



SATISFACTION WITH CERTIFIED GREEN BUILDINGS— AN INQUIRY OF BUILDING OCCUPANTS IN MINNESOTA

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Introduction

A primary purpose of green building certification programs is to assist in the process of creating “green” buildings and to evaluate the level of their “greenness” compared to regular buildings. Today over 85 green building programs have been formed at national, regional, and local levels. Some of the most widely recognized national certification systems in the United States are the U.S. Green Building Council’s (USGBC) Leadership in Energy and Environmental Design (LEED) system, the EnergyStar program, and the National Association for Homebuilders (NAHB) National Green Building Standard. The Minnesota GreenStar Remodeling and New Homes program and the Green Communities program with Minnesota Overlay are examples of green building standards specifically designed for green building in Minnesota.

Most green building programs aim to address issues related to energy efficiency, indoor air quality, site development, water consumption, waste management and responsible material use, and generally follow a structure of meeting required credits and achieving a specified number of additional credits or points. But what happens to the buildings once the final inspection for certification is completed? Do the buildings remain “green” once they have been occupied? How do occupants feel about items that were installed in order to meet green building standards requirements? Will the certified buildings change over time due to actions of building occupants, and if so, are modified buildings likely to still be considered “green”? To gain an initial indication of the answers to these questions, a questionnaire was developed for use with owners, occupants, managers, and builders of certified green buildings in Minnesota.

Background

A green building questionnaire was created to help gain an understanding of whether certified green building projects retain their green attributes post-occupancy. The set of questions aimed to gather information about the long-term satisfaction of green building practices by identifying which green building methods and materials are well accepted and which are being discontinued, modified, removed, or replaced after construction is completed. This project aimed to answer the following questions:

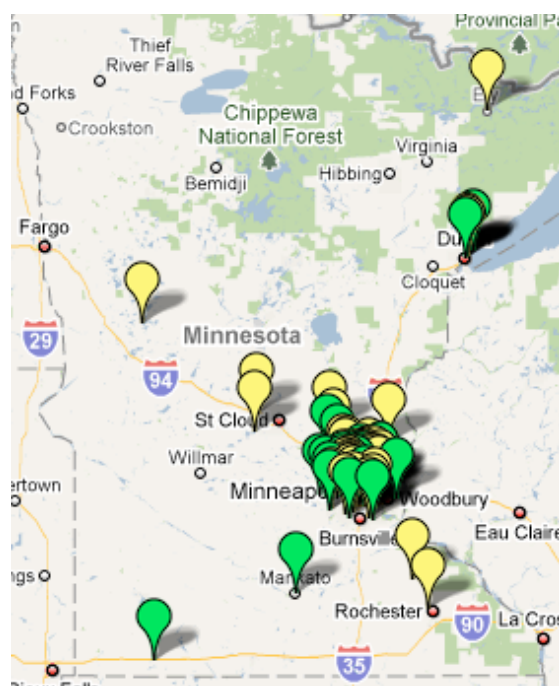
- What changes were made after the green building certification?
- What changes were made after the home or building was fully occupied?
- What do occupants think of the green features?
- Are the green features performing properly and if not, what are the items that are being changed, removed, or otherwise modified?
- What impact does the occupant have in maintaining the green integrity of a certified green building?

Methodology

The first step was to develop a database of green building projects in Minnesota.¹ The database range included only Minnesota projects in order to limit the number of responses and to focus on locally available resources. The database was constructed by researching green building programs commonly used in Minnesota and included the most currently available lists as of October 2008 of all LEED registered and certified buildings, Minnesota GreenStar Remodeling and New Home projects, and Minnesota Green Communities completed projects. No information was available on projects certified to NAHB's National Green Building Standard in Minnesota. At the time, a list of EnergyStar home certified buildings was also not available beyond a list of builders participating in the program. Information in the compiled green building project database includes contact information, project address, green building program, certification level, construction completion date, move-in date, building type, square footage, and available website information. Initially the database identified a total of 50² certified building projects³ in Minnesota, but upon inspection it was discovered that this number included uncompleted projects and projects that were that were registered but had not yet achieved certification at the time of the survey.

A total of twenty-eight certified projects were selected from the compiled database to partake in the inquiry, including projects certified to LEED for Homes, LEED New Construction, Minnesota GreenStar—Remodeling and New construction, and Minnesota Green Communities standards. Projects were selected based on the total number of projects certified per program (i.e. more LEED projects were examined since there were more LEED certified projects), length of time occupied, and available contact information. The range of different green building programs provided access to residential (single-family and multi-family) and commercial markets. Given the relatively small number of projects certified, registered, and occupied within Minnesota at the time, the distribution of the survey instrument was by definition quite limited.

Map of Minnesota Green Building Projects
www.dovetailinc.org



¹ A map of Minnesota green building projects is available here: <http://www.dovetailinc.org/content/minnesota-green-building-projects>

² This number did not include the over 4,000 EnergyStar certified projects at the time because no contact information was available for specific projects.

³ Multi-family projects were counted as one project instead of individual units

A questionnaire was then developed to measure the satisfaction with specific green building methods and materials in the project and to identify which might have been discontinued, modified, removed, or replaced by building occupants (See *Appendix B*). Green building attributes included in the questionnaire were based on anecdotal discussions and evidence within the green building and affordable housing industry and were chosen based on the ability and likelihood of the building occupant to make changes after moving in.

