___ 3 – neither agree nor disagree

___ 4 – somewhat agree

___ 5 – strongly agree

5. My home must be constructed with enhanced insulation.

___1 - strongly disagree

___ 2 – somewhat disagree

___ 3 – neither agree nor disagree

___ 4 – somewhat agree

___ 5 – strongly agree

6. My home must have "ENERGY STAR" appliances.

___1 - strongly disagree

___ 2 – somewhat disagree

___ 3 – neither agree nor disagree

___ 4 – somewhat agree

___ 5 – strongly agree

7. My home must have double or triple pane windows.

___1 – strongly disagree

___ 2 – somewhat disagree

___ 3 – neither agree nor disagree

___ 4 – somewhat agree

___ 5 – strongly agree

8. My home must have light fixtures that accommodate compact fluorescent light bulbs.

___1 – strongly disagree

___ 2 – somewhat disagree

___ 3 – neither agree nor disagree

___ 4 – somewhat agree

___ 5 – strongly agree

9. My home must have access to enough sunlight to warm the house in cooler months.

___1 – strongly disagree

___ 2 – somewhat disagree

___ 3 – neither agree nor disagree

___ 4 – somewhat agree

___ 5 – strongly agree

10. My home must be constructed with some materials (specific woods or stones) that are found in the region, within a 500 mile radius of my home.

___1 - strongly disagree

___ 2 – somewhat disagree

___ 3 – neither agree nor disagree

___ 4 – somewhat agree

___ 5 – strongly agree

11. My home must be built with materials made from recycled content (recycled wood decking, recycled content insulation, etc).

___1 - strongly disagree

___ 2 – somewhat disagree

___ 3 – neither agree nor disagree

___ 4 – somewhat agree

___ 5 – strongly agree

12. My home must be built with interior finish materials (flooring, cabinets, light fixtures, etc.) that will last a minimum of 20 years without replacement.

___1 - strongly disagree

___ 2 – somewhat disagree

___ 3 – neither agree nor disagree

___ 4 – somewhat agree

___ 5 – strongly agree

13. My home must have a radon detector and alarm system.

___1 – strongly disagree

___ 2 – somewhat disagree

___ 3 – neither agree nor disagree

___ 4 – somewhat agree

___ 5 – strongly agree

14. The windows in my home must be able to open to allow in fresh air.

___1 – strongly disagree

___ 2 – somewhat disagree

___ 3 – neither agree nor disagree

___ 4 – somewhat agree

___ 5 – strongly agree

15. My home must be fitted with an air filtering system on the heating and cooling equipment.

___1 – strongly disagree

___ 2 – somewhat disagree

___ 3 – neither agree nor disagree

___ 4 – somewhat agree

___ 5 – strongly agree

## Section 4.
## The following questions refer to you and your community lifestyle

Please address how you see yourself and your neighbors in the cohousing community:

1. My lifestyle is sustainable:

___ 1 – strongly disagree

___ 2 – somewhat disagree

___ 3 – neither agree nor disagree

___ 4 – somewhat agree

___ 5 – strongly agree

2. My lifestyle now is more sustainable than it was 1 year ago.

___ 1 – strongly disagree

___ 2 – somewhat disagree

___ 3 – neither agree nor disagree

___ 4 – somewhat agree

___ 5 – strongly agree

3. My lifestyle now is more sustainable than it was 5 years ago.

___ 1 – strongly disagree

___ 2 – somewhat disagree

___ 3 – neither agree nor disagree

___ 4 – somewhat agree

___ 5 – strongly agree

4. Living in cohousing has made me more aware of sustainability.

___ 1 – strongly disagree

___ 2 – somewhat disagree

___ 3 – neither agree nor disagree

___ 4 – somewhat agree

___ 5 – strongly agree

5. I recycle on a regular basis.

___ yes

___ no

___ don't know

___does not apply

6. I walk or bike rather than drive on a regular basis.

___ yes

___ no

___ don't know

___does not apply

7. I use public transportation on a regular basis.

___ yes

___ no

___ don't know

___does not apply

8. I lower my heat in the winter to save on heating cost and consumption.

___ yes

___ no

___ don't know

___does not apply

9. I raise my air conditioning in the summer to save on cost and consumption.

___ yes

___ no

___ don't know

___does not apply

10. Other residents of my cohousing community recycle on a regular basis.

___ yes

___ no

___ don't know

___does not apply

11. Other residents of my cohousing community walk or bike rather than drive on a regular basis.

___ yes

___ no

___ don't know

___does not apply

12. Other residents of my cohousing community use public transportation on a regular basis.

___ yes

___ no

___ don't know

___does not apply

13. Other residents of my cohousing community lower their heat in the winter to save on cost and consumption.

___ yes

___ no

___ don't know

___does not apply

14. Other residents of my cohousing community raise their air conditioning to save on cost and consumption.

___ yes

___ no

___ don't know

___does not apply

15. I have been diagnosed with asthma.

___ yes

___ no

___ don't know

16. I have been diagnosed with COPD (chronic obstructive pulmonary disease).

___ yes

___ no

___ don't know

17. I have allergies to airborne particulates.

___ yes

___ no

___ don't know

18. I have experienced mold in my home.

___ yes

___ no

___ don't know

## Section 5.
## The following questions refer to the cohousing planning process

As you worked with the cohousing group to plan your community, please answer the following:

1. Do you feel you traded cost savings for sustainability in the construction process?

___ yes

___ no

___ don't know

2. Do you feel you were forced to accept some additional costs for sustainability that you did not feel was necessary?

___ yes

___ no

___ don't know

3. If you had not moved into cohousing, would you have designed the same sustainability factors into a stand alone house?

