

Addressing the Barriers to Sustainable Design in the Process of Developing Multifamily
Affordable Housing in Minnesota

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Abstract

Sustainable design balances the economic, social, and environmental needs of today with those of the future. This is not an abstract concept. Examples of very sustainable developments exist today. If design professionals possess the skills to design sustainable projects, and the benefits of being sustainable are so clearly accessible, why do sustainably designed projects remain the exception rather than the norm? Focusing on affordable multifamily rental housing as a project type, this paper documents the specific barriers that deter the incorporation of sustainable design in the development process. Examples of tools that successfully promote sustainable design and recommendations to further improve the incorporation of sustainable design practices are also included. The paper begins with a review of existing scholarship citing research from England, Scotland, and Saudi Arabia. These findings provide a point of reference for the author's original research, which was gathered through interviews with well-established nonprofit developers of multifamily affordable housing in Minnesota. Barriers uncovered include: funding limitations, site and project specific issues, limited data and expertise, regulations and requirements, relationships/collaborations, sustainable design standards, and issues unique to Minnesota. Examples of successful tools for promoting sustainable design include: community involvement, statutory regulations, demonstration projects / competitions, sustainable design standards, and local expertise and integrated design / design charrettes. Recommendations from previous scholarship and Minnesota developers focused on the following: awareness and education, building occupants, research, replicating success, collaboration, and funder opportunities. The author concludes with five specific recommendations: increase funding, expand education, support research, promote collaboration, and change the funding process.

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Introduction

Sustainably designed buildings are created to be healthy for people and the planet, today and into the future. While sustainable design practices benefit all types of housing, numerous barriers exist that deter or limit their inclusion in the development of affordable multifamily housing in Minnesota. Many of these barriers are unwittingly imposed or supported by the very funders and policymakers charged with promoting the creation of affordable multifamily housing.

Whereas sustainable design; which seeks to balance environmental, social, and economic needs; adds long-term value to development projects, this approach to design has not yet been fully integrated into affordable housing development in Minnesota. Those involved in the creation of affordable housing, including developers, designers, and funders, are generally familiar with, and supportive of, the concept of sustainable design. Still the full incorporation of sustainable design practices remains limited.

The purpose of this investigation is to discover and expose the barriers that deter the incorporation of sustainable design into the development of affordable multifamily housing and to recognize and promote opportunities to successfully integrate sustainable design into the development process.

While the published background research for this project has been gathered from diverse locations, the original research is focused exclusively on affordable multifamily rental housing development in Minnesota. Many parties are involved in the creation of affordable housing, including funders, policymakers, local government officials and representatives, developers, designers, and builders. This investigation is focused on input from nonprofit housing developers collected through in-person interviews. Developers were selected for this study based on their very broad understanding of and involvement in the development process, from conception to building occupancy, including fundraising, design, and construction.

While sustainable design has been accepted conceptually in Minnesota and elsewhere, in practice its inclusion into real housing projects remains limited. The goal of this thesis is to better understand the barriers that currently hinder the incorporation of sustainable design in actual practice.

Definitions

Before exploring the specific process and findings of this thesis investigation, it is appropriate to establish a clear basis of understanding by defining four key terms central to the discussion: affordable, funders, sustainable, and sustainable design.

Affordable

Affordability, like sustainability, involves balancing present needs with future needs. A housing burden (the cost of housing) is not affordable if it exhausts a household's financial resources such that nothing is preserved for future needs. Accepting that housing is a universal need, affordable housing is essential.

In the United States, housing is considered to meet the definition of affordable if it absorbs no more than 30 percent of a household's income. The U.S. Department of Housing and Urban Development explains it this way:

“Families who pay more than 30 percent of their income for housing are considered cost burdened and may have difficulty affording necessities such as food, clothing, transportation and medical care.” (Community Planning and Development, 2010)

To offer a bit of perspective, the median household income in Minnesota in 2009, the most recent year for which such information is available, was \$55,621 (U.S. Census Bureau, 2011). This is \$1,697 less than in 2008 (U.S. Census Bureau, 2010). Based on 2009 numbers, a family earning 50% of the state's median income could afford only \$695 per month for housing. A family earning 30% of the state's median income could afford only \$417 per month.

While incomes are dropping, rental costs are rising. Today the average rent for a housing unit in the Twin Cities is \$921, up from \$902 a year ago. The current vacancy rate of 2.4% is at a ten-year low. (MHP's "2 x 4" Report, 2011) To afford an average rental unit in the Twin Cities in 2011, a family would need to earn at least \$36,840 a year.

Funders of affordable housing generally require that residents of units designated as affordable be qualified based on their household income as it compares to the area median income, or AMI. Programs specifically aimed at those with the greatest need may stipulate that residents earn no more than 30% AMI. Other programs set limits of 50% AMI or 80% AMI. Some programs, particularly those focused on homeownership opportunities, may qualify households earning as much as 110% AMI. Nonprofit developers of affordable housing endeavor to provide an alternative for individuals and families who are not able to afford market rate rents or mortgages.

Funders

Funding for the creation of affordable housing comes from a variety of sources including: housing finance agencies who direct public funds, municipalities who allocate dollars and/or tax incentives, and private foundations and donors. Collectively these entities are referred to within the world of affordable housing development as funders. Financing affordable housing typically requires funding and support from multiple sources. Funding may come in the form of grants, loans or mortgages, forgivable loans, and/or tax credits. To utilize tax credits a nonprofit developer must enter into partnership with a syndicator. It is not unusual for a single multifamily housing project to require support from a dozen or more funders. The primary conduit for affordable housing funds in Minnesota is the Minnesota Housing Finance Agency, also known as Minnesota Housing.

Sustainable

The term sustainable is sometimes presented as a synonym for green or eco-friendly. While these alternative terms capture the environmental aspect of sustainability, they fail to communicate the more holistic meaning of the term. At its heart sustainability is

balance, most notably the balance between the needs of the present and those of the future.

A 1987 report from the United Nations' Commission on Environment and Development defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs."
(Bruntland, 1987)

More contemporary definitions of sustainability also focus on balance. The term is often illustrated as a triad. A familiar diagram shows three equal interconnected circles labeled environment, economy, and (social) equity. An alternative version uses the terms ecology, economy, and equality. Common shorthand for either option is "the three E's." Another common image is composed of three pillars titled people, planet, and profit. People, planet, and profit are also known as "the triple bottom line."

To be sustainable a project must be created with the future in mind. Money must be balanced with people (equity). People's needs must be balanced with those of the planet (ecology). And, the resources of the planet must be balanced with financial needs and resources (economy). Only development that successfully balances these interconnected and often competing priorities, both for the present and the future, is truly sustainable.

Sustainable Design

A sustainable development is a physical place constructed and maintained in a manner that balances the environmental, social, and financial needs of the present with those of the future. For such projects, sustainable design is the careful planning process which determines exactly what will be created.

There are a variety of ways sustainable design practices are incorporated into actual construction projects, including affordable multifamily housing developments. Because balance is such an important aspect of sustainability, it is imperative that practitioners of sustainable design seek holistic design solutions when creating sustainable projects. Some design teams find published sustainable design standards or guidelines to be very

helpful. Others prefer to utilize a process based on their own design experience and research. Either approach is valid, as long as the project's design, materials, and systems are created to function as an integrated sustainable whole.

Many people mistakenly believe that sustainable design is the process of *adding* sustainable features onto a building, as though the structure being created were a cake and sustainability a lovely frosting. In reality, the most impactful opportunities for sustainability occur very early in the design process and are absolutely integral to the whole. If the cake analogy were appropriately applied, a sustainable design process would ensure just the right blending of quality flour, sugar, and eggs to create an exceptional dessert.

A successful sustainable design process typically focuses concurrently on a broad range of topics, such as the following.

1. Location – the project should avoid negatively impacting natural habitat and seek to provide convenient access to amenities for residents, including transportation options.
2. Site Improvements – site design should include connections to nature, native or adaptive plantings, and localized storm water management.
3. Water Conservation – plumbing fixtures and appliances should conserve water; water use for irrigation should be limited.
4. Energy Efficiency – mechanical systems, lighting, and appliance choices should minimize future energy use.
5. Building Materials – resource efficiency, durability, and occupant health should be considered in all material selections.
6. Resident Health – all aspects of design and construction should consider the health of both construction workers and future occupants.
7. Operation and Maintenance – the lifecycle and maintenance needs of systems and materials should be considered and planned for.

Practitioners of sustainable design seek to create projects that exceed conventional building and site performance expectations. This is generally done by establishing very specific goals in multiple design areas, including those listed above. For example, one goal may be to create an energy efficient structure that exceeds current energy code requirements by a minimum of 50%. Achieving such ambitious goals requires team collaboration. Architects, engineers, landscape architects, interior designers, and others must work closely to create innovative holistic design solutions. A successful sustainable design and construction process benefits the planet, the budget, and the residents.

Research

While scholarship documenting specific case studies and the how-to's of creating green design is readily available, finding published research focused on the actual process of incorporating sustainable design into the development of affordable housing is more challenging. While the focus of this thesis project is affordable multifamily housing in Minnesota, locating relevant academic scholarship required casting a large net. Research from scholars outside of the United States provides the academic context for this project's original Minnesota investigation.