The questionnaire was initially developed as a phone inquiry, but was also used as an email survey if no other contact information was available or when several unsuccessful attempts were made to contact a builder/owner/occupant via telephone. Questions were directed to individuals occupying the space and/or familiar with the projects. The phone and email surveys began on October 28th, 2008 and were completed on November 20th, 2008. Each person was contacted three times via telephone or email, and if there was no response the project was not included in the survey.

Results

The survey included responses from nine green building projects (See *Appendix A*), with a response rate of 32%. Although the survey did not obtain responses from a high number of projects, useful results were obtained. One response was not included as part of the nine responses as the project had not achieved full green building certification.

Type of Communication	Number in Sample	Number of Responses
Phone Call	13	7
E-mail	15	2

Respondents participating in the survey included sales assistants, project managers, custodians/facilities managers, tour guides, homeowners, and builders. Each respondent was knowledgeable about the specific building involved, which for many was their first green building experience. For others, familiarity with green building already existed. One respondent had been building green homes since 1997, and one respondent was beginning their second green building project. Every respondent was familiar with the LEED certification system and half were familiar with the Minnesota GreenStar standard. Only one respondent was familiar with Minnesota Green Communities, and only one was familiar with EnergyStar⁴.

The survey pool contained a wide variety of different buildings, including homes (2), an elementary school, office buildings (3), a clinic, a distribution center, and a food/grocery co-op. Square footages of the buildings varied greatly, from a 1,466 sq.ft. home to a commercial building of approximately 300,000 sq.ft. Most buildings were built within the last few years. Occupancy move-in dates for newly constructed structures varied from 2003 to 2008. One project included in the survey was built in 1953 and then was recently renovated.

⁴ No buildings certified only to EnergyStar were included in the inquiry because specific contact information per project was unavailable. While some green building programs require or can be supported by including an EnergyStar certification, at the time of the survey the EnergyStar program would have included only single-family homes.

In general, the respondents were very enthusiastic about green building and were eager to share their experiences for the purpose of this survey. None of the respondents had an entirely negative opinion about green building, although some green features were much more popular than others. For example, nearly every project in the survey used low-VOC paints and/or adhesives, programmable thermostats, and compact fluorescent lightbulbs (CFLs). Dehumidifiers, rain barrels, and instantaneous water heaters were used more rarely in the projects represented in the survey. Some respondents stated that certain green features, such as rain barrels, were too expensive⁵ and thus were not included. Many times respondents said that more education would have greatly helped them in their project development.

Respondents were asked to rate their experience and satisfaction with specific features and materials on a scale of 1 to 5, with 1 as “highly dissatisfied” and 5 as “highly satisfied”.

Dual-flush toilets

Dual flush/low-flow toilets and/or waterless urinals are included in green building programs as a way to maximize water efficiency. In the Minnesota GreenStar Remodeling⁶ program, installing a very low-flow, dual-flush toilet of 0.8/1.6 gallons per flush (gpf) is worth 3 points. LEED v3 requires toilets of 1.6 gpf as a baseline in commercial buildings from which to calculate an overall required 20% water use reduction. Minnesota Green Communities requires toilets to be 1.3 gpf or less.

Dual flush/low-flow toilets and/or waterless urinals were included in eight of the nine projects. The project that did not include at least one of these features was a single-family home. In the projects in which they were included, dual-flush toilets had an average score of 4.7 (all scores are out of 5), low-flow toilets had an average score of 4.4, and waterless urinals (which were only included in one project) scored a 5. With one exception, there were no problems reported with the toilets or urinals. One respondent stated that the low-flow toilets clog up a lot, but had not replaced them. No respondent had made changes to or replaced equipment that was installed at the time of construction.

Dimmer switches and CFLs

Installing dimmer switches and using compact fluorescent light bulbs (CFLs) aids in reducing electricity consumption, and these features are frequently included in green building programs. The Minnesota GreenStar Remodeling program gives 6 points for using CFLs in 90% of the total project, and also rewards installation of dimmer switches and automatic timers on light fixtures. LEED-Homes requires the installation of four EnergyStar labeled light fixtures or CFLs in high-use spaces, and gives extra points for going beyond and installing hard-wired EnergyStar fixtures as part of the EnergyStar lighting package. Minnesota Green Communities requires hard-wired EnergyStar labeled CFL fixtures at a minimum (but will allow installing CFL bulbs only if reusing existing fixtures).

⁵ Rain barrel cost can range from \$80-\$250 at common hardware stores.

⁶ Version 2.0

Dimmer switches and CFLs were used in eight of the nine projects. Five projects included both dimmer switches and CFLs, two projects included just CFLs, and one project included just dimmer switches. In some projects, CFLs and dimmer switches were used together, and other projects included T8 light bulbs⁷ in the dimmer switches. Dimmer switches had an average score of 4.5 and the CFLs had an average score of 4.4. One respondent reported with the dimmer switches was that the switches were “a bit touchy and are hard to get used to.” However, once the respondent learned how to use the switches properly, they became well liked. No other problems were reported and no changes were made to any of these products.