___ yes

___ no

___ don't know

4. Other members in the cohousing planning group had more information about sustainability than I did in the planning process

___1 – strongly disagree

___ 2 – somewhat disagree

___ 3 – neither agree nor disagree

___ 4 – somewhat agree

___ 5 – strongly agree

5. It is very important to you to measure your home's level of sustainability.

___1 – strongly disagree

___ 2 – somewhat disagree

___ 3 – neither agree nor disagree

___ 4 – somewhat agree

___ 5 – strongly agree

6. It is very important to you to measure your cohousing community's level of sustainability.

___1 – strongly disagree

___ 2 – somewhat disagree

___ 3 – neither agree nor disagree

___ 4 – somewhat agree

___ 5 – strongly agree

## Section 6. THANK YOU!

Thank you very much for participating in this survey, your information is valuable and will remain confidential.

1. I would like to receive information on the results of this study.

___ yes

___ no

2. If you would like to receive information on the results of this study, please enter your email address here:

_____

## APPENDIX B

## RESPONSES TO ON LINE SURVEY TAKEN BY COHOUSING RESIDENTS

### Section 1.
### Please answer the following questions about yourself.

2. Please select the cohousing community where you live, or where you will soon be living[1]

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| Rural location | 4 | 9 | 3 | 1 | 0 |
| Suburban location | 9 | 6 | 3 | 2 | 1 |
| Urban location | 18 | 19 | 10 | 2 | 0 |
| Skipped question | 0 | 1 | 0 | 0 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

2. Your current age is

| 35 – 50 yrs | 50 – 65 yrs | 65 – 75 yrs | 75 – 85 yrs | 85+ yrs |
|---|---|---|---|---|
| 31 | 35 | 16 | 5 | 1 |

3. Your highest education level is

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| Some high school No degree | 0 | 0 | 0 | 0 | 0 |
| High school graduate (or equivalent) | 0 | 0 | 0 | 0 | 0 |
| Some college, no degree | 0 | 2 | 1 | 0 | 0 |
| College degree | 13 | 10 | 5 | 3 | 0 |
| Graduate degree or higher | 18 | 23 | 10 | 2 | 1 |
| Skipped question | 0 | 0 | 0 | 0 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

4. Have you heard the term "LEED" (Leadership in Energy and Environmental Design) in regard to building construction?

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| Yes | 26 | 29 | 12 | 2 | 0 |
| No | 5 | 6 | 3 | 3 | 1 |
| Don't know | 0 | 0 | 1 | 0 | 0 |
| Skipped question | 0 | 0 | 0 | 0 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

5. Have you heard the term "NAHB (National Association of Home Builders) Green Building Guidelines" in regard to building construction?

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| Yes | 16 | 18 | 8 | 2 | 0 |
| No | 13 | 16 | 5 | 3 | 0 |
| Don't know | 2 | 1 | 3 | 0 | 1 |
| Skipped question | 0 | 0 | 0 | 0 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

6. Have you heard the term "Energy Star" (United States Department of Energy program) in regard to home building construction?

| | Age 35 – 50 yrs | Age 50– 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| Yes | 31 | 35 | 15 | 4 | 1 |
| No | 0 | 0 | 0 | 1 | 0 |
| Don't know | 0 | 0 | 1 | 0 | 0 |
| Skipped question | 0 | 0 | 0 | 0 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

7. How long have you lived in cohousing?

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| Have not moved in yet | 0 | 0 | 0 | 0 | 0 |
| 1 year or less | 1 | 8 | 1 | 1 | 0 |
| 1 to 5 years | 19 | 16 | 7 | 1 | 0 |
| 6 to 10 years | 11 | 9 | 7 | 2 | 1 |
| More than 10 years | 0 | 2 | 1 | 1 | 0 |
| Skipped question | 0 | 0 | 0 | 0 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

8. Do you have sustainable flooring in your cohousing home (bamboo flooring, cork flooring, or linoleum)?

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| Yes | 21 | 16 | 9 | 1 | 1 |
| No | 6 | 16 | 6 | 3 | 0 |
| Don't know | 4 | 1 | 1 | 1 | 0 |
| Skipped question | 0 | 2 | 0 | 0 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

9. Is the paint used for the interior of your home low or no VOC (volatile organic compound) content?

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| Yes | 18 | 23 | 10 | 4 | 0 |
| No | 7 | 6 | 1 | 0 | 0 |
| Don't know | 6 | 6 | 5 | 1 | 1 |
| Skipped question | 0 | 0 | 0 | 0 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