Global Investigation

The effort to better understand the specific barriers that challenge the inclusion of sustainable design practices in the development of affordable multifamily housing in Minnesota began with a search for existing research on the topic. The focus on process was key. While related topics of scholarship, such as sustainable building methods, provide useful information, the specific purpose of this investigation is to better understand why sustainable design practices, particularly those with proven track records and known benefits, are not more readily and universally incorporated into the multifamily affordable housing projects currently being developed in Minnesota.

To help unravel this puzzle, three research studies that specifically focus on the process of creating sustainable affordable housing developments, were carefully examined. Each offers a distinct approach to the topic.

The first study, “What Is Stopping Sustainable Building in England? Barriers Experienced by Stakeholders in Delivering Sustainable Developments” by Katie Williams and Carol Dair specifically focuses on exposing obstacles. Williams and Dair’s research is based on interviews with more than 60 stakeholders involved with five housing development projects in England. The paper identifies the specific barriers that persist, despite what the authors describe as “top-down and bottom-up pressure to deliver a sustainable built environment.” (2006)

A second relevant investigation is Paul Dewick and Marcela Miozzo’s “Networks and Innovation: Sustainable Technologies in Scottish Social Housing.” Similar to the work of Williams and Dair, these authors seek to understand why, despite strong policy initiatives in Scotland, sustainable technologies and processes are not more frequently utilized in housing development projects. (In Europe housing specifically designated for low income households is known as social housing.) This work is based on interviews with more than two dozen organizations involved with the creation of social housing, predominately in the areas of Glasgow and Edinburgh.

A third research paper providing background for the investigation of sustainable affordable housing in Minnesota, is Ashraf M. Salama and Habib M. Alshuwaikhat’s “A Trans-Disciplinary Approach for a Comprehensive Understanding of Sustainable Affordable Housing.” In this paper from Saudi Arabia the authors investigate current design and development practices, their limitations, and the potential benefits of a more integrated approach to the creation of sustainable affordable housing.

The work of these six scholars provides a point of entry for understanding the creation of sustainable affordable multifamily housing in Minnesota.

Barriers – Previously Documented

The following is a list of barriers that have prevented or limited the inclusion of sustainable features in affordable housing developments. This list was assembled from the three published research papers previously described.

1. Funding limitations
2. Project/site specific issues
3. Perceived risks
4. Problems with regulations
5. Relationships – lack of cooperation/cohesion
6. Lack of awareness and/or expertise
7. Limitations of design guidance documents

The following section expands on each of the barriers listed.

Funding Limitations

While concerns about funding limitations are often phrased as, “it cost too much,” the reality is a bit more nuanced. Two distinct challenges were presented.

The first challenge is one of perception. There is a common perception that sustainable design is inherently more expensive than conventional construction. The following statement from Williams and Dair’s report demonstrates how preconceptions often trump hard data. “In many instances, although cost differentials had not been thoroughly investigated, developers . . . were certain that anything other than ‘business as usual’ would be more expensive.” (2006)

Salama and Alshuwaikhat uncovered the same preconception.

“Once the goal of providing quality design and once the goal of incorporating environmental and social concerns, or introducing the sustainable design issues enter the discussion, it is generally assumed that the cost will automatically increase.” (2006)

The risk of such preconceptions is that beneficial design ideas and techniques may be dismissed before they are fully understood and opportunities for actual savings may be prematurely dismissed.

The second challenge related to funding limitations can be summarized as “first cost” versus lifecycle cost. Lifecycle cost includes both first cost (i.e. purchase and installation) and anticipated long term costs, such as operations, maintenance, and future replacement. A primary tenet of sustainable design is decision making that considers the future, as well as the present. First cost only calculations, which are typical for most funders, focus exclusively on immediate project cost (i.e. construction budgets). This narrow lens fails to recognize the long term financial benefits that may be gained through the incorporation of sustainable design and technology.

From their research interviews, Dewick and Miozzo provide a description of how sustainable design decisions, even those requiring additional first cost, can provide long term financial benefits to developers and residents.

“Although ‘life-cycle’ calculations are not explicitly recognized in mainstream funding schemes, representatives of three of the housing associations interviewed argued that they have recouped higher initial capital costs through higher subsequent rental streams. For example, in the Shettleston Housing Association’s Glenalmond Street development, the rents increased marginally but the tenants were provided with virtually free heating and hot water all year round by a geothermal district heating system supported by solar power and extremely high levels of insulation.”
(Dewick and Miozzo, 2004)

Project/Site Specific Issues

Every development is unique, including distinct project and site issues. These issues may present specific barriers to the incorporating certain sustainable design approaches or opportunities. Through their research Williams and Dair provide a few examples. In one case the presence of a major aquifer on site precluded the use of a particular drainage system. In another, decisions were guided by local priorities and one benefit, in this case preserving natural habitat, was traded for another, providing needed housing. Finally, ambitious goals, such as local material sourcing, may be limited by actual product

availability within a project area. (2006) Barriers such as these must be addressed on a case-by-case basis.

Perceived Risks

Perceived risks associated with sustainable materials, products and systems can create a barrier to their inclusion. Specific stakeholder concerns noted in Williams and Dair's report included availability, reliability, and long term maintenance. (2006) Stakeholders interviewed by Dewick and Miozzo also expressed reservations about the risks of accessing materials from niche markets. (2004) Stakeholders appear to be more strongly influenced by immediate concerns than by potential long term benefits.

Problems with Regulations

Within the examined research, regulations were noted for creating barriers in two ways. First, existing regulations disallowed certain sustainable measures. For example, in one development reducing street space for cars to increase space for bicyclists and pedestrians was prohibited. Second, regulations which permitted less sustainable options often resulted in lower standards. For example, an environmental health officer wished to have anticipated high noise levels addressed in a proposed development, but was over-ruled. (Williams and Dair, 2006)

Lack of Awareness and/or Expertise

A lack of awareness and expertise often results in significant barriers to the inclusion of sustainable design practices in housing development. For example, the finding "sustainability measure was not considered by stakeholders" was "by far the most commonly recorded barrier" documented in Williams and Dair's report (2006). This top ranking indicates a need for basic education and awareness building around the concepts of sustainability. The second most commonly cited barrier from their research was "sustainability measure not required by client." This was followed by the "stakeholder had no power to enforce or require sustainability measure." (Williams and Dair, 2006) Additional barriers that appear on Williams and Dair's top-twelve list include

“stakeholder was not included, or was included too late, in the development process to implement sustainability measure” and “stakeholder lacked information, (awareness) or expertise to achieve sustainable measure.” In each of these cases the barriers to acting sustainably are neither physical nor monetary; rather the barriers were related to will and understanding.

The challenge of limited awareness and expertise is not unique to England. Dewick and Miozzo attributed the low number of innovative projects being constructed by housing associations in Scotland to a “lack of in-house expertise in using . . . sustainable building products and processes.” (2004)

Relationships – Lack of Cooperation/Cohesion

Collaboration is an essential component of a successful sustainable design process. When important stakeholders are excluded from the process or included too late sustainable design opportunities may be lost. Dewick and Miozzo and Salama and Alshuwaikhat each describe barriers to successful project collaboration.

Dewick and Miozzo investigated key relationships in the development of social housing in Scotland. Specifically the critical relationships between housing associations (developers), design teams (including architects and consulting engineers), and contractors. (2004)

Dewick and Miozzo described two procurement methods commonly used to form project teams. The first, “off-the-shelf turnkey,” is the more traditional approach, which involves a housing association hiring a design team to fully plan and detail a housing project. The contractor is then selected through a competitive process based on securing the lowest bid. According to the authors architects and consulting engineers generally prefer this method of procurement because they believe that in a lead role they are better able to implement their specialized knowledge, including sustainable technologies. Unfortunately the “off-the-shelf turnkey” method of procurement is credited with producing significant tension between housing associations and contractors. The authors suggest this may be due to their contrasting non-profit and for profit motives. (2004)

The alternative method, referred to as “design and build,” involves housing associations hiring contractors early to lock in a price before the design is complete. This approach is credited with significantly improving relationships between housing associations and contractors; however, the architects interviewed believe that such an arrangement “inhibits the implementation of sustainable innovation.” (Dewick and Miozzo, 2004)

As is illustrated by the competing tensions noted above, each method of procurement available to Scottish housing developers presents a significant obstacle to forming cohesive relationships. The lack of such relationships is a barrier to full team collaboration and inhibits opportunities for innovation that may have emerged.

The basic premise of Salama and Alshuwaikhat’s paper is that “sustainable affordable housing has not been addressed in a comprehensive manner.” (2006) As discussed earlier, sustainable design recognizes social, economic, and environmental needs and opportunities. The authors have found clear disconnects in both scholarship and practice. Salama and Alshuwaikhat identify these distinctly separate academic silos by referring to them as dimensions.

“Sustainability in affordable housing research seems to encompass three dimensions; *the economic dimension*, for example, the financial costs associated with housing development, *the social dimension*, for example, the sense of belonging and the feeling of community among the inhabitants, and *the environmental dimension*, for example, encouraging water and energy conservation within the building.” (2006)

While each of these dimensions is imperative to creating sustainable development, the authors argue that there is not currently a holistic approach that successfully unites them.

