

INTRODUCTION

The State of Minnesota has set a long-term goal of reducing greenhouse gases by 80% over 2005 levels by the year 2050. A number of cities in Minnesota have adopted similar policies, such as the Mayors Climate Protection agreement and participation in the ICLEI Cities for Climate Protection Program. As life-cycle energy use attributable to buildings (including construction, energy use, and demolition) is almost 40% of total energy use in the United States, these standards will require that the state and local governments create a new paradigm in the way that they plan for growth. Relying on existing standards such as the State Energy Code, incentive-based utility efficiency programs, and state renewable energy portfolios is insufficient to create the necessary transformation in development and redevelopment practices.

Local governments have a clear and well-defined interest in the energy efficiency and renewable energy use of private sector buildings. The community's interest is defined in several ways:

- Achieving state and local climate protection goals
- Managing local infrastructure (electric and natural gas delivery systems) to allow for continued efficient growth
- Enhancing the economic sustainability of local businesses and residences by reducing their exposure to energy price volatility
- Improving local energy security

The good news is that creating a new paradigm in the way our communities grow does not require a different set of tools than local government already uses. Rather, the transformation comes from using existing tools in a new way. Performance standards, conditional use permits, rezoning procedures, and variances are common practices in most Minnesota communities to shape how development occurs. Development incentives such as tax increment financing (TIF), tax abatements, infrastructure cost sharing, and brownfield cleanup cost sharing similarly are already used to guide development markets and practices.

Linking these tools to energy efficiency makes particular sense, because energy efficiency investments virtually always pay for themselves in reduced energy and maintenance costs (usually several times over) during the lifetime of the building. Taking such steps is often called a “no-regrets” strategy; the policies that help meet climate change and infrastructural goals are also justified on an economic basis. The ‘no-regrets’ concept is that even if the strategy turns out to be ineffective at protecting climate, improving energy security, or managing infrastructure capacity, it still makes sense.

The following energy efficiency performance standard focuses on the no-regrets strategy of incorporating a high level of energy efficient design, technologies, and practices into new and significantly renovated buildings. The performance standard is required for some construction and advisory for others.

Incentive Example

The model ordinance includes an example, starting with Section V, of an energy efficiency density bonus for commercial, office, or mixed use buildings. The example is based upon the City of Minneapolis' FAR energy efficiency bonus for the core downtown zoning district. The FAR example uses an electric utility efficiency design program as a third-party certification process. The language used in the FAR bonus could be made mandatory for certain types of development projects, such as when the City is a financial partner in the project, or it could be incorporated into a PUD process where density is allowed to be increased over base zoning maximums in exchange for community benefits.

Relationship to the State Energy Code

Many, but not all, communities in Minnesota enforce the State Building and Energy code in their community. The State Energy Code provides a minimum threshold for energy efficiency that has been deemed to be applicable throughout the State for broad categories of buildings. The Code, however, is only a minimum standard and does not include a number of design elements, technologies and practices that have quite attractive economic paybacks and could substantially improve the sustainability of buildings. The State Code was set as a uniform minimum standard, and communities are not allowed to either lessen or increase the State standards.

Consequently the following energy efficiency performance standards are not a replacement for the State Energy Code, but an enhancement that is applicable only when the community is a financial or regulatory partner in the development process.

- I. Scope** - This article applies to all new building construction and major renovation projects in Model Community.
- II. Purpose** - The purpose of this ordinance is to meet the following objectives:
- A. Comprehensive Plan Goals** - To meet the goals of the Comprehensive Plan and preserve the health, safety and welfare of the Community's citizens and businesses. The energy efficiency standards specifically implement the following goals from the Comprehensive Plan:
- Goal** – Assist local businesses to lower financial and regulatory risks and improve their economic, community, and environmental sustainability.
 - Goal** – Work with the private sector to meet Model Community's greenhouse gas emission reduction goals.
 - Goal** – Encourage the use of local renewable energy resources, including appropriate applications for wind, solar, and biomass energy.
 - Goal** – Promote sustainable building design and management practices in residential, commercial, and industrial buildings to serve the needs of current and future generations.
- B. Energy Efficiency** - Encourage the use of energy efficient technologies and design in new and remodeled buildings in Model Community;
- C. Environmental Stewardship** - Encourage environmental stewardship through reduction in non-renewable fuel uses;
- D. Economic Development** - Encourage local investment in efficiency as a substitute for out-of-state resources.
- III. Energy Efficiency Performance Standards** - The Model Community Energy Efficiency Standards are hereby adopted by reference, and have the same force and effect as though fully set forth in the Model Community Code. The Performance Standards are the compilation of design and performance criteria developed by engineering and design professionals and adopted as standards by the Council.
- A. Design Standards** - The standards include specific design elements for new buildings and substantial renovations.