10. How many bedrooms in your cohousing home?

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| None | 0 | 2 | 2 | 0 | 0 |
| 1 | 1 | 3 | 5 | 2 | 0 |
| 2 | 13 | 16 | 4 | 1 | 1 |
| 3 | 14 | 12 | 3 | 2 | 0 |
| 4 | 3 | 2 | 2 | 0 | 0 |
| Skipped question | 0 | 0 | 0 | 0 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

11. How many bathrooms in your cohousing home?

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| 1 | 1 | 8 | 6 | 3 | 1 |
| 1-1/2 | 12 | 4 | 3 | 1 | 0 |
| 2 | 7 | 19 | 4 | 1 | 0 |
| 2-1/2 | 6 | 1 | 0 | 0 | 0 |
| 3 | 3 | 2 | 2 | 0 | 0 |
| More | 2 | 1 | 1 | 0 | 0 |
| Skipped question | 0 | 0 | 0 | 0 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

12. Your cohousing home is how many square feet (finished and livable square feet, do not include unfinished space)?

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| Under 1000 | 4 | 8 | 7 | 3 | 1 |
| Between 1000 And 1500 | 12 | 15 | 2 | 1 | 0 |
| Between 1500 And 2000 | 11 | 12 | 4 | 1 | 0 |
| Between 2000 And 2500 | 1 | 0 | 2 | 0 | 0 |
| Between 2500 And 3000 | 1 | 0 | 1 | 0 | 0 |
| Over 3000 | 0 | 0 | 0 | 0 | 0 |
| Don't know | 2 | 0 | 0 | 0 | 0 |
| Skipped question | 0 | 0 | 0 | 0 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

## Section 2.
## The following questions refer to your cohousing common space

As you were planning your cohousing community, rate the following in terms of their importance for your new community:

1. My cohousing community must be located in an urban area where I can meet most daily commuting needs by walking, biking, or with public transportation.

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| 1 – strongly disagree | 1 | 4 | 1 | 0 | 0 |
| 2 – somewhat disagree | 3 | 4 | 1 | 0 | 0 |
| 3 – neither agree nor disagree | 1 | 4 | 2 | 2 | 0 |
| 4 – somewhat agree | 10 | 4 | 5 | 2 | 1 |
| 5 – strongly agree | 16 | 16 | 7 | 1 | 0 |
| Skipped question | 0 | 3 | 0 | 0 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

2. An open green space (public square or park) must be within walking distance of my home.

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| 1 – strongly disagree | 2 | 2 | 2 | 1 | 0 |
| 2 – somewhat disagree | 0 | 2 | 2 | 0 | 0 |
| 3 – neither agree nor disagree | 3 | 8 | 4 | 2 | 0 |
| 4 – somewhat agree | 12 | 7 | 3 | 0 | 1 |
| 5 – strongly agree | 14 | 13 | 5 | 1 | 0 |
| Skipped question | 0 | 3 | 0 | 1 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

3. All landscaping must use non-toxic pest control.

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| 1 – strongly disagree | 2 | 1 | 0 | 1 | 0 |
| 2 – somewhat disagree | 2 | 1 | 0 | 1 | 0 |
| 3 – neither agree nor disagree | 5 | 2 | 1 | 0 | 0 |
| 4 – somewhat agree | 10 | 13 | 4 | 0 | 1 |
| 5 – strongly agree | 12 | 16 | 11 | 3 | 0 |
| Skipped question | 0 | 2 | 0 | 0 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

4. The common house must be planned with water saving-technologies such as low-flow faucets and dual-flush toilets.

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| 1 – strongly disagree | 0 | 1 | 0 | 1 | 0 |
| 2 – somewhat disagree | 1 | 0 | 0 | 0 | 0 |
| 3 – neither agree nor disagree | 5 | 3 | 1 | 0 | 1 |
| 4 – somewhat agree | 8 | 8 | 6 | 1 | 0 |
| 5 – strongly agree | 17 | 20 | 9 | 3 | 0 |
| Skipped question | 0 | 3 | 0 | 0 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

5. The common house must be planned with energy saving technologies such as compact fluorescent lighting fixtures.

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| 1 – strongly disagree | 0 | 2 | 1 | 0 | 0 |
| 2 – somewhat disagree | 0 | 0 | 0 | 1 | 0 |
| 3 – neither agree nor disagree | 2 | 1 | 0 | 0 | 0 |
| 4 – somewhat agree | 10 | 4 | 4 | 2 | 0 |
| 5 – strongly agree | 19 | 24 | 11 | 2 | 1 |
| Skipped question | 0 | 4 | 0 | 0 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