Exhaust fans

Exhaust fans are installed in bathrooms and kitchens to decrease the chance for mold growth and to improve indoor air quality. Exhaust fans can be turned on using a switch when needed, with a switch connected to a light, or by using programmable timers. Many green building programs, including LEED, incorporate exhaust fans. Sometimes the noise of an exhaust fan may cause occupants to disconnect the exhaust completely or discontinue use, so some green building programs include low-sone (ie, very quiet) exhaust fans as part of their standard. The Minnesota GreenStar Remodeling standard requires that all bathrooms and kitchens have exhaust systems, and gives 2 points per room for installing an EnergyStar ≤ 1 sone, proper CFM⁸, and smooth rigid duct exhaust fan. Minnesota Green Communities requires “low-sone Energy Star-labeled bathroom fans that exhaust to the outdoors and are equipped with a humidistat sensor or timer, or operate while light is turned on, or operate continuously.”

Exhaust fans were used in five projects and two of those projects used them in conjunction with programmable timers. Several respondents were unsure if timers were used in conjunction with exhaust fans. Some fans were activated when the lights were on or used as necessary with a separate switch. Exhaust fans had an average score of 4.6. Although this had been predicted to be a major area for potential changes when developing this survey, there were no problems or changes reported in this area of the projects.

Low-VOC products

VOCs (Volatile Organic Compounds) are organic chemical compounds that off-gas from products into the atmosphere, potentially harming indoor air quality. Incorporating low-VOC paints and adhesives into a project minimizes the amount of chemicals introduced into a building. LEED v3 and LEED-H give points for meeting certain thresholds of VOCs in paints, sealants, and adhesives. In addition to points for using low and no-VOC products, the Minnesota GreenStar Remodeling program requires that projects be aired out for 48 hours before occupancy to ensure that initially high releases of VOCs from products which contain them have dissipated. In Minnesota Green Communities, using low or no VOC adhesives, paints, sealants, and primers is mandatory. There has been some concern that contractors would not choose low-VOC products without a green building program because of the belief that those products do not perform as well or are more expensive than traditional products. Today it is relatively common to

⁷ T8 light bulbs are designed to save more energy than the typical, T12, fluorescent light bulbs and are distinguished by the smaller 1 inch diameter.

⁸ Cubic Feet per Minute

find low or no-VOC paints or adhesives in hardware stores, but that does not ensure that future occupants will understand to incorporate them into renovations or small repair projects.

Low-VOC paints and adhesives were used in eight of the nine projects. They were not used in the elementary school because of a non-compliance with a certain district policy. On average, low-VOC paints were given a score of 3.8 by respondents. There was one complaint that the paint chipped and was not durable. Most respondents said that the Low-VOC paint was similar to any other paints. Some people also used low-VOC furniture, sealants, and/or carpet in their projects. No changes were reported with these products.

Rain barrels

Water use reduction is an important aspect to many green building programs, and one way to reduce water is to use a rain barrel to collect rainwater for non-potable uses, such as watering the landscaping vegetation. LEED does not give specific credit for using rain barrels, but gives points based on overall water use reduction, which a rain barrel can help to achieve. Minnesota GreenStar remodeling requires preparing a Water Management Plan, which can include rain barrels. Minnesota Green Communities gives 5 points for capturing, retaining, and/or harvesting the first 1-inch of rainfall over the period of 24 hours and suggests using rain barrels as one option to help meet this credit. Rain barrels do require some maintenance and cleaning, and need to be weatherized in the winter, which is why they were included in this study.

Rain Barrels were used in two of the responding projects. Two other projects included different measures for conserving rainwater. One respondent indicated that the addition of rain barrels was planned for the future. Those using rain barrels were very satisfied, giving them an overall score of 5 and indicating they would use them again. Some respondents said that rain barrels were not included in their projects because they were too expensive.

Dehumidifiers

Dehumidifiers may be installed in projects where moisture or mold might potentially become an issue, such as projects in humid climates or homes with a basement. Other times they are installed to regulate humidity in buildings that do not use air conditioning units. It has been noted by some weatherization professionals that not all occupants understand or properly use dehumidifiers and some eventually shut them off, which can lead to mold. Minnesota Green Communities, LEED-Homes, and EnergyStar homes all have a mandatory requirement to complete the ACCA⁹ Manual J, which should ensure proper HVAC sizing and humidity levels and may therefore result in the inclusion of a dehumidification system. Minnesota GreenStar gives 5 points for installing systems that meet the Manual J. LEED-Homes gives an extra 1 point for installing a dehumidification system that helps maintain relative humidity at or below 60%. The Minnesota GreenStar Remodeling program gives points for monitoring humidity levels for two weeks prior to construction and for one year after occupancy, and for replacing an old humidifier with an EnergyStar labeled dehumidifier with a humidity sensor.

⁹ Air Conditioning Contractors of America, <http://www.acca.org/>

Dehumidifiers were not known to be used in any projects; several respondents stated that they were probably installed but were unsure. Some said that there was no need to include dehumidifiers because regular air quality checks were done, while others gave no reason for not including them.

Tankless water heaters

Instantaneous water heaters, also known as tankless or on-demand water heaters, offer an option to reduce energy consumption by heating water only as it is needed rather than heating it continuously like a standard tank water heater. Instantaneous water heaters are useful in small spaces and are commonly used in Europe and Asia. The Minnesota GreenStar Remodeling program gives 5 points for installing a gas tankless water heater and LEED-Homes gives 2 points for installing a tankless water heater with an efficiency factor greater than 0.8. Minnesota Green Communities offers tankless water heaters as an option to fulfill the “Water Heaters: Mold Prevention” prerequisite. Instantaneous water heaters require annual maintenance and cleaning in order to maximize performance.