Applying Performance Standards

The model ordinance applies the performance standards to all buildings because (as defined below) some projects are required to use the standards while others are simply encouraged to use the standards. By applying the standards to all buildings (as requirements or suggestions) the community recognizes that buildings – public and private -- are community infrastructure. The community has a long-term interest in buildings that serve present and future owners well by limiting wasteful and inefficient use.

Comprehensive Plan Goals

In order to require the use of energy efficiency standards outside the context of (and more aggressive than) the State Energy Code communities must create a clear policy foundation in the Comprehensive Plan or other formally adopted policy document. Just as zoning districts must be consistent with the Comprehensive Plan land use map supported by the goals and policies of the Plan, energy efficiency performance standards should be linked explicitly to adopted policy. If the community does not have supporting policy, the community should either update the Comprehensive Plan or conduct another planning process (such as an energy plan or a sustainability plan) to provide a policy foundation.

Efficiency Performance Standards

Rather than create technical standards from scratch, communities should consider using one of the many existing energy efficiency and green building standards. For a description of standards used in Minnesota see the appendix. In addition, several Minnesota utility companies have created energy efficiency design programs with standards and designated measurement protocols.

- B. **Performance Criteria** - The standards include performance criteria for building systems.
- C. **Benchmarking** - The standards set protocols for benchmarking and evaluating means of meeting performance criteria.
- D. **Verification Required** - The standards identify approved verification methods during and after construction.

IV. Applicability of Energy Performance Standards - Model Community encourages all new building construction and major renovations to meet the Energy Efficiency Performance Standards.

- A. **Standards Required** - The following types of buildings and projects are required to meet the Energy Efficiency Performance Standards:
 - 1. Any building constructed with the financial assistance of Model Community including TIF, brownfield cleanup, and use of Model Community’s bonding authority.
 - 2. Residential, commercial, and institutional buildings that are part of a PUD.
 - 3. Rezoning that result in significantly increased loads on electric or gas infrastructure.
 - 4. New buildings or significant modifications of existing buildings requiring a conditional use permit that increase load or are located in an area in which electric or gas infrastructure has limited capacity to allow for future development.
- B. **Standards Encouraged** - For buildings not covered under subsections 1 – 4, Model Community encourages compliance with the standards, but does not require compliance. No penalty or violation shall be assessed for failing to comply with the Standards, nor shall any Model Community official deny a permit or petition on the basis of compliance with the Standards.

Applicability Considerations

The points of applicability described in this model ordinance provide examples for how the standards can be linked to existing regulatory processes. Some communities may have different programs or approval processes that could also provide points of influence. Some communities may wish to limit the applicability to cases when the community is a financial partner in the development (subsection 4.1.a) or when the project meets rezoning and is of a sufficient size to increase loads on local infrastructure.

Floor to Area (FAR) Premiums

As an example of how land use incentives can be used to encourage, Section V. describes a density bonus for energy efficiency in commercial and office buildings. This example is adapted from one of the first energy efficiency density bonuses in the nation, created for the City of Minneapolis.

V. Floor Area Ratio Premiums - The following floor area ratio (FAR) premiums shall be available as specified in Table XXX Maximum Floor Area Ration Premiums in all zoning districts where FARs are used to guide density, subject to the provisions of this article and provided all other requirements of this zoning ordinance are met:

- A. **High Performance Buildings Eligible for FAR Bonus** - High performance buildings, as defined below, are eligible for up to two (2) FAR bonus in some zoning districts.
 - 1. **Submission of a High Performance Building Plan** - The applicant shall submit a High Per-

formance Building plan that includes all information to demonstrate, to the satisfaction of Model Community review staff, a minimum of 35 percent increase in overall building energy efficiency as compared to the Minnesota Energy Code. The demonstration shall include all reports, modeling, and approval processes described in 3.c., d., and e. below. Full participation and compliance with the Energy Design Assistance program (or most recent Department of Commerce approved version) offered by Xcel Energy or similar Department of Commerce approved Conservation Improvement Program offered by any other energy provider shall be sufficient documentation provided the program uses the modeling and approval processes described in c., d., and e. below. Documentation of the 35 percent increase in overall building efficiency, third party verification or commissioning as described below, and Department of Commerce program approval are necessary to waive the requirements of 3.c., d., and e. The High Performance Building Plan shall also include specific provisions for mitigating non-compliance with the designated energy efficiency performance standard sufficient to generate an equivalent reduction of CO₂ and other pollutants, and other any other provisions necessary to demonstrate compliance with this section.