Salama and Alshuwaikhat also recognize disconnect within professional practice. They describe it this way. “To many architects, engineers, and developers, the terms ‘*affordable housing*’, ‘*design*’, and ‘*environmental quality*’ are exclusive and are looked at in isolation.” (2006.)

While a narrow focus may be useful in addressing some distinct challenges, such a narrow vision is not adequate when seeking to create truly sustainable projects.

Limitations of Design Guidance Documents

Within their research, Salama and Alshuwaikhat explore the influence of sustainable design guidance documents.¹ In Minnesota, sustainable design guidance documents are commonly known in as sustainable design standards.

Based on their investigation, Salama and Alshuwaikhat outline five fundamental problems with design guidance documents. These deficiencies, summarized below, are barriers to a successful sustainable design process. (2006)

1. Prescriptive, point-based, and proxy measures in many cases do not relate to real outcomes.
2. Lifecycle costs and benefits are not understood and well documented early in the process.
3. There is no planning framework or process to analyze choices during project initiation and budgeting.
4. Guidelines are not always appropriate for specific geographical locations or housing types.
5. Fixed standards don't fit each housing project, population or location.

The authors describe the usefulness of sustainable design guidance documents this way, “guidelines do not provide blue prints on how sustainability can be achieved; only a good pretty picture of what the future might be.” (Salama and Alshuwaikhat, 2006)

Successes – Previously Documented

¹ Salama and Alshuwaikhat's review of five design guidance documents – Leadership in Energy and Environmental Design (LEED - National), Triangle Region Public Facilities High Performance Guidelines (North Carolina), Commonwealth of Pennsylvania Guidelines for Creating High Performance Buildings (Pennsylvania), High Performance Building Guidelines (New York City), and the University of Minnesota Sustainable Design Guide (Minnesota) – relies on the findings of an earlier study, Salama and Adams, 2004.

In addition to noting specific barriers that deter the incorporation of sustainable design in the development of affordable housing, Williams and Dair, Dewick and Miozzo, and Salama and Alshuwaikhat also provide examples of efforts that have been successful in supporting the incorporation of sustainability in affordable housing developments. The following are three examples; descriptions follow.

1. Statutory building and environmental regulations
2. Demonstration projects / innovation competitions
3. Sustainable design guidance documents

Statutory Building and Environmental Regulations

A very basic concept: where statutory building and environmental regulations were in place they were met. While the bar set by regulations was generally low, it did ensure at least a minimum standard for projects, which was better than what might have occurred without the regulation. (Williams and Dair, 2006)

Demonstration Projects / Innovation Competitions

In Scotland, innovation is promoted through demonstration projects and design competitions, such as those sponsored by Scottish Homes, the government entity that serves as the primary funder of social housing. Dewick and Miozzo document two significant benefits from these efforts.

The first benefit is the opportunity to implement sustainable features and innovations beyond that of conventional housing projects. Demonstration projects, which receive additional funding, incorporate “more high-tech options, such as active solar heating and geo-thermal heating.” Similarly innovation competitions “play a very important role in prototyping technologies and techniques that would not otherwise be implemented.” The second benefit is housing these projects that serve as precedents, stimulating the use of sustainable technologies in “subsequent conventionally funded projects.” (Dewick and Miozzo, 2004)

Sustainable Design Guidance Documents

While Salama and Alshuwaikhat's research recognizes that simply referencing sustainable design guidance documents does not guarantee a sustainable project will be created, use of such documents can have a very positive impact. The authors note significant trends and patterns within design guidance documents that are beneficial to project development. Their findings include the following. (2006)

1. Addressing sustainability early in the process
2. Awareness and involvement of clients and users
3. Partnership and team building
4. Relationship between technical issues and project phases
5. Relationship between sustainable guidance documents and other documents

Recommendations – Previously Documented

In addition to the barriers and successes previously discussed, the research efforts of Williams and Dair, Dewick and Miozzo, and Salama and Alshuwaikhat present a variety of insightful recommendations intended to promote sustainable design in affordable multifamily housing projects. Below is a summary of these recommendations, followed by a brief explanation of each.

1. Increase awareness and expertise through education
2. Stimulate demand by end users to improve availability
3. Collect and disseminate comparative cost data information
4. Replicate successful demonstration projects
5. Promote a design process that is comprehensive, trans-disciplinary, and collaborative
6. Expand funder considerations to include lifecycle, environmental, and social costs

Increase Awareness and Expertise Through Education

Greater awareness and increased expertise are crucial vehicles for deconstructing barriers to sustainable design. As noted earlier, five of the twelve barriers documented in Williams and Dair's research are human limitations. Sustainable opportunities were excluded from projects due to either basic ignorance and/or a lack of involvement, information, will, or authority. (2006) Because these barriers are neither physical nor monetary, they may be the most straightforward to address. All of the above barriers can be reduced through education and outreach.

Stimulate Demand by End Users to Improve Availability

Williams and Dair's research shows "very little evidence of any interest in a sustainable built environment" among end users, the future occupants of buildings. (2006) However it is demand by end users that will ultimately inspire greater interest by stakeholders to include sustainable building materials and technologies in future projects. As a result of increased interest and demand, more sustainable products and systems will be specified. With greater use, such materials will become more readily available and the technologies will become more mainstream.

Collect and Disseminate Comparative Cost Data Information

Clear accurate research data is necessary to propel sustainable design forward. Without clear data documenting actual costs and returns on investment, it is very difficult to achieve the confidence necessary to pursue innovation. This is true for developers, as well as, designers. Therefore it is imperative that additional research be conducted and the findings be made available to designers and decision makers.

Williams and Dair put it this way,

"Without such information, those involved in development either as professional advisors (such as architects and urban designers working for

developers) or developers themselves are unlikely to take what they see as risks to achieve more sustainable outcomes.” (2006)

Replicate Successful Demonstration Projects

One of the most accessible and direct ways to advance best practices is to repeat innovations proven through demonstration projects. Once techniques and technologies have been shown to operate successfully, these may be incorporated in future projects replacing more conventional, but less sustainable, practices. Replicating the success of demonstration projects also supports greater collaboration. Dewick and Miozzo described it this way, “Equally important in reducing some of the tensions between the parties in the construction process appears to be the repetition of successful demonstration projects.” (2004)

Promote a Design Process that is Comprehensive, Trans-Disciplinary, and Collaborative

While each of the published papers cited recognizes the benefits of collaboration and communication, Salama and Alshuwaikhat provide the most detailed vision for how a more holistic approach to sustainable design may be structured. The authors propose a design process that is comprehensive, trans-disciplinary, and collaborative.

To be comprehensive the effort must be long term, spanning from advance planning and pre-design to post occupancy evaluations. To be trans-disciplinary it is necessary to cross boundaries between fields and areas of expertise. And finally, to be collaborative the process requires stakeholder involvement from the earliest stages, as well as a committed team of experts throughout the design and construction process. Salama and Alshuwaikhat suggest the following tools to support an effective sustainable design process: defined roles, guidelines, check lists, comparative analyses, walking tours, workshops, and post occupancy evaluations. (Salama and Alshuwaikhat, 2006)

Expand Funder Considerations to Include Lifecycle, Environmental, and Social Costs

To increase the sustainability of affordable housing, funder criteria must support sustainable design efforts. Authors Dewick and Miozzo state that funding decisions focused exclusively on “first cost” must be replaced with “different time and cost dimensions.” To facilitate a more successful sustainable design process, funders of affordable housing should consider lifecycle, environmental, and social costs, in addition to first costs, when evaluating projects. (2004)

Methodology

The scholarship from England, Scotland, and Saudi Arabia provides a well constructed foundation for a Minnesota focused investigation of sustainable design in affordable multifamily housing development.

To gain a detailed understanding of barriers that hinder sustainable design in the development of multifamily affordable housing projects in Minnesota, interviews were conducted with leaders from five well known nonprofit housing organizations. In addition to documenting barriers, positive experiences and recommendations were also solicited. The following Minnesota developers contributed to this investigation.

- Aeon, based in Minneapolis;
- CommonBond Communities, based in St. Paul;
- Plymouth Church Neighborhood Foundation, based in Minneapolis;
- Project for Pride in Living, based in Minneapolis; and
- Southwest Minnesota Housing Partnership, based in Slayton.

These nonprofit organizations were chosen based on their extensive work creating affordable multifamily rental housing. Nonprofit developers focused primarily on home ownership opportunities and/or smaller scale projects, such as single family homes and duplexes, (e.g. Habitat for Humanity) were not included in this study.

Individual interviews were conducted in person by the author. The interviews varied in length and included opportunities for both formal and informal discussion. Each interview included the following questions.

- 1) What obstacles has your organization encountered in its efforts to create more sustainable developments?
- 2) Does your organization utilize specific design guidelines or standards?
- 3) What tools or resources have you found helpful in creating more sustainable housing developments?

Additional topics discussed in detail included, architect and general contractor selection processes and funding challenges.