6. The common house must be planned with energy saving technologies such as "ENERGY STAR" appliances.

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| 1 – strongly disagree | 0 | 2 | 0 | 1 | 0 |
| 2 – somewhat disagree | 0 | 0 | 0 | 0 | 0 |
| 3 – neither agree nor disagree | 1 | 1 | 0 | 0 | 0 |
| 4 – somewhat agree | 13 | 6 | 8 | 2 | 1 |
| 5 – strongly agree | 17 | 22 | 8 | 2 | 0 |
| Skipped question | 0 | 4 | 0 | 0 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

7. The common house must be planned with energy saving technologies such as "ENERGY STAR" doors and windows.

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| 1 – strongly disagree | 0 | 3 | 0 | 1 | 0 |
| 2 – somewhat disagree | 0 | 0 | 0 | 0 | 0 |
| 3 – neither agree nor disagree | 0 | 1 | 0 | 0 | 0 |
| 4 – somewhat agree | 10 | 6 | 5 | 1 | 0 |
| 5 – strongly agree | 21 | 22 | 11 | 3 | 1 |
| Skipped question | 0 | 3 | 0 | 0 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

8. The common house must be planned with energy saving technologies such as enhanced insulation.

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| 1 – strongly disagree | 0 | 2 | 0 | 1 | 0 |
| 2 – somewhat disagree | 0 | 0 | 0 | 0 | 0 |
| 3 – neither agree nor disagree | 3 | 0 | 1 | 0 | 0 |
| 4 – somewhat agree | 8 | 4 | 1 | 1 | 0 |
| 5 – strongly agree | 20 | 25 | 14 | 3 | 1 |
| Skipped question | 0 | 4 | 0 | 0 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

9. The common house must be planned with energy saving technologies such as high efficiency water heaters.

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| 1 – strongly disagree | 0 | 2 | 0 | 1 | 0 |
| 2 – somewhat disagree | 0 | 0 | 0 | 0 | 0 |
| 3 – neither agree nor disagree | 4 | 1 | 1 | 0 | 0 |
| 4 – somewhat agree | 15 | 6 | 1 | 0 | 0 |
| 5 – strongly agree | 12 | 23 | 14 | 4 | 1 |
| Skipped question | 0 | 3 | 0 | 0 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

10. The common house must be built with some materials (specific woods or stones) that are found in my local region, within a 500 mile radius of my home.

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| 1 – strongly disagree | 1 | 0 | 0 | 0 | 0 |
| 2 – somewhat disagree | 4 | 3 | 0 | 1 | 1 |
| 3 – neither agree nor disagree | 14 | 6 | 8 | 2 | 0 |
| 4 – somewhat agree | 4 | 17 | 2 | 1 | 0 |
| 5 – strongly agree | 7 | 6 | 5 | 1 | 0 |
| Skipped question | 1 | 3 | 1 | 0 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

11. The common house must incorporate recycled content materials (recycled wood decking, recycled content carpet, etc).

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| 1 – strongly disagree | 2 | 1 | 0 | 1 | 0 |
| 2 – somewhat disagree | 2 | 2 | 0 | 0 | 1 |
| 3 – neither agree nor disagree | 7 | 6 | 6 | 1 | 0 |
| 4 – somewhat agree | 11 | 11 | 4 | 1 | 0 |
| 5 – strongly agree | 9 | 10 | 5 | 2 | 0 |
| Skipped question | 0 | 5 | 1 | 0 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

12. The common house must be built with interior finish materials (flooring, cabinets, furniture, etc.) that will last a minimum of 10 years without replacement.

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| 1 – strongly disagree | 0 | 1 | 0 | 0 | 0 |
| 2 – somewhat disagree | 1 | 1 | 0 | 1 | 0 |
| 3 – neither agree nor disagree | 3 | 3 | 1 | 0 | 0 |
| 4 – somewhat agree | 5 | 6 | 2 | 0 | 1 |
| 5 – strongly agree | 22 | 21 | 12 | 4 | 0 |
| Skipped question | 0 | 3 | 1 | 0 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

13. The common house must be a "no-smoking" area.

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| 1 – strongly disagree | 0 | 1 | 0 | 0 | 0 |
| 2 – somewhat disagree | 0 | 0 | 0 | 0 | 0 |
| 3 – neither agree nor disagree | 1 | 0 | 0 | 1 | 0 |
| 4 – somewhat agree | 2 | 0 | 0 | 1 | 0 |
| 5 – strongly agree | 28 | 31 | 16 | 3 | 1 |
| Skipped question | 0 | 3 | 0 | 0 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

14. The common house must have radon detectors and alarms.

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| 1 – strongly disagree | 1 | 1 | 1 | 0 | 0 |
| 2 – somewhat disagree | 4 | 1 | 1 | 1 | 0 |
| 3 – neither agree nor disagree | 15 | 14 | 7 | 2 | 1 |
| 4 – somewhat agree | 5 | 5 | 5 | 0 | 0 |
| 5 – strongly agree | 6 | 10 | 2 | 2 | 0 |
| Skipped question | 0 | 4 | 0 | 0 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

15. The cohousing community must be able to generate some of its own power through renewable sources such as sun or wind.