2. **Energy Efficiency Defined** - Energy efficiency is to be defined by the use of purchased (generated or refined at a separate site) or on-site-generated fuels consumed per square foot of occupied space. Calculations can take into account the use of the following:
 - a. on-site generated renewable energy, including photovoltaic, wind, or hydro generation of electricity; passive solar systems using solar heat or light; geothermal source; or other use of renewable fuels displacing the use of non-renewable fuels in the building's systems.
 - b. efficiency of all building mechanical systems that burn, convert, or transform the energy in natural gas, electricity, oil, coal, steam, or purchased heat or cold in any form.
 - c. Calculations shall not include manufacturing or mechanical processes for which the State of Minnesota has not set a minimum standard.
3. **Energy Efficiency Measured** - Energy efficiency shall be measured consistent with the following methodology:
 - a. Identify and describe energy using systems covered by the State Energy Code, including heating, cooling, fans and pumps, lighting, equipment plug loads, and domestic hot water.
 - b. Identify and describe the base operating assumptions for the project, including hours of use, temperature set-points, supply/exhaust/ventilation air flow, interior humidity deadband, cooling and heating distribution and equipment types, and all other base operating assumptions necessary to calculate energy use and energy savings consistent with DOE2.1E standards or

Utility Program as Energy Standard

As an alternative to using a third-party-created certification program such as LEED or Green Communities, several Minnesota utility companies have created energy efficiency design programs with standards and designated measurement protocols. The FAR bonus section is designed to be consistent with the protocols in the utility program, and to use utility approval as a third-party technical review.

- c. Identify and describe the energy-saving strategies to be incorporated in the design, the strategy-improved parameters exceeding the Minnesota Energy Code, and the location within the building where each strategy will be implemented.
 - d. Provide a report outlining energy savings model estimates for each energy-saving strategy as compared to the code compliant design for both energy consumption (Btus, kWhs, and electric demand in KW) and energy costs using current energy rates. Energy savings estimates are to be determined using the DOE2.1E annual hourly thermal and daylighting simulation model (or most recent substitute) utilizing a Minneapolis TMY2 weather file (or most recent substitute). A Code compliant model will be established set to the minimum standards identified in the current Minnesota State Energy Code. Isolated strategy savings will be estimated by simulating each strategy separately and then by subtracting the annual results from the code compliant model results.
 - e. Estimate the integrated energy savings impact of all strategies incorporated into the design by simulating all strategies in one model and comparing the results to the Code compliant model. The savings results of this model shall use at least 35% less energy to operate than the code compliant model.
4. **90% CD Plan** - Provide a set of plans to Model Community at 90% Construction Document (CD) completion for review of energy savings strategies identified. Model Community will issue a CD review report (within three weeks of receipt of the drawings) to identify if all strategies and related parameters have been adequately incorporated into the design documents.
 5. **Verification** - At the time of building occupancy Model Community will, by special inspector, as described in the Building Code, conduct an onsite verification that all designed energy savings strategies are installed and functioning as per design specification, and will issue a report of its findings. The applicant may, as an alternative to Model Community’s special inspector, submit a third party Commissioning report showing all energy systems and energy efficiency measures to be installed and functioning according to design specifications. The Commissioning process shall be consistent with ASHRAE Guideline 1-1996 (HVAC Commissioning) or the most recent version. Commissioning of non-HVAC systems shall use the process described in ASHRAE 1-1996, or subsequent ASHRAE variations for non-HVAC equipment.
 6. **Commissioning Failure** - Energy-saving strategies that do not perform to specification or are missing must be brought to design specification or installed within 90 days of Model Community’s verification report or submittal to Model Community of a third party Commissioning report by a licensed engineer (5. above).
- B. **Limitations on Premiums** - A zoning lot shall not qualify for more than two (2) energy efficiency premiums.