An instantaneous water heater was used in one project, in which it scored a satisfaction score of 5. Some respondents were not sure whether or not these water heaters were used in their projects. There were no changes or problems reported on the instantaneous water heater that was installed.

EnergyStar appliances

EnergyStar appliances can contribute to reducing the overall energy and water consumed in a building, and their use is often specified in green building standards. The Minnesota GreenStar program and Minnesota Green Communities require EnergyStar appliances when appliances are installed. LEED-Homes requires at least 5 EnergyStar rated items (via meeting the EnergyStar Home requirements). EnergyStar rated appliances may also be included as part of meeting LEED v3 energy requirements and credits.

EnergyStar appliances were used in eight of the nine projects. The school project did not include them in order to comply with the district standard. Respondents gave EnergyStar appliances an average score of 4.3 and comments were mostly positive. One item, a dishwasher, was given a satisfaction score of 2 by a respondent. Although the respondent indicated a desire to change the dishwasher, no changes had been made at the time of the survey. According to most respondents, EnergyStar appliances will continue to be used in future green projects by this group.

Programmable thermostats

Installing programmable thermostats can help to reduce energy use, especially if the occupant uses them properly. LEED-Homes requires that all HVAC systems be connected to a programmable thermostat (besides heat pumps and hydronic systems). The Minnesota GreenStar program requires that all cooling and heating equipment be connected to a programmable thermostat, and that it must be programmed. Programmable thermostats may be incorporated into a building design in order to help meet the energy requirements for many programs in LEED v3.

Programmable thermostats were used in eight of the nine projects. They were given an average satisfaction score of 4.3. A number of thermostat types were used, ranging from typical programmable thermostats to complex computer systems with sensors. Respondent comments were overall positive with these systems. One comment noted that while there were complaints from some tenants, it was likely due to personal preference in temperature rather than the fault of the thermostat itself. No changes or other problems were reported.

FSC-certified products

Some green building programs include credits for incorporating materials that are FSC¹⁰ certified, which means the products are made from wood that is harvested from responsibly-managed forests and tracked from the forest to the supplier. LEED v3 gives 1 point if 50% (based on cost) of permanent wood products are FSC-certified. The Minnesota GreenStar Remodeling program and LEED-Homes give points for each product type (such as doors or flooring) that is FSC-certified, and the Minnesota GreenStar program requires that all wood not from the U.S. or Canada be FSC-certified. The Minnesota Green Communities criteria gives an optional 5 points if 25% of the wood (based on cost) in a project is FSC-certified.

FSC certified wood was used in four of the nine projects. Several other respondents were uncertain if FSC certified wood was included in their projects. For projects which contained FSC materials, responses yielded an average score of 5. Comments were overall positive regarding the use of FSC certified wood. One respondent commented that while they believe in responsible forestry, they did not believe in chain of custody and that FSC was too controlling of people's business. For some respondents, using FSC certified wood made them "feel good". According to responses, there would likely be a continued use of FSC for those that did have it present in their projects.

Local materials

Using local materials can reduce the environmental impact of a project by decreasing the distance of transporting materials. Minnesota GreenStar Remodeling, Minnesota Green Communities, LEED-Homes and LEED v3 define a local material as one that is harvested, manufactured, salvaged/recovered *and* processed within 500 miles, and all give points for including the local sourcing of materials.

Local materials were used in six of the nine projects. Respondents gave locally sourced materials an average score of 4.8. Some comments expressed surprise at the ease of building with local materials. Continued use is likely according to responses. No changes were reported in regard to local materials.

Homeowner/occupant manuals

Providing education to homeowners, building occupants, building managers, and employees is a key element to ensuring the best performance from green building features. Along with an orientation, a manual can act as a reference for future questions or changes in occupants. LEED-

¹⁰ Forest Stewardship Council www.fscus.org

Homes, Minnesota GreenStar Remodeling, and Minnesota Green Communities require that a homeowner/occupant manual be made available.

Homeowners/employees manuals were available at every project in some form or were under development. Many places had a pamphlet available to both the staff and the public. Other places trained the staff on how to use the green features to their fullest potential. One person, who acted as both the builder and the homeowner, commented that the manual was not necessary, while respondents of other projects expressed that the education was very useful.

Additional green building features

Many respondents commented on additional green building features that were not included in the questionnaire. The use of natural light elicited a strong positive reaction from employees where it was incorporated, while highly-reflective white PVC roofs had mixed reviews from the three projects where they were incorporated. In one project the respondent had a very positive experience, in one project the roof membrane leaked in the first Spring, and in another the respondent stated that it worked great in the summer but cost the company more money in the winter. As a result, the latter respondent would not include this feature in his next project. A few projects also included special carpool/hybrid car parking, which received positive responses. Other projects included a number of recycled materials, which appeared to be well accepted.

Many respondents remarked that problems could have been avoided with more education and accurate information on the part of the builder or product manufacturer. For example, a specialty floor was included in one project which was supposed to allow normal cleaning. It was later discovered that the floor required special cleaning services, which caused the respondent's company to invest additional time and money trying to find a company that could clean the floor. In the school project flooring was also an issue. The building manager for this project remarked that the flooring absorbed a lot of noise (a desired benefit) but after a short time, it peeled off of the sub-floor. This may have been partially due to cement not completely drying at the time of installation. Both respondents reporting flooring problems said that education for the builder and themselves would likely have prevented the problems.