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| 1 – strongly disagree | 2 | 1 | 0 | 0 | 0 |
| 2 – somewhat disagree | 4 | 0 | 0 | 0 | 1 |
| 3 – neither agree nor disagree | 7 | 10 | 1 | 1 | 0 |
| 4 – somewhat agree | 10 | 13 | 8 | 2 | 0 |
| 5 – strongly agree | 8 | 8 | 7 | 2 | 0 |
| Skipped question | 0 | 3 | 0 | 0 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

## Section 3.
## The following questions refer to your personal home

As you were planning your own home within the cohousing community, rate the following in terms of importance for your own home:

1. My own home must have its own yard that I can landscape as I choose.

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| 1 – strongly disagree | 5 | 4 | 0 | 0 | 0 |
| 2 – somewhat disagree | 8 | 3 | 4 | 0 | 0 |
| 3 – neither agree nor disagree | 3 | 12 | 7 | 3 | 0 |
| 4 – somewhat agree | 6 | 5 | 2 | 1 | 1 |
| 5 – strongly agree | 9 | 8 | 2 | 0 | 0 |
| Skipped question | 0 | 3 | 1 | 1 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

2. My home must be designed to reduce my own personal water used (based on water use in my previous home) with low-flow fixtures and dual flush toilets, for example.

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| 1 – strongly disagree | 1 | 1 | 0 | 0 | 0 |
| 2 – somewhat disagree | 1 | 0 | 0 | 1 | 1 |
| 3 – neither agree nor disagree | 5 | 2 | 1 | 0 | 0 |
| 4 – somewhat agree | 11 | 7 | 7 | 0 | 0 |
| 5 – strongly agree | 13 | 22 | 7 | 3 | 0 |
| Skipped question | 0 | 3 | 1 | 1 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

3. My home must have a high efficiency heating and cooling system installed (this may include ground source heat pumps, commonly referred to as "geo-thermal" heating and cooling).

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| 1 – strongly disagree | 1 | 1 | 0 | 0 | 0 |
| 2 – somewhat disagree | 4 | 0 | 0 | 0 | 1 |
| 3 – neither agree nor disagree | 1 | 6 | 4 | 1 | 0 |
| 4 – somewhat agree | 14 | 8 | 6 | 2 | 0 |
| 5 – strongly agree | 11 | 16 | 6 | 1 | 0 |
| Skipped question | 0 | 4 | 0 | 1 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

4. My home must have a high efficiency water heater (this may include an "on-demand" water heating system).

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| 1 – strongly disagree | 1 | 1 | 0 | 0 | 0 |
| 2 – somewhat disagree | 2 | 0 | 0 | 0 | 0 |
| 3 – neither agree nor disagree | 3 | 4 | 4 | 2 | 0 |
| 4 – somewhat agree | 11 | 11 | 5 | 1 | 1 |
| 5 – strongly agree | 14 | 15 | 6 | 1 | 0 |
| Skipped question | 0 | 4 | 1 | 1 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

5. My home must be constructed with enhanced insulation.

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| 1 – strongly disagree | 1 | 1 | 0 | 0 | 0 |
| 2 – somewhat disagree | 0 | 0 | 0 | 0 | 0 |
| 3 – neither agree nor disagree | 1 | 0 | 1 | 0 | 0 |
| 4 – somewhat agree | 4 | 3 | 3 | 2 | 0 |
| 5 – strongly agree | 25 | 28 | 11 | 2 | 1 |
| Skipped question | 0 | 3 | 1 | 1 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

6. My home must have "ENERGY STAR" appliances.

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| 1 – strongly disagree | 0 | 1 | 0 | 0 | 0 |
| 2 – somewhat disagree | 0 | 0 | 0 | 0 | 0 |
| 3 – neither agree nor disagree | 1 | 0 | 1 | 1 | 0 |
| 4 – somewhat agree | 4 | 5 | 4 | 0 | 1 |
| 5 – strongly agree | 26 | 26 | 10 | 3 | 0 |
| Skipped question | 0 | 3 | 1 | 1 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

7. My home must have double or triple pane windows.

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| 1 – strongly disagree | 1 | 1 | 0 | 0 | 0 |
| 2 – somewhat disagree | 0 | 0 | 0 | 0 | 0 |
| 3 – neither agree nor disagree | 2 | 1 | 0 | 0 | 0 |
| 4 – somewhat agree | 8 | 1 | 4 | 0 | 0 |
| 5 – strongly agree | 20 | 28 | 11 | 4 | 1 |
| Skipped question | 0 | 4 | 1 | 1 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

8. My home must have light fixtures that accommodate compact fluorescent light bulbs.

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| 1 – strongly disagree | 0 | 1 | 1 | 1 | 0 |
| 2 – somewhat disagree | 1 | 1 | 0 | 0 | 0 |
| 3 – neither agree nor disagree | 0 | 0 | 0 | 0 | 0 |
| 4 – somewhat agree | 6 | 7 | 6 | 1 | 1 |
| 5 – strongly agree | 24 | 23 | 8 | 2 | 0 |
| Skipped question | 0 | 3 | 1 | 1 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

9. My home must have access to enough sunlight to warm the house in cooler months.

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| 1 – strongly disagree | 0 | 1 | 0 | 0 | 0 |
| 2 – somewhat disagree | 1 | 1 | 0 | 0 | 0 |
| 3 – neither agree nor disagree | 3 | 4 | 1 | 2 | 0 |
| 4 – somewhat agree | 10 | 10 | 7 | 1 | 1 |
| 5 – strongly agree | 16 | 16 | 7 | 1 | 0 |
| Skipped question | 1 | 3 | 1 | 1 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

10. My home must be constructed with some materials (specific woods or stones) that are found in the region, within a 500 mile radius of my home.