Table XX - Maximum Floor Area Ratio Premiums by Zoning District

Premium Type	DMU	TOD	HComm
Energy Efficiency @ 35%	1	1	1
Energy Efficiency @ 45%	2	2	2

Appendix

US Green Building Council LEED Standards - LEED is a third-party certification system that provides guidance about how to construct sustainable buildings and neighborhoods to builders, designers, developers, government officials, and others involved in designing and constructing the built environment. LEED is based on a point system in which a project must score a certain number of points to be eligible for certification and higher point scores receive a higher level of certification. LEED has four levels: certified, silver, gold and platinum.

What does this standard apply to?

Any public or privately owned building can be certified by the US Green Building Council according to their LEED standards. Different types of projects are rated under the following rating systems:

- **New Construction** – For new construction or major renovation of commercial and institutional buildings.
- **Existing Buildings** – Provides a benchmark for owners and operators to measure operations improvements and maintenance.
- **Commercial Interiors** – Provides a benchmark for tenant improvements.
- **Core and Shell** – Designed to be complementary to the Commercial Interiors rating system. Provides green criteria for developers, owners and tenants.
- **Schools** – Addresses the unique design requirements of K-12 schools.
- **Retail** – Addresses the specific needs of retail spaces.
- **Healthcare** – Promotes sustainable planning, design and construction for healthcare facilities.
- **Homes** – Promotes the design and construction of green homes.
- **Neighborhood Development** – Integrates the principles of smart growth, urbanism, and green building to provide guidance on neighborhood design.

How do you certify a project?

The construction team must register their project with the U.S. Green Building Council (USGBC) at the beginning of the design process and specify which rating system their project will be rated under. In addition to submitting drawings, photos, and other construction documents, the team must include a description of which LEED credits the team seeks and how they will achieve each credit. The USGBC will review the application and determine whether the credits should be approved or not. If credits are denied, the applicant may resubmit additional supporting materials for a second review of the application.

Cost and benefits of certification - The cost of certification varies depending on the size of the project and the type of certification, ranging from \$500 to \$20,000. Certification may be seen as an additional construction cost, but recent studies have demonstrated significant financial benefits of LEED certification. A study by the CoStar Group found that LEED buildings tend

to command higher rents, up to \$11.24 more per square foot over non-LEED buildings¹. When sold, LEED certified buildings command an average of \$171 more per square foot as compared to a non-LEED building². The CoStar Group's study compared more than 1,300 LEED and Energy Star certified buildings to non-certified buildings of similar size, type, location and age.

PDF powerpoint of CoStar study: <http://www.costar.com/partners/costar-green-study.pdf>

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Minnesota Green Communities - Minnesota Green Communities is a partnership between the Greater Minnesota Housing Fund, the Family Housing Fund, and Enterprise Community Partners. This partnership has supported the creation of affordable, energy-efficient housing that is healthy for people and the environment.

Enterprise Community Partners is a national nonprofit that provides loans, grants and information to help build affordable housing. As part of its Green Communities initiative, Enterprise has made a 5-year commitment to assist in the creation of more than 8,500 green homes nationwide for low income people and to make sustainable development the mainstream in the affordable housing industry. By 2009, Enterprise will have committed \$550 million in Green Grants, financing and equity investments.

Enterprise has developed a set of green building standards that projects must conform to in order to receive Green Communities funding. The Green Communities criteria are aligned with LEED standards, but uniquely focused on affordable housing. Minnesota Green Communities and Minnesota Housing have negotiated changes to the national criteria to make them appropriate for Minnesota. In order to qualify for funding from Enterprise or Minnesota Green Communities, a project must meet certain mandatory criteria and also receive 30-35 optional criteria points. Minimum Green Communities criteria that must be met for funding include:

¹CoStar Group. Available at: <http://www.costar.com/news/Article.aspx?id=D968F1E0DCF73712B03A099E0E99C679>

²Ibid

- Integrated Design
- Site, Location and Neighborhood Fabric
- Site Improvements
- Water Conservation
- Energy Efficiency
- Materials Beneficial to the Environment
- Healthy Living Environment
- Operations and Maintenance

While Enterprise's five year commitment is almost over, many affordable housing projects within Minnesota will continue to be built according to the Minnesota Green Communities building standards. Minnesota Housing, the state's affordable housing bank, has decided to require all new construction projects receiving financing from the bank to conform to the Minnesota Overlay to the national Green Communities building standards starting with their Fall 2007 funding round. The City of St. Paul has also decided to require all affordable housing projects that receive funding from the city to conform to the Minnesota Green Communities criteria, and the City of Minneapolis is considering the creation of a similar policy.