Conclusion

Valuable information was obtained from the respondents that participated in the survey. The overall response to the green features was positive, with a few exceptions that may have been prevented with better education, more information, and proper installation. Surprisingly, none of the features examined through the questionnaire had been discontinued, modified, removed, or replaced by the building occupants.

Several areas were identified where occupants would like to see improvements in green building features. Some examples include an energy-efficient appliance not performing to expectations, a low-flow toilet clogging, a white PVC roof costing more than expected during the winter, and low-VOC paint chipping. These problems may be due to improper installation and/or faulty products. Education of the contractors or producers of specialized green products in product maintenance and installation may have helped ensure proper functionality in some cases. Others, such as the white roof, may need to be evaluated for performance in a Minnesota climate.

It appears that the novelty of a green product may help in its overall likeability. For example, respondents noted that there was no smell from low-VOC products, meaning the paint functioned properly and created spaces that contained less chemicals than when using non-low-VOC products. Despite the fact that low-VOC paints were well-liked when discussed in general conversation, they received medium scores (average 3.8) and were “not very exciting” and functioned “as well as regular paint.” Rain barrels on the other hand, which also performed their job according to responses, are a more visible and novel green building product. They scored a 5 on the satisfaction scale.

The questionnaire also provided insight to which materials are commonly incorporated into green building projects. Items that are not too different from the norm or do not require drastic behavior alterations, e.g., low-VOC paints or energy-efficient appliances, were incorporated into a high percentage of projects. Meanwhile rain barrels and tankless water heaters (which are not typical, require maintenance, and require behavioral change) were only incorporated into a handful of projects. Low-flow toilets were common but waterless urinals were not, which is likely due to the fact that policy only recently (May 2008) allowed the installation waterless urinals in Minnesota. Product cost was a deciding factor, especially in residential projects. Education on upfront costs versus the long term benefits may be helpful to instill confidence and acceptance of green products, especially those out of the norm.

The responses also revealed that while manuals were provided for most of the buildings included in the survey, the building occupants did not always know which features were included in the buildings, or did not understand how specific building components work together. While it is not necessary or realistic for every person to know all of the details of how their building operates, lack of information can lead to improper use and maintenance, especially as building owners, occupants, and employees change. Education of building occupants should include pointing out that manuals are located in an easily accessible area, and should extend to each new building occupant to ensure maximum advantage and longevity of the green building features.

The greatest missing piece seems to be better education to homeowners, contractors, manufacturers, and building occupants. Based on the responses, more education is necessary on the part of builders or producers of specialized green products regarding product operation and maintenance to ensure that building occupants are aware of features and operational requirements. Education for builders and contractors on proper installation of green products may also be helpful. Education to the homeowner and building occupant regarding the benefits of green building, e.g., the impact of VOCs to human health and the environment and how green building features work together, may help in the overall functionality and also lead to an increased appreciation of the building, extending its longevity. Overall the questionnaire has helped to identify opportunities to increase the longevity of green features in buildings.

Appendix A. Projects included in Survey

Project Name	Certification achieved	Interviewee Position in Company/Home-owner	Role in Building Project	Green Experience	Green Building Programs Familiarity	# Bed	# Bath	Total Square Footage	Date built	Date move-in	Addition or New Construction?
QBP Distribution Center	LEED-NC GOLD	Sales Assistant	n/a	Had never been in LEED-Gold building before working there, is now on Environmental Committee, considers himself an environmentalist	LEED, heard of GreenStar	n/a	n/a	~300,000	2005	2007	Addition to Existing Building
Polaris Industries Research and Development	LEED-NC Certified	Maintenance	n/a	This is his first experience with a green building	n/a	n/a	n/a	127,000		Mar-05	New construction
Wilder Center	LEED-NC GOLD registered	Project Manager	Project Manager	This is his only experience with green building	LEED, MN GreenStar	n/a	n/a	100,000	2006	Jan-08	New construction
Great River Energy	LEED-NC Platinum	Tour Guide	n/a	Her background is in Development and City Planning	LEED, EnergyStar	n/a	n/a	166,000	2006	Apr-08	New construction
Westwood Elementary School	LEED-NC Certified	Principal of School	On the Design and Building Teams	She has learned through developing this elementary school	LEED	n/a	n/a	70,000	2002-2003	2003	New construction
Home built by Kathy Timble Custom Homes	Registered with MN GreenStar	Homeowner	Project Manager, Architect, Builder, General Contractor, and Building Owner	Built personal residence as a pilot project for MN GreenStar	MN GreenStar	2	2	2,000	Spring 2008	15-Oct-08	New construction
House built by Biermann Contracting, Inc.	Registered with MN GreenStar	President/Owner of Homes by Biermann	Project Manager, Builder, General Contractor	He has been building energy efficient homes ever since they built the American Lung home in 1997	MN GreenStar, MN Green Communities	3	2	1,466	Spring 2008	1-Nov-08	New construction
Fairview Bass Lake Clinic	LEED-NC Certified	Facilities Manager	Owner Rep, Commissioning Officer in LEED process	He is currently helping with his 2nd LEED project, a clinic in Rosemont	LEED	n/a	n/a	6,085	2006	2006	New construction
Whole Foods Coop	LEED-NC Certified	Marketing & Member Services Manager	On the design team	This is her only experience	LEED, MN GreenStar	n/a	n/a	7,500	1953		Recycled building

Appendix B.