Results

The developer interviews provided a great deal of information regarding both the barriers to and opportunities for developing affordable multifamily housing more sustainably in Minnesota. The findings from these interviews have been organized using the same structure as the published research findings previously discussed: barriers, successes, recommendations.

Barriers – Minnesota Developers

The following list documents the eight primary barriers encountered by the Minnesota developers interviewed in their efforts to incorporate sustainable design practices into affordable multifamily housing projects. A description of each barrier is provided.

1. Funding limitations
2. Existing building limitations
3. Lack of data and research
4. Conflicting or inconsistent requirements / competing needs
5. Procurement requirements
6. Geographical location

7. Length of development process
8. Resident behavior

Funding Limitations

Each nonprofit developer interviewed cited funding limitations as a barrier to creating affordable multifamily housing more sustainably. Specific funding limitation concerns include: the timing of funding awards within the development process, the criteria funders use to evaluate projects, and the amount of capital available for construction.

Most funding for affordable housing projects in Minnesota is awarded through a request for proposals (RFP) process led by the Minnesota Housing Finance Agency. This competitive process requires developers to solidify each project's site, program, and schematic design prior to submitting an application for funding. This approach harms the design process and reduces opportunities for sustainability in two significant ways.

First, because little or no funding is available for predevelopment expenses prior to the RFP process, the amount of time and careful consideration invested in early design is often very limited. This is a lost opportunity because the earliest design decisions are the most impactful. By the time funding is secured early schematic designs have been accepted as givens and are rarely changed or challenged. Without adequate predevelopment investment, alternative design concepts that might greatly improve a project's design will likely never be discovered.

Second, architects are frequently asked to defer their design fees until the developer receives funding for the project. It is not unusual for a developer to submit multiple applications over time, before adequate funding is received. This significantly delays the architect's payment. In some instances funding is never awarded and the designer may not be paid at all. Because payment is not guaranteed designers are likely to limit the amount of time and effort invested during schematic design. When a project's schematic design phase is abbreviated, significant design opportunities are inevitably lost.

Another funding limitation barrier repeatedly mentioned during interviews is the tendency by funders, including the Minnesota Housing Finance Agency, to focus funding award evaluations on upfront costs, or first costs, without recognizing or rewarding design decisions based on long term investments. Developers generally understand that higher performing equipment and materials, which may cost more at the time of installation, often pay for themselves within a few years and ultimately provide long term savings. Unfortunately, project funding and financing is generally not set up in a manner that allows for future savings to be captured for the benefit of a project's construction. As a result, a project designed in a manner focused exclusively on first costs, which is not a sustainable approach, will often be considered more favorably for funding awards than a project designed to be financially sustainable over time.

When discussing funding limitation barriers, the scarcity of funds available for affordable housing was a steady refrain. Without funding, no project can move forward. In addition, project budgets often dictate which desired features may be included in a project and which must be omitted. Cynthia Lee with CommonBond Communities provided an example based on a recent project in Wisconsin. She noted that a 15% energy savings was targeted, but not achievable due to funding limitations. Gina Ciganik of Aeon spoke about some forward thinking foundations who are pushing developers to do more in terms of sustainability, but indicated their financial "support is smaller than their appetites," in terms of desired outcomes.

Funding limitations – including the disjointed relationship between the funding application process and the design process, the limited evaluation criteria by which funding applications are judged, and the modest amount of capital available annually for the construction of affordable housing – present real barriers to the creation of sustainably designed affordable housing.

Existing Buildings Limitations

A number of developers cited the unique limitations of existing buildings as a barrier to achieving desired sustainable outcomes. While maintaining and reusing existing

buildings, even those without historic designation, conserves both community history and actual building fabric, existing buildings also have many constraints inherent in their forms. Examples of common challenges include accessibility limitations for those with mobility impairments, minimal wall insulation, limited opportunities for mechanical system and ventilation improvements, and the presence of hazardous materials such as lead and asbestos. The list goes on and on. So, while maintaining existing structures is itself a sustainable practice, the barriers encountered in these projects are often more restrictive than barriers associated with new construction projects.

Lack of Data and Research

Developers noted that one of the primary challenges faced by those striving to create sustainable environments is the lack of good available data to inform design and development decisions. Gina Ciganik of Aeon noted that much of the information available today is anecdotal. According to Ciganik, there has not been a sufficient quantification of investments made, “formulas and calculations are needed.”

Conflicting or Inconsistent Requirements / Competing Needs

Based on interviews with experienced developers, the greatest barrier to creating affordable housing sustainably may be conflicting requirements and expectations by funders and other regulatory powers. Areas of conflict cited include,

- State regulations and funder criteria;
- Historic preservation mandates;
- Policies dictating location, building type, scale, and schedule; and
- Competing needs and preferences.

A brief description of each follows.

State Regulations and Funder Criteria – Cynthia Lee of CommonBond Communities described the challenge of working in multiple states. She noted that each state has its own energy and sustainability criteria. Similarly, each housing finance agency

determines its own design criteria. In addition, each funder mandates its own requirements, as an example she cited tax credits and HOME funds (a federal grant program). While there is significant overlap between the program requirements, there are also differences that must be tracked and addressed for each project.

Historic Preservation Mandates – Many of the developers interviewed, including CommonBond, Plymouth Church Neighborhood Foundation, and Aeon, spoke about the additional challenges involved with redeveloping historically designated structures, which require historic design reviews. Not only is it difficult to balance increased energy efficiency goals with the maintenance of historic building fabric (e.g. historic windows); it is very challenging to anticipate how historic requirements will be applied to each building. Lee Blons of Plymouth Church Neighborhood Foundation provided the example of two identical buildings in the Stevens Square neighborhood of Minneapolis. In the first building window replacement was allowed, in the second it was not. Blons said this difference delayed the financial closing of the second project by six weeks.

Policies Dictating Location, Building Type, Scale, and Schedule – Developers frequently spoke about funder requirements that limited development opportunities. For example, Lee Blons cited the decision by the City of Minneapolis to support affordable housing development only in “non-impacted” areas, meaning those areas without concentrated poverty. She indicated that the lack of new affordable housing development in north Minneapolis where a great need exists is a direct outcome of this policy. Another example provided by Blons was Low Income Tax Credit financing, which drives developers towards constructing new development rather than rehabilitating existing structures, even though rehabilitation is usually a more sustainable approach. Blons and Chris Wilson of Project for Pride in Living each spoke about financial incentives for creating larger projects. Rather than prioritizing large scale development, a more sustainable approach may be to consider the best fit for a particular site and community. Developers are limited by funders’ priorities and schedules. When describing the influence of funders, Jorge Lopez of Southwest Minnesota Housing Partnership put it this way, “HUD wants to do things their way, their own timeline.”

Competing Needs and Preferences – Competing interests often become barriers for developers working to create sustainable developments. Many of CommonBond’s developments are created for senior citizens. Cynthia Lee noted that serving seniors requires some special accommodation, such as windows that are easy to operate with minimal strength. This can be especially challenging when combined with energy efficiency goals and historic interests. Blons spoke of a private foundation’s interest in incorporating green roofs while the primary public funder, Minnesota Housing Finance Agency, expressed an aversion to the technology. The developers interviewed often noted Minnesota Housing’s reluctance to move towards innovative sustainable products and technologies. Most acknowledged improvement in this area, but still found Minnesota Housing’s approach and guidelines to be limiting.

Because funding for affordable housing is a very limited resource, developers generally assemble funding from many sources to create each development. As a result, every project must be designed to meet a plethora of often competing requirements and agendas. This need to balance competing priorities significantly impacts opportunities for design innovation, including sustainable design.

Geographical Location

Jorge Lopez of Southwest Minnesota Housing Partnership spoke of one barrier unique to his organization, geographical location. Unlike Aeon, CommonBond Communities, Plymouth Church Neighborhood Foundation, and Project for Pride in Living, which are located in the central cities of Minneapolis and St. Paul, Southwest Minnesota Housing Partnership is located in Slayton, Minnesota, well outside of Minnesota’s urban core. Lopez described architects and contractors in more rural areas as often being less informed about environmentally conscious design and construction practices compared to those in the state’s core cities. To add to this challenge, most resources for additional expertise, such as the University of Minnesota’s Center for Sustainable Building Research and Center for Energy and Environment, are located in the Twin Cities. For Southwest Minnesota Housing Partnership location is a barrier to incorporating sustainable design into the development process.

Procurement Requirements

Most of the Minnesota housing developers interviewed found funder imposed procurement requirements, particularly those which restrict the use of an integrated design process, to be a significant barrier the successful incorporation of sustainable design. To appreciate the benefits of a truly integrated design process it is advantageous to have a general contractor at the table during design to provide input on both cost and constructability. Minnesota Housing Finance Agency discourages this approach by expressing a strong preference for the selection of general contractors through a closed bid process. This type of selection process requires that all construction documents are final prior to selecting a general contractor. Minnesota Housing does allow an alternative approach where the closed bid process is applied to subcontractors rather than general contractors; however, developers who elect this alternative approach do so against the recommendation of the state's primary funder.