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| 1 – strongly disagree | 1 | 0 | 0 | 0 | 0 |
| 2 – somewhat disagree | 6 | 3 | 0 | 0 | 0 |
| 3 – neither agree nor disagree | 11 | 7 | 7 | 2 | 0 |
| 4 – somewhat agree | 6 | 15 | 3 | 0 | 1 |
| 5 – strongly agree | 7 | 7 | 5 | 1 | 0 |
| Skipped question | 0 | 3 | 1 | 2 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

11. My home must be built with materials made from recycled content (recycled wood decking, recycled content insulation, etc).

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| 1 – strongly disagree | 0 | 2 | 0 | 0 | 0 |
| 2 – somewhat disagree | 5 | 1 | 0 | 0 | 0 |
| 3 – neither agree nor disagree | 9 | 9 | 6 | 3 | 1 |
| 4 – somewhat agree | 8 | 14 | 7 | 1 | 0 |
| 5 – strongly agree | 8 | 5 | 2 | 0 | 0 |
| Skipped question | 1 | 4 | 1 | 1 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

12. My home must be built with interior finish materials (flooring, cabinets, light fixtures, etc.) that will last a minimum of 20 years without replacement.

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| 1 – strongly disagree | 1 | 1 | 0 | 0 | 0 |
| 2 – somewhat disagree | 2 | 0 | 0 | 0 | 0 |
| 3 – neither agree nor disagree | 2 | 3 | 1 | 1 | 1 |
| 4 – somewhat agree | 11 | 8 | 7 | 2 | 0 |
| 5 – strongly agree | 15 | 20 | 7 | 1 | 0 |
| Skipped question | 0 | 3 | 1 | 1 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

13. My home must have a radon detector and alarm system.

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| 1 – strongly disagree | 3 | 1 | 1 | 0 | 0 |
| 2 – somewhat disagree | 6 | 2 | 2 | 0 | 1 |
| 3 – neither agree nor disagree | 9 | 15 | 6 | 4 | 0 |
| 4 – somewhat agree | 8 | 5 | 4 | 0 | 0 |
| 5 – strongly agree | 5 | 9 | 2 | 0 | 0 |
| Skipped question | 0 | 3 | 1 | 1 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

14. The windows in my home must be able to open to allow in fresh air.

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| 1 – strongly disagree | 0 | 1 | 0 | 0 | 0 |
| 2 – somewhat disagree | 0 | 0 | 0 | 0 | 0 |
| 3 – neither agree nor disagree | 1 | 0 | 0 | 0 | 0 |
| 4 – somewhat agree | 3 | 1 | 0 | 0 | 0 |
| 5 – strongly agree | 27 | 30 | 15 | 4 | 1 |
| Skipped question | 0 | 3 | 1 | 1 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

15. My home must be fitted with an air filtering system on the heating and cooling equipment.

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| 1 – strongly disagree | 0 | 0 | 1 | 0 | 0 |
| 2 – somewhat disagree | 6 | 3 | 0 | 0 | 1 |
| 3 – neither agree nor disagree | 10 | 14 | 8 | 2 | 0 |
| 4 – somewhat agree | 4 | 4 | 3 | 1 | 0 |
| 5 – strongly agree | 10 | 10 | 3 | 1 | 0 |
| Skipped question | 1 | 4 | 1 | 1 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

## Section 4.
## The following questions refer to you and your community lifestyle

Please address how you see yourself and your neighbors in the cohousing community:

1. My lifestyle is sustainable:

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| 1 – strongly disagree | 3 | 1 | 1 | 0 | 0 |
| 2 – somewhat disagree | 6 | 7 | 4 | 1 | 0 |
| 3 – neither agree nor disagree | 3 | 3 | 0 | 0 | 0 |
| 4 – somewhat agree | 16 | 21 | 9 | 1 | 1 |
| 5 – strongly agree | 3 | 0 | 2 | 2 | 0 |
| Skipped question | 0 | 3 | 0 | 1 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

2. My lifestyle now is more sustainable than it was 1 year ago.

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| 1 – strongly disagree | 0 | 1 | 0 | 0 | 0 |
| 2 – somewhat disagree | 4 | 3 | 1 | 1 | 1 |
| 3 – neither agree nor disagree | 9 | 10 | 1 | 1 | 0 |
| 4 – somewhat agree | 14 | 13 | 9 | 2 | 0 |
| 5 – strongly agree | 4 | 4 | 4 | 0 | 0 |
| Skipped question | 0 | 4 | 1 | 1 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