Questions for the Evaluation of the Longevity of Green Building Programs

SCRIPT:

Hello, My name is _____ and I am calling from Dovetail Partners, a non-profit organization in Minneapolis that is interested in evaluating green building practices. I am calling because you or your organization has been identified as being involved with green building projects in Minnesota.

(If they ask what the project is about, explain that we are interested in evaluating customer satisfaction and durability of practices implemented by green building programs, in hopes to better improve the programs for both builders and owners.)

I have about 10 questions to ask about the green building project(s) you have been involved with and this interview should take about 15 minutes of time. Do you have a few minutes to talk with me or would you like to schedule another time to talk?

CALL BACK DATE/TIME/NUMBER: _____

***Note:** If you get voicemail or have to leave a message, the script is:*

Hello, My name is _____ and I am calling from Dovetail Partners, a non-profit organization in Minneapolis that is interested in evaluating green building practices. I am calling because you or your organization has been identified as being involved with green building projects in Minnesota.

I have about 10 questions to ask about the green building project(s) you have been involved with and this interview should take about 15 minutes of time. Please call me back at your convenience and if you get my voicemail, please let me know a good time to contact you. Thanks and my number is 612-333-0430, again my name is: _____ and the number is 612-333-0430. Thank you.)

1. Please tell me a little bit about yourself:

My records show that you are _____(name) from _____(business/company/project name). Is that correct? What is your position there (if applicable)?

A. What is your:

Name:

Occupation/ Title:

Company/Organization:

2. Please describe your green building experiences:

A. What green building programs are you familiar with?

- ☐ LEED
- ☐ Minnesota GreenStar
- ☐ Green Globes
- ☐ Minnesota Green Communities
- ☐ Wisconsin Green Built Home
- ☐ Other

B. What role(s) have you had in a green building project?

- ☐ Project Manager
- ☐ Architect
- ☐ Builder
- ☐ General Contractor
- ☐ Sub-contractor
- ☐ Building Owner
- ☐ Building Manager
- ☐ Building Occupant
- ☐ Homeowner

3. Please provide some basic information about your project

A. Was the project a:

Commercial building?

Single-Family home?

Multi-family housing?

Other: _____

B. If the project was a home or housing:

Number of Bedrooms?

Number of Bathrooms?

Total square footage of each home?

Date built?

Date homeowner(s) moved in?

C. If the project was a commercial building:

What is the primary use:

offices education restaurant/bar medical other: _____

Total square feet:

Date built:

Date occupied:

D. Is the project a remodel or addition to an existing building?

4. Please describe the green features that were included in your green building project?

A. Was the project registered with a green building program?

If Yes, which program?

B. Was the project certified by a green building program?

If Yes, which program?

C. I am going to read from a list of green features. As I name the feature, please indicate “Yes” for any feature that was included in your project and “No” for any feature that your project didn’t include. For each included feature please indicate your level of satisfaction with the performance of the feature. Satisfaction is measured on a scale of 1 to 5 with 1 being highly dissatisfied and 5 being highly satisfied. There are some additional questions for specific features that I will also be asking.

Example: Did your project include the use of _____? If yes, how satisfied are you with its/their performance on a scale of 1 to 5 with 1 being “highly dissatisfied”.

Questions related to “Notes” and for features included in the project: Has this green feature met your expectations? Have you made any modifications to this green feature since installation (including repairs, replacements, removal, etc.)? Have you found it necessary to provide training or education on the use of this green feature? What has the maintenance for this feature been like?

			Satisfaction Low ----- High					
	Yes	No	1	2	3	4	5	Notes
Dual Flush Toilet(s)								
Low-Flow Toilet								
Waterless Urinal								
Dimmer Switches								
Compact Florescent Light bulbs (CFLs)								
Are you using CFLs in dimmer switches? If yes, have you encountered any problems or need to switch to standard bulbs?								
Exhaust Fans in bathrooms								
Exhaust Fans in kitchen								
Are you using exhaust fans on a programmable timer? How often are the fans used?								
Low-VOC paints and adhesives								

Dehumidifier								
Rain barrel(s)								
On-demand instantaneous water heater(s)								
Energy-star appliances								
Programmable Thermostat								
FSC-Certified Wood								
Locally harvested/locally manufactured materials								

5. Were there any other green features included in the project? (Describe and ask the same questions.)

6. Were you given a homeowner's manual, and was it helpful?

7. If you did it again, would you do it the same way using the same products? Will you continue to choose FSC-certified, recycled content, or low-VOC paints and adhesives if you alter the space at all?

8. Thank you for your timing in answering my questions. Do you have any other comments you would like to make regarding the green features that were included in your project? Any advice you would offer for others who are considering green options in their project? Do you have any questions for me?