A couple years ago the City of Minneapolis took the idea one step further and instituted a policy that required all developers receiving funding from the city to adhere to a closed bid process for general contractor selection exclusively. It took a prolonged effort, led largely by the Metropolitan Consortium of Community Developers (a local association of nonprofit community development organizations), to convince the city to amend this requirement in such a way that the early selection of general contractors was again permitted. To ensure fair competition and competitive pricing, subcontracts are required to be competitively bid through a closed bid process, when the general contractor is not. Cynthia Lee said that CommonBond Communities, the only multi-state developer interviewed, has not run into a policy like the one instituted in Minneapolis anywhere else.

Plymouth Church Neighborhood Foundation found Minneapolis's heavy handed approach to contractor selection and bidding particularly challenging when working on rehabilitation projects. In rehabilitation projects specific design choices are often influenced by building conditions uncovered during the actual demolition and construction process. Lee Blons stated that one of the foundation's preferred architects

became so frustrated with the city's restrictions against using a design-build approach in rehabilitation projects that he ultimately refused to do any further work in the city of Minneapolis.

Southwest Minnesota Housing Partnership has also been impacted by procurement requirements which restrict the general contractor selection process. Southwest has a construction division within its larger organization. This resource may not be utilized during the design process because early involvement by the construction group would disqualify the division from bidding on the construction of Southwest Minnesota Housing Partnership housing development projects.

Length of Process

Time was one of the barriers most frequently mentioned by Minnesota developers during interviews. The amount of time – multiple years – necessary to complete each affordable housing project negatively impacts project outcomes. Starting and stopping a project – a frequent result of multiple funding applications and review processes – disrupts continuity in terms of design, as well as, the development team's institutional knowledge. Staff changes and shifting focuses result in lost momentum. In addition, construction costs fluctuate over time, which impacts the budget, which then impacts design, which then requires additional time, which then further delays construction. Streamlining funding and regulatory review processes to be more efficient and timely would provide significant benefit to affordable housing development projects and result in improved final products.

Resident Behavior

Both Abbie Loosen of Project for Pride in Living and Gina Ciganik of Aeon spoke about resident behavior as a barrier to the successful incorporation of sustainable design in housing projects. Ciganik pointed out that when creating an environmentally conscious building “misuse can thwart everything you're doing.” Loosen emphasized the importance of continual education to ensure that residents understand their homes and the impact of their own behavior. Simple examples of information to be disseminated to

residents include the importance of closing windows when air conditioning is in use and understanding how to properly dispose of recyclable materials. It is imperative that sustainable design successfully balance the needs of people with those of profit and the planet.

Successes – Minnesota Developers

While many barriers challenge sustainable design efforts in Minnesota, there are also positive trends that encourage sustainable design in the development of affordable multifamily housing. Below are some notable examples from the developer interviews, an explanation of each follows.

1. Long term community involvement
2. Use of design standards and guidelines
3. Local expertise
4. Integrated design / design charrettes

Long Term Community Involvement

Minnesota developers recognize the importance of establishing an understanding of and positive presence within the communities where affordable housing is needed. Chris Wilson of Project for Pride in Living (PPL) provided one example. He described the positive impact of developing a long term relationship with the Hawthorne Neighborhood in North Minneapolis. PPL has been working with the Hawthorne Neighborhood since 2002. When the collaboration began there was no money to support the effort. An architecture firm agreed to provide some pro bono design services and PPL worked closely with the community to develop a “progressive forward thinking” vision for the future. This vision came to be known as the Hawthorne Eco-Village.

As Wilson described it, resources follow visions and lots of little pieces have come together since the initial vision was conceived. The county and city have become supportive partners. The Home Depot Foundation provided a significant grant. Changes have begun including, two rehabilitation projects, two new construction LEED

(Leadership in Energy and Environmental Design) certified homes, a tree nursery, a demonstration garden, and the removal of a derelict apartment building. Wilson reported that crime in the area has gone down.

Use of Design Standards and Guidelines

Design standards and guidelines have proved to be a very positive tool for developers wishing to improve the quality and sustainability of their housing projects. All the developers interviewed had incorporated at least one design standard into their development work. A key advantage to using design standards or guidelines is that they provide a method for ensuring that the design process has carefully considered and evaluated a broad range of sustainable design topics and possibilities. The actual impact of each standard varies with the specific goals established and by the design team and developer's commitment to achieving those goals.

Design standards and guidelines cited during nonprofit developer interviews include,

- Organization specific design guidelines,
- Green Communities Criteria,
- Leadership in Energy and Environmental Design, and
- Living Building Challenge.

Organization specific design guidelines allow developers to capture and learn from their own experiences. Aeon, CommonBond Communities, and Project for Pride in Living have each created design standards based on its organization's unique needs and knowledge.

Aeon captured lessons from previous projects in a document referred to as their "Do This, Don't Do This List." Aeon reported this document, which is predominantly prescriptive rather than performance based, is now being phased out and new guidelines are being developed. Aeon's new standards are being formed around the following topic areas: big idea, connections/interconnectedness, earth and exterior grounds, building structure, building systems, and interior spaces.

In 2006 CommonBond Communities created a document titled “CommonBond Communities Green Building Strategies: An Approach to Sustainable, Affordable Multi-Family Housing Projects New and Existing Buildings.” This document, weighing in at more than 300 pages, utilizes a point system and includes six focus areas: neighborhood and site, water, energy, materials, indoor health, and waste.

Project for Pride in Living’s internal document, “Maintenance & Development Design Standards” was updated in 2010 to align with the 2008 Green Communities Criteria (described below). The structure of PPL’s document, which is 23 pages, reflects the format typically utilized in construction document specifications.

Each of these organization specific documents capture expertise gained through years of development experience. The purpose is to efficiently incorporate previous lessons learned into new and ongoing projects.

Green Communities Criteria is unique among national design standards in that it was created specifically to promote the production of green affordable housing. Developed by Enterprise Community Partners, the criteria support an integrated design process. To ensure a holistic approach, the 2008 Green Communities Criteria include the following topics: location and neighborhood fabric, site improvements, water conservation, energy efficiency, materials beneficial to the environment, healthy living environment, and operations and maintenance (*Green Communities Criteria 2008*, 2008).

Whereas many design standards, such as Leadership in Energy and Environmental Design and the Living Building Challenge (both of which will be discussed below), add an additional expense to projects in the form of registration and certification fees, Green Communities has taken an alternative path. Rather than adding to the upfront cost a project, Green Communities has worked to create incentives for nonprofit developers electing to incorporate Green Communities’ goals. For example, to promote integrated design Green Communities awards \$5,000 charrette grants to nonprofit organizations. The intention is to better facilitate team collaboration early in the design process.

Green Communities also utilized an innovative, incentive-based approach when it initially introduced the Green Communities Criteria. Through a competitive application process early Green Communities demonstration projects, such as Cherry Ridge and Viking Terrace Apartments by Southwest Minnesota Housing Partnership and Ripley Gardens and The Wellstone by Aeon, were awarded project funding in return for incorporating the Green Communities Criteria. One of the successful outcomes of this proactive approach, which successfully demonstrates the applicability and benefits of green housing, was Minnesota Housing Finance Agency's decision to add an amended version of the criteria to its mandatory design requirements. As a result, all housing projects awarded significant funding by Minnesota Housing are now required to incorporate aspects of the Green Communities Criteria. Through these efforts, all Minnesota nonprofit developers have become familiar with Green Communities and the minimum standard of sustainability for affordable housing projects developed in Minnesota has increased.

For developers interested in reaching for an even a higher level, in terms of sustainable design, Leadership in Energy and Environmental Design from the U.S. Green Building Council and the Living Building Challenge from the International Living Building Institute provide more ambitious goals, well-established support structures, and third-party verification.

Leadership in Energy and Environmental Design (LEED) is the most recognized green building design standard nationally. Originally focused on new construction, LEED now has nine distinct rating systems, as well as, various levels of certification with a top rating of platinum. Building categories specifically addressed by LEED include: sustainable sites, water efficiency, energy and atmosphere, materials and resources, and indoor environmental quality. Additional credits may be earned in the areas of innovation and regional priorities.

Project for Pride in Living utilized LEED ND (Neighborhood Development) as a tool for planning the Hawthorne Eco-Village mentioned earlier. CommonBond Communities and Aeon were each developing LEED NC (New Construction and Major Renovations)

projects at the time of their interviews. Recently Aeon's Alliance Addition project in Minneapolis was awarded platinum certification through the LEED for Homes midrise pilot program. (The midrise pilot modified LEED for Homes to include four to six story housing developments.) Green Communities Criteria and LEED for Homes are intended to be complementary standards.

The *Living Building Challenge* is a very ambitious performance-based design standard that begins with the question, "What if every single act of design and construction made the world a better place?" (International Living Future Institute, 2010) This standard is more holistic than LEED. It includes seven performance areas: site, water, energy, health, materials, equity, and beauty. In the summer of 2010, Aeon held a series of workshops to explore the feasibility of applying the Living Building Challenge to a planned housing development in Minneapolis, the fourth phase of the Portland-Franklin Gateway. (At the time of these interviews, no Minnesota projects had ever received certification as Living Buildings.)