Enterprise is considering renewing their commitment to Green Communities after 2009 but has not finalized their plans.

What does this standard apply to?

The Minnesota Green Communities criteria provide guidance for the construction of affordable housing.

Why is this standard uniquely suited to affordable housing?

Energy efficiency is particularly important for affordable housing units. The cost of heating and cooling a home can account for a large budget portion for an individual or family with limited income. Reducing utility costs, as accomplished through the Green Communities criteria, dramatically improves the affordability of a house or apartment.

The Green Communities standard requires project to be located near mass transit services and within walkable neighborhoods, in addition to a number of other location requirements. Residents of affordable housing units are far more likely to be transit dependant than the general population – enabling low-income households to limit or eliminate dependence on automobiles can be a huge step to economic sustainability.

The standard includes indoor environmental quality standards. Affordable housing is frequently affordable due to location near polluting industry, busy highways, or other environmental risks. Affordable housing is also much more likely to use inexpensive and ultimately unhealthy building materials such as vinyl, formaldehyde-laced particle wood and other materials that create poor indoor

air quality. The Green Communities standards recognize that sustaining the health of people in low-income households is a critical component of community sustainability.

How are projects certified to ensure they meet Minnesota Green Communities standards?

The Minnesota Green Communities criteria require projects to meet specific Energy Star ratings or HERS (Home Energy Rating System) ratings, which are third party certified. Also, the architect on the project must certify that the project has been built to Green Communities criteria.

A copy of the National Green Communities Criteria can be requested at:

<http://www.greencommunitiesonline.org/tools/criteria/index.asp>

Minnesota's changes to the national criteria are available at:

<http://www.mngreencommunities.org/publications/download/MinnesotaOverlay2007-MF.pdf>

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Energy Star Buildings - Energy Star is the EPA's (Environmental Protection Agency) rating system for homes and buildings as well as home appliances and other products. Just like Energy Star rated appliances, buildings that have received the Energy Star rating have been tested and inspected to ensure that they meet high energy efficiency standards.

What does this standard apply to?

The EPA has Energy Star standards specific to new homes, commercial buildings and industrial facilities. Unlike LEED, Green Communities and the Minnesota Sustainable Building Guidelines, Energy Star standards apply primarily to energy efficiency and do not address other sustainability issues such as building materials, waste reduction, water conservation, and sustainable land development practices.

Home - Energy Star homes are 15% more energy efficient than homes built to the 2004 International Residential Code (a basic building code for one- and two-family dwellings). They are typically 20-30% more efficient than standard homes. Energy Star homes are inspected and tested by independent Home Energy Raters to ensure that they meet the EPA's guidelines. Energy star homes typically have the following features:

- An efficient building envelope that is properly sealed and that has effective levels of insulation.
- Efficient air distribution systems, with fully sealed and insulated air ducts.
- Efficient heating and cooling equipment.
- Energy Star light fixtures.
- Energy Star appliances.

Commercial and Industrial Buildings - The Energy Star rating system for commercial and industrial buildings is based on a point system with possible scores ranging from 1 to 100. Facilities that earn a score of 75 or higher can receive the Energy Star. These facilities typically use 35% less energy than similar buildings. Types of industrial facilities that can be certified include:

- wet corn mills
- portland cement plants
- auto manufacturers
- petroleum refineries

Types of commercial facilities that can be certified include: offices, bank branches, financial centers, retailers, courthouses, hospitals, hotels, K-12 schools, medical offices, supermarkets, dormitories, and warehouses.

How are projects certified to ensure they meet Energy Star standards?

Home - During the construction process, an Energy Star home energy rater helps the builder choose energy-efficient features. The rater might use computer software to model the amount of energy the building will use based on the construction plans or the rater may simply recommend construction techniques that have been tried and tested in the specific climate of the home. Once the home is constructed, the energy rater will conduct on-site inspections. In addition to visually inspecting the construction, the rater usually performs a blower door test to assess the leakiness of the home and a duct blaster test to assess the leakiness of the duct system.

Commercial and Industrial Buildings - Building owners who wish to certify their buildings must enter a variety of information about their building into an application form to determine whether their building will receive the required 75 points. A professional engineer must validate that the building information is correct, and then the application is mailed to Energy Star for review. If the building does not receive the 75 points initially, Energy Star has a set of guidelines that building owners can use to improve the efficiency of the buildings and industrial processes.

Costs and benefits of certification?