Thanks again for your time and if you would like to receive information about the results of our research, please provide your email address:

Email Address to send results:

***END

Appendix C.**Questionnaire Results***Dual Flush and Low-Flush Toilets, Waterless Urinals*

Project Name	Dual Flush Toilet - satisfaction	Low-flow Toilet - satisfaction	Waterless Urinal - satisfaction	Comments
QBP Distribution Center	4	n/a	5	Waterless urinals work great!
Polaris Industries Research and Development	n/a	3	n/a	Low-flow toilets clog up a lot
Wilder Center	5	5	n/a	
Great River Energy	5	5	n/a	
Westwood Elementary School	n/a	5	n/a	They have automatic flush toilets
Home built by Kathy Timble Custom Homes	n/a	n/a	n/a	
House built by Biermann Contracting, Inc.	n/a	5	n/a	
Fairview Bass Lake Clinic	n/a	4	n/a	
Whole Foods Coop	n/a	4	n/a	Not sure about the dual flush toilets

Dimmer Switches and Compact Fluorescent Bulbs

Project Name	Dimmers or occupancy sensors - satisfaction	CFLs - satisfaction	Comments
QBP Distribution Center	4	4	CFLs have great light, doesn't know if they use them together. Dimmers only in certain areas
Polaris Industries Research and Development	5	5	CFLs not used in dimmer switches
Wilder Center	5	5	They have daylight harvesting in which they use Super T 8 light bulbs (?). A computer automatically dims the lights depending upon how much natural light is coming in the building.
Great River Energy	5	5	They use low mercury T-8 bulbs in the dimmer switches.
Westwood Elementary School	5	5	The dimmer switches were a process to get used to. They didn't suit the students and teachers right away, but now they really like them. They do use dimmer switches and CFLs together and do not have a problem
Home built by Kathy Timble Custom Homes	n/a	3	
House built by Biermann Contracting, Inc.	n/a	3	
Fairview Bass Lake Clinic	3	n/a	Dimmer switches are a little touchy, hard to get it just right
Whole Foods Coop	n/a	5	

Exhaust Fans

Project Name	Fans Bathroom - satisfaction	Fans Kitchen - satisfaction	Programmable timer? Yes/No	Comments
QBP Distribution Center	n/a	n/a	n/a	There are exhaust fans in the locker rooms, which work great. There's no range in the kitchen area
Polaris Industries Research and Development	5	5	Yes	The fan in the kitchen is on a programmable timer, but can also be used when needed. The time it is used varies
Wilder Center	n/a	n/a		He's actually not sure about the kitchen, but said there isn't any cooking going on in the kitchen.
Great River Energy	n/a	n/a		Not sure about the exhaust fans
Westwood Elementary School	not sure	5	maybe	She thinks that the kitchen exhaust fans run on a sensory system, but wasn't 100% sure.
Home built by Kathy Timble Custom Homes	4	3	Yes, in the kitchen only. Fans are used regularly	
House built by Biermann Contracting, Inc.	n/a	n/a	Never	source points for the air exchanger is the bathrooms and the air in the home is being exchanged every 4-6 hours
Fairview Bass Lake Clinic	5	5	The fans come on when the lights are on	
Whole Foods Coop	5	4	No timer	

Low VOC Paints & Adhesives

Project Name	Low VOC paints/adhesives - satisfaction	Comments	Additional - Low VOC? Yes/No
QBP Distribution Center	3	They are fine, nothing to write home about. No durability issues	n/a
Polaris Industries Research and Development	1	the paint chips and is very fragile	Yes, furniture
Wilder Center	5		n/a
Great River Energy	5	They also used low VOC sealants	Yes
Westwood Elementary School	n/a	It is a district policy to use epoxy paint because it has to be washable. This is why they did not use Low-VOC paints	Yes, carpet
Home built by Kathy Timble Custom Homes	4		n/a
House built by Biermann Contracting, Inc.	4		n/a
Fairview Bass Lake Clinic	3	Nothing special, no chipping	no
Whole Foods Coop	5		n/a

Dehumidifier

Project Name	Dehumidifier satisfaction	Comments
QBP Distribution Center		n/a
Polaris Industries Research and Development	n/a	
Wilder Center	n/a	
Great River Energy	n/a	Not sure about a dehumidifier
Westwood Elementary School	n/a	
Home built by Kathy Timble Custom Homes	n/a	
House built by Biermann Contracting, Inc.	n/a	
Fairview Bass Lake Clinic	n/a	
Whole Foods Coop	n/a	There is no need for one. They do check air quality regularly

Rain Barrels

Project Name	Rain Barrel - satisfaction	Comments
QBP Distribution Center	5	He was actually talking about rain gardens, which are different. 93% of their rainwater stays on the site
Polaris Industries Research and Development	n/a	
Wilder Center	n/a	They did not do rain barrels because it was too expensive.
Great River Energy	5	They use the rain water to flush the toilets and urinals.
Westwood Elementary School	n/a	
Home built by Kathy Timble Custom Homes	n/a	
House built by Biermann Contracting, Inc.	5	
Fairview Bass Lake Clinic	n/a	They used native plants in their design
Whole Foods Coop	n/a	It is on their long term list of things to do

On-demand Water Heaters

Project Name	On-demand water heater - satisfaction	Comments
QBP Distribution Center	n/a	n/a
Polaris Industries Research and Development	n/a	
Wilder Center	n/a	
Great River Energy	n/a	not sure
Westwood Elementary School	n/a	not sure
Home built by Kathy Timble Custom Homes	n/a	
House built by Biermann Contracting, Inc.	n/a	
Fairview Bass Lake Clinic	n/a	
Whole Foods Coop	5	Used in the classroom

Energy Star Appliances

Project Name	Energy Star Appliances - satisfaction	Comments
QBP Distribution Center	4	Not all are Energy-Star appliances but believe it's wrong to replace good appliances before their life span
Polaris Industries Research and Development	5	They use them wherever they can
Wilder Center	5	
Great River Energy	5	
Westwood Elementary School	n/a	Not completely sure about this because they used the kitchen appliances that were district standard
Home built by Kathy Timble Custom Homes	4	
House built by Biermann Contracting, Inc.	4	
Fairview Bass Lake Clinic	5	
Whole Foods Coop	5	Not satisfied with the dishwasher- gave that a 2. Everything else works great!