Local Expertise

Local expertise in sustainable design has been very beneficial to nonprofit developers in Minnesota wishing to create affordable housing more sustainably. Local experts cited in interviews include,

- Energy consultants,
- Enterprise Rose Architectural Fellow, and
- University of Minnesota's Center for Sustainable Building Research

A description of each follows.

Energy consultants focus on energy efficiency. For many, the greatest expense associated with housing, beyond the initial construction, is the cost of energy. This is especially true in a state like Minnesota where extreme heat and extreme cold occur annually. To ensure that energy efficiency is a top priority energy consultants are a very valuable resource. These consultants are able to contribute their unique expertise to the

design process in several ways including: guiding design teams to set appropriate energy conservation goals, reviewing designs for conformance to those goals, and constructing energy models.

Computerized energy modeling is a useful way to compare the energy efficiency of multiple design alternatives. Energy consults may also serve as commissioning authorities to ensure mechanical systems are installed and performing as specified. Energy consultants were mentioned as contributing experts by several developers.

Cynthia Lee of CommonBond Communities spoke about receiving an energy audit for a project in Wisconsin, as well as working with an energy consultant in Iowa. (The energy consultant's involvement in Iowa was mandated by a state requirement.) More locally, Plymouth Church Neighborhood Foundation and Aeon described cost benefit analyses completed by the Center for Energy and Environment, based in Minneapolis. Such analysis is helpful for determining the most appropriate mechanical system for each project.

Larger projects sometimes qualify for utility sponsored energy design support. Aeon's Ripley Gardens, a Green Communities demonstration project, benefited from Xcel Energy's Design Assistance program. This program includes energy modeling and consulting services by The Weidt Group, based in Minnetonka. Aeon's planned Gateway IV project has been selected by Xcel Energy to participate in its Enhanced Design Assistance program, which will also include involvement by The Weidt Group during the project's predesign and schematic design phases. Decisions made very early in the design process offer the greatest potential for impacting a project's long term sustainability.

The *Enterprise Architectural Rose Fellow* program has had a very direct impact on housing development in Minnesota. Since 2000 Enterprise Community Partners has sponsored the Rose Fellowship "to inspire and nurture a new generation of architects as lifelong leaders dedicated to creating sustainable communities for people of all income levels" (About the Fellowship: Introduction). Each year two to five fellows are selected

through a nationwide application process to share their expertise with selected nonprofit organizations throughout the United States for a period of three years. In 2008, Project for Pride in Living was awarded a Rose Fellow.

Rose Fellow Abbie Loosen was selected to be a member of Project for Pride in Living's development team from 2008-2011. An architectural graduate with a few years of previous experience, Loosen is charged with helping PPL to reach the next level in terms of green design, while also improving project aesthetics. At the time of my interviews with PPL, Loosen had recently updated PPL's internal design standards and was helping her colleagues nationally create similar standards. While Loosen's tenure as a Rose Fellow will soon be coming to a close, a new Rose Fellow is expected in Minnesota in 2012. Saint Paul Riverfront Corporation has been selected to receive a 2012-2015 Rose Fellow who will be focusing his or her attention on affordable housing development along the Central Corridor. The Central Corridor will connect Minneapolis and St. Paul via light rail. (Join the Fellowship: [Apply to Be a Fellow](#))

The *University of Minnesota's Center for Sustainable Building Research (CSBR)* is a source of sustainable affordable housing expertise, which is completely unique to Minnesota. Sustainable affordable housing has been a primary focus of CSBR for a number of years. Senior Research Fellow Billy Weber has led affordable housing research projects on behalf both the McKnight Foundation, based in Minnesota, and Enterprise Green Communities. Aeon, Project for Pride in Living, and Southwest Minnesota Housing Partnership all looked to the Center for Sustainable Building Research for leadership in sustainable design charrettes. (Design charrettes are discussed in the next section.)

Aeon utilized the CSBR's expertise in a multiyear initiative to inform Aeon's design process. This effort, Homes for Generations, also included the Center for Energy and Environment. This partnership contributed to the design and development of three distinct multifamily housing projects – a full gut rehab in Roseville, a historic reuse in St. Paul, and a new construction project in Minneapolis. All three projects were under construction at the time of Gina Ciganik's interview. As each project comes online,

Aeon will continue to work with the Center for Sustainable Building Research to evaluate and learn from the performance of each site.

Integrated Design / Design Charrettes

An integrated design process expands the variety of voices and expertise involved with the design process, compared to a more conventional design approach. The intent is to create a more holistic project vision, reflective of both present and future needs. An integrated design process includes, at a minimum, the active involvement of a project's owner (developer), designer, and general contractor. Each party brings a unique perspective. For example the contractor can evaluate the constructability of specific design ideas at a time when multiple options may still be readily considered. Similarly, an owner may raise concerns regarding long term maintenance as the designer is exploring finish options.

Some Minnesota developers are strong advocates for this approach while others remain neutral. Commonbond Communities, Aeon, and Southwest Minnesota Housing Partnership expressed a clear preference for integrated design.

At CommonBond Communities, typical team meetings include the developer, contractor and architect. Cynthia Lee said CommonBond prefers to select contractors early, especially for rehab projects. Aeon agrees with this approach. Aeon believes the unique knowledge and perspective of contractors is too valuable to be excluded during the design process. In fact, Gina Ciganik of Aeon expressed a desire to expand beyond the owner-architect-contractor model. She would like to see engineers brought in up front. "Not just a triangle, but a new geometry."

While Southwest Minnesota Housing Partnership (Southwest) fully recognizes the value of a truly integrated design process they are faced with an extra challenge. In addition to being a developer, Southwest Minnesota Housing Partnership is also a general contractor. However, to ensure the type of translucent impartiality demanded by funders, Southwest must adhere to a closed-bid process for all general contracting on its own projects. Thus, the opportunity to utilize their in-house expertise is greatly restricted.

Chris Wilson of Project for Pride in Living (PPL) is comfortable with a design process that does not include a general contractor, noting that PPL tends to repeat similar designs. While he acknowledged that it is important to have good rapport with contractors, he believes that an invited bid process with multiple general contractors competing and a process with a pre-selected general contractor and bids submitted by competing subcontractors can both work effectively. Plymouth Church Neighborhood Foundation relies on project architects to drive the design process, including sustainability, without necessarily including a general contractor in that process.

Green Communities promotes integrated design as an important tool for incorporating sustainable design into affordable housing development. Supported by Green Communities grants Southwest Minnesota Housing Partnership, Project for Pride in Living, and Aeon have all held Green Communities charrettes facilitated by the University of Minnesota's Center for Sustainable Building Research. Green Communities uses the term charrette to describe integrated workshops intended to gather owners, architects, contractors, engineers, sustainable design experts, community residents, and others into a common dialogue to establish clear sustainable design goals for affordable housing projects.

Within Minnesota, Southwest Minnesota Housing Partnership is a strong leader in this area. At the time of their interview, Southwest had recently completed four charrettes with the Center for Sustainable Building Research. (Three charrettes were sponsored by Green Communities, the fourth by Blue Cross Blue Shield, a health insurance organization.) Jorge Lopez said the idea is to "learn and then take to the next project" thus building Southwest's own knowledge with each charrette experience.

In 2010, Aeon expanded on the charrette model by holding three workshop sessions, in close partnership with the Center for Sustainable Building Research, to explore the potential for developing a Living Building Challenge project in Minneapolis. The workshops included owners, architects, engineers, contractors, and sustainable design experts, as well as, city officials, neighborhood residents, and experts in health, education, and transportation.

Recommendations – Minnesota Developers

In addition to the successes previously noted, the Minnesota developers interviewed offered a variety of recommendations that they believe would better support and promote the incorporation of sustainable design practices into affordable housing development. Below is a list of recommendations, followed by explanations of each.

1. Educate the general public
2. Learn from and involve residents
3. Support more quantitative research
4. Promote greater collaboration
5. Increase funder education
6. Revise funder requirements
7. Reward sustainable design and innovation

Educate the General Public

The general public should be better educated on the issue of sustainability. While some environmental topics, such as climate change and fuel efficiency, have reached a broad audience in recent years, the general public continues to have only a limited understanding of many aspects of sustainability, including the relationship between the natural environment and the built environment.

Lee Blons of Plymouth Church Neighborhood Foundation spoke about her experience with the organization's congregation partnerships. She observed that people's expectations are largely based on what is readily visible. For example, many equate sustainable architecture with green roofs and raingardens.

Providing more education to the general public will help expand the public's understanding of what is available, as well as what is possible. Greater understanding will likely push consumer demand and influence the market, which will likely result in increased sustainable housing options.

Learn From and Involve Residents

Much can be gained by working directly with the residents of multi-family housing developments. Some residents may contribute directly to a project's sustainability by sharing their expertise. For example, new immigrant residents may offer advice for alternative cooling or water conservation strategies based on their own life experiences. At the same time, many residents would benefit from basic instruction on operating systems and appliances that may not be familiar to them.

Abbie Loosen of Project for Pride in Living suggested that apartment guides should be provided to all residents. In addition, she proposed holding workshops for renters. Loosen spoke of the importance of tracking energy usage. Providing such information would allow residents to better understand the impact of their individual actions.