3. My lifestyle now is more sustainable than it was 5 years ago.

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| 1 – strongly disagree | 1 | 1 | 0 | 0 | 0 |
| 2 – somewhat disagree | 4 | 1 | 0 | 1 | 0 |
| 3 – neither agree nor disagree | 1 | 3 | 0 | 1 | 1 |
| 4 – somewhat agree | 13 | 8 | 8 | 2 | 0 |
| 5 – strongly agree | 12 | 18 | 7 | 0 | 0 |
| Skipped question | 0 | 4 | 1 | 1 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

4. Living in cohousing has made me more aware of sustainability.

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| 1 – strongly disagree | 1 | 1 | 0 | 0 | 0 |
| 2 – somewhat disagree | 3 | 2 | 0 | 0 | 0 |
| 3 – neither agree nor disagree | 3 | 1 | 4 | 2 | 0 |
| 4 – somewhat agree | 7 | 16 | 5 | 0 | 1 |
| 5 – strongly agree | 17 | 12 | 6 | 2 | 0 |
| skipped question | 0 | 3 | 1 | 1 | 0 |
| total | 31 | 35 | 16 | 5 | 1 |

5. I recycle on a regular basis.

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| yes | 31 | 32 | 15 | 4 | 1 |
| no | 0 | 0 | 0 | 0 | 0 |
| don't know | 0 | 0 | 0 | 0 | 0 |
| does not apply | 0 | 0 | 0 | 0 | 0 |
| Skipped question | 0 | 3 | 1 | 1 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

6. I walk or bike rather than drive on a regular basis.

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| yes | 21 | 11 | 7 | 0 | 0 |
| no | 9 | 15 | 7 | 3 | 1 |
| don't know | 0 | 1 | 0 | 0 | 0 |
| does not apply | 1 | 5 | 2 | 0 | 0 |
| Skipped question | 0 | 3 | 0 | 2 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

7. I use public transportation on a regular basis.

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| yes | 14 | 11 | 6 | 1 | 1 |
| no | 16 | 19 | 8 | 3 | 0 |
| don't know | 0 | 0 | 0 | 0 | 0 |
| does not apply | 1 | 2 | 2 | 0 | 0 |
| Skipped question | 0 | 3 | 0 | 1 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

8. I lower my heat in the winter to save on heating cost and consumption.

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| yes | 28 | 28 | 11 | 2 | 1 |
| no | 2 | 3 | 1 | 1 | 0 |
| don't know | 0 | 0 | 0 | 0 | 0 |
| does not apply | 0 | 1 | 3 | 0 | 0 |
| Skipped question | 1 | 3 | 1 | 2 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

9. I raise my air conditioning in the summer to save on cost and consumption.

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| yes | 12 | 8 | 5 | 2 | 1 |
| no | 2 | 1 | 0 | 1 | 0 |
| don't know | 0 | 2 | 0 | 0 | 0 |
| does not apply | 17 | 21 | 11 | 1 | 0 |
| Skipped question | 0 | 3 | 0 | 1 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

10. Other residents of my cohousing community recycle on a regular basis.

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| yes | 30 | 32 | 16 | 4 | 1 |
| no | 0 | 0 | 0 | 0 | 0 |
| don't know | 1 | 0 | 0 | 0 | 0 |
| does not apply | 0 | 0 | 0 | 0 | 0 |
| Skipped question | 0 | 3 | 0 | 1 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

11. Other residents of my cohousing community walk or bike rather than drive on a regular basis.

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| yes | 25 | 22 | 13 | 3 | 1 |
| no | 2 | 4 | 0 | 0 | 0 |
| don't know | 2 | 4 | 2 | 1 | 0 |
| does not apply | 1 | 1 | 1 | 0 | 0 |
| Skipped question | 1 | 4 | 0 | 1 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

12. Other residents of my cohousing community use public transportation on a regular basis.

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| yes | 24 | 24 | 12 | 2 | 1 |
| no | 1 | 3 | 0 | 1 | 0 |
| don't know | 5 | 3 | 3 | 1 | 0 |
| does not apply | 0 | 2 | 1 | 0 | 0 |
| Skipped question | 1 | 3 | 0 | 1 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

13. Other residents of my cohousing community lower their heat in the winter to save on cost and consumption.

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| yes | 18 | 20 | 6 | 2 | 1 |
| no | 0 | 0 | 0 | 1 | 0 |
| don't know | 12 | 11 | 9 | 1 | 0 |
| does not apply | 0 | 0 | 1 | 0 | 0 |
| Skipped question | 1 | 4 | 0 | 1 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

14. Other residents of my cohousing community raise their air conditioning to save on cost and consumption.

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| yes | 11 | 7 | 0 | 2 | 1 |
| no | 0 | 0 | 0 | 0 | 0 |
| don't know | 8 | 8 | 8 | 0 | 0 |
| does not apply | 11 | 16 | 8 | 2 | 0 |
| Skipped question | 1 | 4 | 0 | 1 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