Programmable Thermostat

Project Name	Programmable Thermostat - satisfaction	Comments
QBP Distribution Center	4	They have a huge comprehensive heating/cooling system with sensors that modify heat in zones
Polaris Industries Research and Development	5	
Wilder Center	5	It's actually a computer system
Great River Energy	5	
Westwood Elementary School	3	You can't please everyone, so there will be complaints
Home built by Kathy Timble Custom Homes	4	
House built by Biermann Contracting, Inc.	4	
Fairview Bass Lake Clinic	4	
Whole Foods Coop	n/a	not sure

FSC-certified Wood Products

Project Name	FSC - satisfaction	Comments
QBP Distribution Center	5	Love it, the doors are not only beautiful but makes him feel good
Polaris Industries Research and Development	n/a	wasn't sure about this
Wilder Center	5	
Great River Energy	5	They used 88% FSC certified wood
Westwood Elementary School	n/a	
Home built by Kathy Timble Custom Homes	n/a	
House built by Biermann Contracting, Inc.	n/a	
Fairview Bass Lake Clinic	n/a	
Whole Foods Coop	5	They did not have the opportunity to use a lot

Locally-sourced Materials

Project Name	Local materials - satisfaction	Comments
QBP Distribution Center	4	Using local products are great!
Polaris Industries Research and Development	n/a	Thinks that they did used them, but not sure
Wilder Center	5	
Great River Energy	5	all from within 500 miles
Westwood Elementary School	5	
Home built by Kathy Timble Custom Homes	5	
House built by Biermann Contracting, Inc.	n/a	
Fairview Bass Lake Clinic	n/a	
Whole Foods Coop	5	

Homeowners Manual and Additional Comments

Project Name	Homeowners Manual or Employee Manual?	Additional Green Features or Comments
QBP Distribution Center	They now have modules, and the employees enjoy them	All bathroom materials are sourced through Kimberly Clark, who some employees raised concern over their environmental practices and they are now locked into - they are now researching ESC-free and Kleenex's Clear Cut Campaign. Project reused 85% of existing building that was demolished. There is a recycled-content wall partition that is not a sufficient sound buffer, pressed sunflower cupboards had to be replaced after rotting when water leaked on them for a period of time
Polaris Industries Research and Development	They are given a handbook as part of HR policy. Very helpful	They get natural light via skylights, which work great. The low-flow faucets work great, and the carpool parking is convenient. The White PVC roof works great as well. The natural runoff system is great, but it could create problems in the spring with ice--he said he wouldn't use it at a hospital or anything like that.
Wilder Center	Employee Handbook	They use the displacement ventilation system, which he is also very pleased with. They haven't had any problems since they moved in and are very happy with the building. He said that he would do it all over again the same way.
Great River Energy	There is a pamphlet that is available	She said that they have not had any negative problems, it's all just a learning process. They have had to modify some things, but it wasn't because of the green features, just because they didn't know about some of the problems that could arise. For instance, they had to modify the filtration system because they were using the rain water to flush the toilets and they were getting dirt in the water.
Westwood Elementary School	They did staff training and even trained some students to give tours	They have low-flow water everywhere, which teaches the students to conserve water at home. The playground was all recycled and their on site drainage system works great. (They use ponds) They used a stratica flooring that wasn't very durable, but it did absorb a lot of noise. (it peeled off the floor, but their cement didn't completely dry either). It has definitely saved a lot of energy and money.
Home built by Kathy Timble Custom Homes	Since she is the builder and the homeowner, a manual wasn't necessary	Very satisfied with closed cell foam (5) and the heat pump (5). She used an electric boiler to heat in floor heat in the lower level, but it is not an acceptable green product. It is wired to an off peak program. She also said that she is not committed to FSC certified lumber because it involves too much control over peoples business. She believes in responsible forestry buy not chain of custody.
House built by Biermann Contracting, Inc.	Yes, they developed one	He wishes there was a way to stream line the project approvals and reduce the amount of paperwork.
Fairview Bass Lake Clinic	He is in the process of making one	They used a high efficiency HVAC system, solar tubes to get daylight into inner rooms, recycled carpet, a white reflective roof, and they have preferred parking for carpools/hybrids. They are currently building another clinic on which they will not use the white reflective roof because it does no good in the winter time.
Whole Foods Coop	There is a pamphlet that is available. They also train their employees	They used a lot of recycled materials, like cabinets, in the project. They were surprised to realize how easy it was to use local materials (within 500 miles). However, the problems they have had with the store are mostly due to education. When they had their floor installed, they were told it could be cleaned just like any other floor. They later found out that it couldn't, and had to go through a long process of finding a cleaner that did it correctly. Also, they have a white reflective roof with an easily punctured membrane. It started to leak during the first spring. If they had been educated about these things. they could have been avoided

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