Support More Quantitative Research

Quality research is imperative to the success of sustainable housing development. Without hard reliable data developers and others understandably shy away from innovative materials and practices. Without readily available information, decisions are influenced by perceptions and fear. Gina Ciganik of Aeon expressed an urgent need for quantitative research to demonstrate the actual investment costs and future benefits of incorporating specific sustainable design practices into projects.

Promote Greater Collaboration

All of the developers interviewed described the benefits of collaboration. Yet, many also noted obstacles to collaboration, such as funder procurement policies that deterred the involvement of general contractors. The creation of real projects that promote environmentally, socially, and economically sound decisions requires expertise in multiple areas.

Increase Funder Education

Funders need to gain a strong foundational understanding of sustainable design. Affordable housing funders, such as the Minnesota Housing Finance Agency, carry a great deal of influence over the projects they fund. Their influence includes project selection, as well as policies that directly influence the development process and design. It is imperative that funders better understand the process of creating sustainable projects, so that they can better support such efforts through both project selection and policy requirements.

Revise Funder Requirements

Funder requirements must be revised to support sustainable design. Because the policies established by funders have such an immediate and direct impact on development, there were a variety of specific recommendations to changes funder requirements.

The most important change called for by developers is the creation of a streamlined funding process. The drawn out process in place today negatively impacts both design quality and budget.

Another important change, money must be available for design. This includes funding for predesign work to ensure that important design opportunities are not lost due to the limited resources available. Similarly, design fee limitations imposed by Minnesota Housing Finance Agency should be eliminated or adjusted to better reflect the larger market.

A third recommended change, funders should allow developers sufficient flexibility to hire the best design team and general contractor for each project. In addition, developers should have the option to bring the contractor on board during the design phase to assist in strengthening the project design.

Lee Blons of Plymouth Church Neighborhood Foundation went so far as to recommend that a “Whoops Fund” be established to support those developers who take on additional

risk with a new innovative technology. The fund could be available in the event of unforeseen complications.

Reward Sustainable Design and Innovation

The benefits of sustainability must be valued. Several developers spoke about how funding awards do not take into account or reward sustainable design practices. Chris Wilson of Project for Pride in Living suggested that, for example, Minnesota Housing Finance Agency could award more points during their competitive funding process to projects designed to provide affordable housing for 100 years, while recognizing that this goal may involve some more expensive but highly durable materials.

Abbie Loosen of Project for Pride in Living noted that a challenge faced by funders and developers is a societal preconception in the United States that affordable housing “should only cost so much.” However, she also indicated that she believes affordable housing is often better built than market rate housing, particularly in terms of sustainability. (The author’s experience supports her view.)

Conclusions

Through the work of previous scholars, including Williams and Dair, Dewick and Miozzo, and Salama and Alshuwaikhat, it is possible to understand some of the specific challenges involved with creating sustainable affordable multifamily housing globally, as well as some of the trends and efforts in place to address these challenges. Similarly the interviews with nonprofit developers in Minnesota revealed specific barriers faced locally, as well as the positive trends and efforts that seek to address them. This section highlights the commonalities shared between these two investigations, as well as the findings unique to each.

Topics common to both investigations may point to universal challenges in creating multifamily projects that are both sustainable and affordable. Issues presented in only one investigation may be attributable to differences of location, including governance and policy differences. In addition, the published papers cited each captures a specific

moment in time. The research papers referenced in this investigation were published in 2004 and 2006, which precede the timing of the Minnesota developer interviews, conducted in 2010 and 2011. Changes in the fields of design and construction, such as the ongoing evolution of sustainable design guidelines, continue to impact the development of affordable housing.

Synthesis of Barriers

The synthesis of these two investigations – the work of previous researchers and interviews with nonprofit developers from Minnesota – begins with a focus on the specific barriers that obstruct and deter the inclusion of sustainable design practices in the development of affordable housing. The following list summarizes the barriers encountered, descriptions follow.

1. Funding limitations
2. Site and project specific issues
3. Limited data and expertise
4. Regulations and requirements
5. Relationships / collaboration
6. Sustainable design standards
7. Issues unique to Minnesota

Funding Limitations

The availability and distribution of funding presents a common challenge for those seeking to create affordable housing. Previous researchers and Minnesota developers each expressed frustration that funding is awarded based on projects' "first cost," rather than considering the long term costs and benefits of each project's design and construction. Both groups indicated that including lifecycle cost considerations, which include maintenance, operation, and replacement cost, would ensure better stewardship of available money, as well as better projects long term.

Another common obstacle to sustainable design is perceived cost. The frequent misperception that sustainable materials and systems are inherently more expensive often causes decision makers to shy away from even considering sustainable options.

Minnesota developers also indicated that the current funding system does not support the early investigation of sustainable design, even though the most impactful opportunities for incorporating sustainable design are at the very beginning of the design process. The specific barriers cited were, a lack of funding for predevelopment and a development process that often relies on deferred fees for designers.

Site and Project Specific Issues

Previous researchers and Minnesota developers both acknowledged that individual sites and projects have unique obstacles that influence sustainable design opportunities.

Previous research cited particular soil conditions and community priorities as examples. Minnesota developers described the unique requirements imposed on historic renovation projects as barriers. Such restrictions do not prevent projects from including sustainable design features they simply influence and sometimes limit which opportunities design teams may elect to pursue.

Limited Data and Expertise

Previous researchers and Minnesota developers each pointed to a lack of clear available research data and professional expertise as significant barriers to the incorporation of sustainable design in affordable housing.

Regulations and Requirements

When considering regulations and requirements, previous researchers recognized as barriers regulations that did not allow certain sustainability measures, as well as regulations that allowed lower standards than those desired for a project.

Minnesota developers shared a longer list of barriers related to specific regulations and requirements. One frequently noted barrier was the sheer volume of requirements that

must be tracked and managed. The complexity described appears to be correlated to the number of funding sources that must be assembled to create affordable housing projects in Minnesota. Each funding source has its own requirements and expectations. An extra challenge caused by this complex assembly of funding sources is conflicting requirements and expectations. Inconsistent requirements can result in significant delays and disappointing compromises.

Historic preservation mandates were specifically called out as a barrier by Minnesota developers due to the developers' experiences with inconsistent interpretations of requirements. Lack of a predictable process and outcomes was blamed for delays.

Minnesota developers also noted that funding processes and priorities created barriers by limiting the types of projects, project locations, and schedules. Projects are frequently proposed for development in response to funder guidelines. The specific needs and opportunities unique to sites and communities become secondary considerations.

The complex of challenges cited by Minnesota developers, compared to the findings of previous researchers, seem to indicate that other locations, including England and Scotland, have more streamlined funding mechanisms in place.

Relationships / Collaboration

Previous researchers and Minnesota developers each cited the benefits of positive collaborations. However, each group noted significant barriers to creating the level of collaboration desired. Research in Scotland showed that procurement policies created an imbalance between designers and builders. Research from Saudi Arabia described professional silos that resulted in isolation. Several Minnesota developers noted policies and requirements that deter collaboration with general contractors during the design process.

Sustainable Design Standards

While previous research documented a variety of specific barriers related to design guidance documents, Minnesota developers interviewed did not appear to share these concerns. The problems noted in the 2006 research included measures that were overly prescriptive; a lack of lifecycle cost and benefit analysis; the absence of a framework or process for comparing design options; a lack of recognition for geographical differences; and a lack of customization to fit specific projects, populations, and locations. While some of these challenges continue in other forms, for example funding awards that do not recognize lifecycle implications, it appears that design standards as a whole have improved significantly in the past five-plus years.

Issues Unique to Minnesota

There were several barriers raised by Minnesota developers that were not mentioned in the research studies cited. One is geographical location. The state of Minnesota has an agrarian history; as a result residents are spread over a very broad area. The twin cities of Minneapolis and St. Paul are the state's financial and political center. In addition, the state's system of higher education is also focused in this urban core. For Minnesota developers in Minneapolis and St. Paul professional expertise around sustainable design resources are readily available. For developers working outside of this geographical area resources were reported to be much more limited.

Another noted barrier unique to housing development in Minnesota is the length of the development process. Typical Minnesota housing projects require many years of effort. Developers attribute this slow process to the complexity of acquiring sufficient funding for each project.

A third barrier uniquely cited by Minnesota developers, is resident behavior. Minnesota developers recognize that the occupants' relationship with the constructed environment can significantly contribute to, or detract from, the potential impact of the sustainable features incorporated into a project's design.

Synthesis of Successes

In addition to noting barriers to sustainability in affordable housing, previous researchers, including Williams and Dair, Dewick and Miozzo, and Salama and Alshuwaikhat, provide examples of efforts and practices that were successful in expanding the incorporation of sustainable design practices into affordable housing development. Similarly, Minnesota developers provided examples of resources and strategies that have had a positive impact on their efforts to create more sustainable affordable housing. This section marries the successes cited in the two investigations. The summary list is followed by descriptions.

1. Community involvement
2. Statutory regulations
3. Demonstration projects / competitions
4. Design guidance documents / sustainable design standards
5. Local expertise and integrated design / design charrettes

Community Involvement

Minnesota developers noted the benefits associated with long term community relationships. They have found that neighborhood and community support is necessary for a smooth development process, and it is ideal to begin nurturing such relationships long before a particular project is on the table.