15. I have been diagnosed with asthma.

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| yes | 5 | 2 | 3 | 0 | 0 |
| no | 25 | 30 | 12 | 4 | 1 |
| don't know | 0 | 0 | 0 | 0 | 0 |
| Skipped question | 1 | 3 | 1 | 1 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

16. I have been diagnosed with COPD (chronic obstructive pulmonary disease).

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| yes | 0 | 0 | 0 | 0 | 0 |
| no | 31 | 32 | 16 | 4 | 1 |
| don't know | 0 | 0 | 0 | 0 | 0 |
| Skipped question | 0 | 3 | 0 | 1 | 0 |
| Total | 31 | 35 | 16 | 5 | |

17. I have allergies to airborne particulates.

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| yes | 14 | 7 | 7 | 0 | 0 |
| no | 14 | 23 | 6 | 3 | 0 |
| don't know | 3 | 2 | 2 | 1 | 1 |
| Skipped question | 0 | 3 | 1 | 1 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

18. I have experienced mold in my home.

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| yes | 3 | 4 | 3 | 1 | 1 |
| no | 27 | 28 | 13 | 3 | 0 |
| don't know | 1 | 0 | 0 | 0 | 0 |
| Skipped question | 0 | 3 | 0 | 1 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

## Section 5.
## The following questions refer to the cohousing planning process

As you worked with the cohousing group to plan your community, please answer the following:

1. Do you feel you traded cost savings for sustainability in the construction process?

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| yes | 17 | 20 | 11 | 3 | 1 |
| no | 9 | 3 | 1 | 0 | 0 |
| don't know | 5 | 9 | 3 | 1 | 0 |
| Skipped question | 0 | 3 | 1 | 1 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

2. Do you feel you were forced to accept some additional costs for sustainability that you did not feel was necessary?

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| yes | 4 | 2 | 2 | 1 | 0 |
| no | 23 | 23 | 12 | 2 | 1 |
| don't know | 4 | 7 | 1 | 1 | 0 |
| Skipped question | 0 | 3 | 1 | 1 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

3. If you had not moved into cohousing, would you have designed the same sustainability factors into a stand alone house?

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| yes | 15 | 20 | 10 | 1 | 1 |
| no | 11 | 6 | 2 | 1 | 0 |
| don't know | 5 | 6 | 4 | 2 | 0 |
| Skipped question | 0 | 3 | 0 | 1 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

4. Other members in the cohousing planning group had more information about sustainability than I did in the planning process

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| 1 – strongly disagree | 4 | 0 | 5 | 0 | 0 |
| 2 – somewhat disagree | 2 | 4 | 2 | 1 | 0 |
| 3 – neither agree nor disagree | 6 | 6 | 2 | 1 | 0 |
| 4 – somewhat agree | 9 | 11 | 4 | 1 | 1 |
| 5 – strongly agree | 9 | 9 | 3 | 1 | 0 |
| Skipped question | 1 | 5 | 0 | 1 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

5. It is very important to you to measure your home's level of sustainability.

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| 1 – strongly disagree | 1 | 0 | 0 | 0 | 0 |
| 2 – somewhat disagree | 4 | 5 | 1 | 0 | 0 |
| 3 – neither agree nor disagree | 3 | 3 | 4 | 1 | 0 |
| 4 – somewhat agree | 18 | 16 | 7 | 1 | 1 |
| 5 – strongly agree | 5 | 7 | 4 | 2 | 0 |
| Skipped question | 0 | 4 | 0 | 1 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

6. It is very important to you to measure your cohousing community's level of sustainability.

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| 1 – strongly disagree | 1 | 1 | 0 | 0 | 0 |
| 2 – somewhat disagree | 4 | 4 | 1 | 0 | 0 |
| 3 – neither agree nor disagree | 3 | 1 | 4 | 2 | 0 |
| 4 – somewhat agree | 16 | 18 | 7 | 1 | 1 |
| 5 – strongly agree | 7 | 7 | 4 | 1 | 0 |
| Skipped question | 0 | 4 | 0 | 1 | 0 |
| Total | 31 | 35 | 16 | 5 | 1 |

## Section 6. THANK YOU!

Thank you very much for participating in this survey, your information is valuable and will remain confidential.

1. I would like to receive information on the results of this study.

| | Age 35 – 50 yrs | Age 50 – 65 yrs | Age 65 – 75 yrs | Age 75 – 85 yrs | Age 85+ yrs |
|---|---|---|---|---|---|
| yes | 16 | 19 | 11 | 3 | 1 |
| no | 14 | 11 | 4 | 0 | 0 |

2. If you would like to receive information on the results of this study, please enter your email address here:

_____

[1] To maintain the privacy of respondents to this survey, cohousing communities were identified by the researcher as either "urban", "suburban", or "rural" based on proximity to city or town center, adjacency to woodlands or farming acreage, and self-assessments of cohousing communities as noted on their web sites. This information was then assembled and sorted as response to question 1 of the survey.

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