Energy Star rating brings a number of benefits. Most obvious is the financial savings due to the building's efficiency. In term of marketing, Energy Star homes and buildings can display the Energy Star label in a prominent location to indicate the owner's environmental values and the quality of the construction. Commercial and industrial buildings that have received the Energy Star rating are recognized publicly each year when the EPA publishes a list of all the buildings that have earned the Energy Star. With the rising cost of fuel, many buyers are looking for assurance that their new home or building will be energy efficient.

For more information on Energy Star ratings visit: <http://www.energystar.gov/>

Contact Information:

www.energystar.gov

Minnesota Sustainable Building Guidelines

The Minnesota Legislature required the Departments of Administration and Commerce, with the assistance of other agencies, to develop sustainable building design guidelines for all new state buildings by January 15, 2003. According to the legislation, the guidelines must:

- Exceed existing energy code by at least 30 percent
- Achieve lowest possible lifetime costs for new buildings
- Encourage continual energy conservation improvements in new buildings
- Ensure good indoor air quality
- Create and maintain a healthy environment
- Facilitate productivity improvements
- Specify ways to reduce material costs
- Consider the long-term operating costs of the building including the use of renewable energy sources and distributed electric energy generation that uses a renewable source of natural gas or a fuel that is as clean or cleaner than natural gas.”

Source: <http://www.msbg.umn.edu/overview.html>

The guidelines are organized around four major aspects of building design: 1) Performance Management; 2) Site and Water; 3) Indoor Environmental Quality; 4) Materials and Waste.

The guidelines do not address neighborhood design issues, unlike LEED ND and the Green Communities Criteria.

What does this standard apply to?

All buildings funding entirely or in part by state bond monies after January 15, 2004 must conform to the guidelines. In general, the guidelines are well suited to institutional buildings and were designed specifically for government buildings in Minnesota.

Why is this standard uniquely suited to government buildings?

One of the goals of the guidelines is to create buildings that have low long-term maintenance and operation costs. This is especially advantageous for government and institutional buildings which typically will be owned and operated by the same entity for a long period of time. Governments will have the opportunity to reap significant costs savings over the life of the building.

How can you certify a project?

Local governments and state agencies self-certify their projects. The guidelines include a system for documenting the design and construction process and the performance of the building once it is occupied to insure that buildings perform to a high standard. The government entity involved must archive this documentation and submit a copy of it to the Center for Sustainable Building Research at the University of Minnesota so that the Center can track the performance of buildings constructed according to the guidelines.

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Minnesota GreenStar

MN GreenStar is a non-profit organization that educates homeowners, builders and remodelers, and certifies green buildings and remodeling residential projects. MN GreenStar has developed its own green building standard for residential construction and remodeling and provides third-party certification for homes that are built according to their standard.

What does this standard apply to?

The GreenStar building standard was designed specifically for the Minnesotan climate and to conform to the Minnesota Building Code. Unlike the Minnesota Sustainable Building Guidelines, GreenStar is focused on residential construction and remodeling. The standard is a point system based around five categories: energy efficiency, resource efficiency, water conservation, indoor environmental quality, and site and community. In order to be certified, a project must meet minimum standards in each category. Projects can be certified at three different levels, bronze, silver or gold, depending on how many points are earned. GreenStar's standards for new residential construction are integrated with the Energy Star rating system and Energy Efficient Home federal tax credit.

How do you certify a project?

The MN GreenStar certification process begins with an eight-hour orientation training for homeowners, builders, and remodelers. After the training session, participants fill out an application for certification and proceed with the design process. The design process involves a creating a number of plans including a construction plan, a waste management plan, an erosion control plan, a landscape plan, and energy modeling. MN GreenStar reviews these plans and identifies necessary modifications. Once the plans have been approved, construction proceeds. During the construction process, GreenStar arranges for third-party inspectors to verify that construction conforms to the plans and GreenStar standards. After construction is completed, GreenStar reviews final project documentation and certifies the project at the appropriate level, either bronze, silver or gold.

Costs and benefits of certification:

A number of benefits are associated with MN GreenStar certified homes. MN GreenStar homes are eligible for energy efficient mortgages and federal energy efficient home tax credit. MN GreenStar certification can increase the value of a home for resale, and energy and resource efficient design results in lower cost of living for MN GreenStar homes. Most importantly, MN GreenStar homes provide a healthy indoor environment and cause minimal environmental impact.

The MN GreenStar orientation training cost approximately \$350. Depending on the type of project, certification costs between \$100 - \$200 plus \$.10 per square foot.

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