The research studies from England, Scotland, and Saudi Arabia did not mention community involvement as a topic. It is possible that communities in Minnesota have greater influence than the areas studied by the previous researchers cited; alternatively, other areas of the world may be more accepting of affordable housing.

Statutory Regulations

Research from England noted that statutory regulations are positive because they assure that at least a minimum amount of sustainability is incorporated into housing

developments. Minnesota developers on the other hand made no mention of regulations as a positive influence.

This difference is most likely tied to the complexity of regulations and requirements in Minnesota. It seems Minnesota developers find balancing requirements so consuming that they are less likely to focus on the unique impact of any one source of regulation or control.

Demonstration Projects / Competitions

Researchers in Scotland discussed the benefits of demonstration projects and competitions. These included, increased opportunities to incorporate sustainable features and the influence of these projects as precedents for future developments.

Minnesota developers did not offer any similar examples, most likely because demonstration projects and competitions are less typical within Minnesota. Green Communities supported demonstration projects were one notable exception.

Design Guidance Documents / Sustainable Design Standards

Salama and Alshuwaikhat's 2006 research uncovered some very positive trends related to design guidance documents including, consideration of sustainability early in the development process, increased awareness and partnerships, and better project coordination.

The sophistication and level of detail presented by Minnesota developers discussing design standards and guidelines demonstrates the significant impact these tools have had in recent years. With Green Communities Criteria as a common point of entry, there was no Minnesota developer without at least a basic knowledge of sustainable design.

Developer specific guidelines, Leadership in Energy and Environmental Design, and the Living Building Challenge provide readily available pathways for developers wishing to pursue ambitious goals.

Local Expertise and Integrated Design / Design Charrettes

In the same way that Minnesota developers shared a number of barriers not addressed in the examined research papers, these developers cited some unique resources and experiences that have contributed to their efforts to create more sustainable affordable housing.

In terms of available resources, Minnesota developers have benefited from the involvement of local experts. Three specific examples were offered: energy consultants, the Enterprise Architectural Rose Fellowship, and the University of Minnesota's Center for Sustainable Building Research. In addition, many Minnesota developers spoke very positively of integrated design teams and design charrettes.

Synthesis of Recommendations

In addition to recognizing barriers and successes, previous researchers and Minnesota developers provide specific recommendations for how to improve the process of incorporating sustainable design practices into the creation of affordable housing. This section brings together the recommendations provided by both groups, beginning with a summary list of topics.

1. Awareness and education
2. Building occupants
3. Research
4. Replicating success
5. Collaboration
6. Funder opportunities

Awareness and Education

Education and awareness are key. Previous researchers and Minnesota developers stressed the value of increased awareness and education. With greater understanding it is possible to overcome many of the existing barriers to sustainable design. These barriers

are frequently based on misconceptions and false presumptions. In addition, it is expected that greater awareness of sustainability will inspire increased consumer demand, which in turn will lead to an increase in sustainable housing options.

Building Occupants

Previous researchers and Minnesota developers each spoke about the importance of reaching building occupants. Williams and Dair's research in England addressed the importance of increasing demand among future building occupants as a way of making sustainable materials and technologies more mainstream. Minnesota developers spoke about resident education as an important tool for ensuring that sustainable design features perform as intended.

Research

The previous research reviewed and Minnesota developers interviewed each emphasized the importance of supporting and disseminating research investigations. Clear data is needed to document actual costs, as well as returns on investment. Clear quantitative research will allow decision makers to confidently incorporate appropriate sustainable design practices in affordable housing developments.

Replicating Success

A clear recommendation from previously published research is to replicate past success. This includes supporting competitions and demonstration projects in order to develop sustainable housing precedents.

Collaboration

Collaboration was encouraged by previous research and Minnesota developers. Researchers Salama and Alshuwaikhat in particular outlined ideas to promote more cross-disciplinary cooperation throughout the design process. Several Minnesota developers advocated for policy changes to allow greater collaboration, including the involvement of general contractors during design.

Funder Opportunities

Minnesota developer interviews and previous research both recommend changes to the funding process for affordable housing. Research from Scotland in particular emphasized the need for funders to consider lifecycle, environmental, and social costs. Minnesota developers recommended that funders receive greater education regarding sustainable design. In addition, they desire a funding process that actually rewards projects for incorporating innovation and sustainable design practices.

Minnesota developers also recommend that significant changes be made to the funding process. To promote the inclusion of sustainability within the design process, funding must be available to support design. In addition, developers should be allowed, and in fact encouraged, to select high quality general contractors and these contractors should be made a part of each project's design team throughout the design process. The most prominent recommendation, which was expressed repeatedly by Minnesota developers, is that the funding process must be streamlined to be more efficient and shorter.

Concluding Recommendations

Sustainable design benefits people and the environment, while also being fiscally responsible. To successfully increase the incorporation of sustainable design into the process of developing affordable multifamily housing in Minnesota five actions are recommended.

These specific recommendations for action are based on the findings of internationally published research on this topic; as well as, research gathered through interviews with local professionals.

- 1) Increase funding
- 2) Expand education
- 3) Support research
- 4) Promote collaboration
- 5) Change the funding process

Increase Funding

Funding for affordable housing is a scarce resource. As a result significant effort is spent assembling sufficient funds for each project constructed. The associated delay has a negative impact on project designs and budgets. Dedicating more financial capital to the creation of affordable housing would substantially improve this process, resulting in an increased quantity and quality of housing. In addition to a general increase in funding, two specific areas recommended for targeted funding are design, particularly during the earliest phases of the design process, and demonstration projects.

For maximum impact, the very best time to explore and incorporate sustainable design opportunities is very early in the design process when topics such as solar orientation, massing, and site placement are being determined. Currently such opportunities are dramatically limited due to a lack of available predevelopment funding.

Funding for demonstration projects is recommended as a means of increasing sustainability. Demonstration projects support the incorporation of innovative design technologies and practices. These projects serve as precedents to improve the sustainability of future projects.

Expand Education

One of the very best ways to increase sustainable design in affordable housing is through education. Greater awareness at all levels will increase both the opportunities for and impact of sustainable design practices.

Through education, the general public will come to better understand the financial and health benefits of sustainable housing. This increased understanding will lead to greater market demand for sustainable options. Engaged building occupants are also more likely to behave more sustainably by, for example, using operable windows, conserving water, and recycling waste. Examples of this type of education locally include the Eco Experience Building at the Minnesota State Fair and the annual Living Green Expo.

Education for professionals in design and construction will help to replace the “business as usual” approach with proactive and innovation design options. This is especially important for professionals outside of Minnesota’s core cities where sustainable resources tend to be less readily available. One positive effort in this direction is the American Institute of Architect’s new requirement, as of 2009, that at least four of the 18 hours of mandatory continuing education each year must be earned in the area of sustainable design.

Education in sustainability for affordable housing funders is imperative so that project selection criteria and policies in the future may support, rather than hinder, the incorporation of sustainable design practices.

Support Research

High quality research is needed to inform decision makers at all levels. Clear quantitative research will allow designers and developers to accurately compare options in order to determine the most appropriate designs, systems, and materials for each project. Clearly documented quality research is also critical to understanding and planning for the long term benefits and needs of materials and systems selected.

Promote Collaboration

To create high quality sustainable projects it is very important to support collaboration. Sustainable design benefits from an integrated design process. Collaboration that includes neighborhoods and communities has been shown to improve project acceptance. Collaboration across disciplines including design, construction, and building management promotes decisions that are cost effective, constructible and appropriate long term. Procurement policies that do not allow for full collaboration significantly limit opportunities for innovation and cost savings.

Change the Funding Process

Funding for affordable housing in Minnesota is absolutely critical for the creation of much needed homes throughout the state. Modifications to the current funding process may provide the greatest opportunity for increasing the development of sustainable affordable housing in Minnesota. Recommended changes include supporting greater collaboration, increasing design opportunities, considering lifecycle costs and benefits, and streamlining the funding process.

First, current funding policies should be reviewed and amended as necessary to promote, rather than discourage, collaboration. Encouraging general contractors to be engaged in the design process is one example of improved collaboration. An efficient way to ensure fair competition and pricing, without excluding general contractors from the integrative design process, is to have a competitive bidding process for subcontractors, rather than general contractors.

Design fees should also be reconsidered. Funder published design fees have kept local affordable housing design fees artificially low compared to other project types and markets. In addition predesign work is not supported through current funding models. To create more sustainable affordable housing, sufficient design funding must be accessible to support design innovation and exploration.

Funding models should be constructed to consider first cost, as well as lifecycle costs. To be sustainable design and construction must balance present and future needs. This includes calculating not only first costs, but also the maintenance and future replacement costs associated with all design decisions. Funding models that consider only first cost do so at the expense of more sustainable options.

The single change to the current affordable housing funding process that would most dramatically impact the creation of sustainable housing in Minnesota is the development of a more streamline process. Today developers are so focused on assembling funding that opportunities to cultivate quality and sustainability are inevitably lost. A more

consistent, predictable, shorter funding process would allow developers and designers to focus more of their talents and resources on creating better, more sustainable, cost effective developments.

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