STATE OF MINNESOTA

MINNESOTA ENERGY AGENCY

CONSERVATION DIVISION



In the Matter of Proposed Rules
Regulating the Home Energy
Disclosure Program, 6 MCAR § 2.2501 - 2510

STATEMENT OF NEED
AND REASONABLENESS

These rules have been developed by the Minnesota Energy Agency for the regulation of the Home Energy Disclosure (HED) Program.

The legislature in 1977 required the Department of Administration to develop energy conservation standards for existing residences (Minn. Stat. 116H.129). Beginning October, 1980, all buyers of residential properties are entitled to a disclosure report, prepared by a certified evaluator, which would demonstrate a structure's compliance with the standards that had been developed. This Home Energy Disclosure Report is presented to the buyer who requests it at the point of sale. Those standards were to gradually become mandatory for all rental buildings.

At about the same time, Congress, through the National Energy Conservation Policy Act (NECPA) (92 USC § 3206 et seq, 1978) as amended by Title V of the Energy Security Act (1980) developed a federal energy audit program, known as the Residential Conservation Service (RCS). This program requires major utilities to provide energy audits to their residential customers.

In accordance with the federal rules, the Energy Agency developed a State Plan which was accepted by the Department of Energy in October, 1980. To implement that State Plan, the Agency proposed and adopted rules, which became final as published in the State Register on June 8, 1981. In this state the program is titled the Minnesota Energy Conservation Service.

The legislature, recognizing the potential confusion that would arise by having two different energy audit programs, one at the time of sale, and another performed by utilities, amended Minn. Stat. 116H.129 in the 1981 session. Two major changes were made. First, responsibility for administering the program was transferred from the Building Codes Division of the Department of Administration to the Energy Agency. It was believed that by having one

agency administer both the RCS and the Home Energy Disclosure Programs, better coordination would result. Secondly, the amended legislation requires the audit done under the HED Program to meet the standards of that audit done under the RCS Program.

The majority of these proposed rules set forth the requirements for performing the HED energy evaluation in accordance with the RCS audit, as the legislation requires. In addition, the rules set energy efficiency standards for the purpose of evaluation for owner occupied residences, mandatory energy efficiency standards for rental buildings and procedures for the certification and decertification of evaluators.

In developing these rules, the Agency sought input from several sources. In accordance with the Administrative Procedures Act the Agency filed a "Notice of Intent to Solicit Outside Opinion." That notice was published in the June 22, 1981 issue of the State Register. One person, Gary Pagel, of the Minnesota Association of Realtors, contacted the Agency and indicated interest in the rules development process.

The following people, with their affiliation, if any, were asked to submit input and provide comments to the Agency as rules were developed.

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|---|---|
| Dan Flaherty | Hennepin County AVTI |
| Gary Pagel | MN. Association of Realtors |
| Steve Roy | MN. Society of Housing Inspectors |
| Sivert Hendrickson | Building Codes Division |
| Monte Aaker | MN. Housing Finance Agency |
| Roger Hankey | HED Evaluator |
| Peter McLaughlin | Urban Coalition |
| Patrick Lamb | MN. Condominium Association |
| Jack Horner | MN. Multi-Housing Association |
| Jacquelyn Brown | Staff, Senate Research |
| Sara Meyer | Staff, House Research |

For the remainder of this statement each section of the proposed rules will be cited, briefly summarized and then presented as underlined text. Following each provision, the Agency will provide for the need and reasonableness of that section. Because the statute (Minn. Stat. 116H.129, Subd. 7 ) requires the disclosure report to meet the standards of 42 USC 8211 et seq, many of

the requirements of these rules will be justified based on the federal rules implementing the federal legislation. Unless otherwise noted, those federal rules will be cited from the November 7, 1979 publication of the Federal Register.

6 MCAR § 2.2502 Definitions.

These definitions are necessary to clarify phrases that are used in the rules. Several have been taken from the federal rules implementing the federal energy audit program, which need to be incorporated to meet the requirements of the state statute Minn. Stat. 116H.129, Subd. 7. Other definitions have been taken from the rules developed by the Building Codes Division of the Department of Administration, which originally administered this program. Some definitions have been modified to clarify language that may have caused confusion for evaluators under the original rules. Finally, some definitions have been added to provide for the new standards that are necessary to meet the requirements of the federal energy audit program.

A. Accessible. "Accessible" means:

1. For purposes of inspection, any area of the residence which can be evaluated with only the removal of temporary components of the structure. Temporary components include, but are not limited to, electrical plate covers, attic hatch covers, and obstructions in closets which provide access to the area of the residence to be evaluated.

2. For purposes of compliance with 6 MCAR § 2.2503, any area that can be made more energy efficient with the installation of program measures that are not determined to be economically infeasible and which area is exposed, without the removal of permanent parts of the structure.

This section provides a two part definition of the term "accessible." The first part describes the general requirements for evaluators as they perform their inspections. This section is needed so that homeowners can be certain that evaluators will perform as thorough an inspection as is physically possible. At the same time, evaluators are put on notice that they should not attempt to

remove permanent components as they do the inspection, as not to damage to the residence. The listing of examples of temporary components sets reasonable requirements to ensure that evaluators will thoroughly evaluate the property.

The second part defining "accessible" with regard to the actual installation of program measures is a necessary distinction from accessible components for the purpose of evaluation. While evaluators can determine the existing condition of an area by removing a temporary component, it is frequently impossible to upgrade that area through that same temporary component. It would be unreasonable to require that areas be brought up to the standards of 6 MCAR § 2303, which are generally considered inaccessible ie, where major costs would be incurred by the owner in making the related repairs after the area was made more energy efficient. This is a critical concern for rental buildings, where these standards are mandatory. By adopting this second paragraph, the Agency continues with the same reasonable requirement that was originally established by the Building Codes Division when the original standards were developed and adopted. Under the original rules, accessible was defined "shall mean exposed, without the removal of permanent parts of the structure." (2 MCAR § 1.16204A)

The second paragraph also requires the installation of program measures that are not determined to be "economically infeasible." This language is necessary due to the requirement in Minn. Stat. 116H.129, Subd. 2(d). "Applicable energy efficiency standards" mean those standards established under subdivision 1 which are not shown to be economically infeasible for the building in question.

B. Agency. "Agency" means the Minnesota Energy Agency. This is self-explanatory.

C. Apartment building. "Apartment building" means any structure containing two or more residential dwelling units which are rented.

This definition is needed because the statute (Minn. Stat. 116H.129, Subd. 1) requires the Agency to develop minimum energy efficiency standards for existing residences. Any building containing only one dwelling

unit which is rented is considered a single family residence.

D. Community Based Organization. "Community Based Organization" means an organization which has a demonstrated community involvement such that the organization has a history of energy or related community service in a specific service area.

This definition is needed because the statute (Minn. Stat. 116H.129, Subd. 6) provides specifically for the certification of evaluators from these organizations. The Agency has already adopted this language in its rules regulating the MECS Program (6 MCAR § 2303 A 3 b(2)). The continued and consistent use of this definition is needed and reasonable to avoid confusion.

E. Conditioned Space. "Conditioned space" means space within a building that is heated or cooled by an energy using system.

This term, included in the original rules adopted by the Building Codes Division, is necessary because evaluators use it extensively in their inspection of residences as they determine the applicability of standards.

F. Cooling Degree Day. "Cooling degree day" means a unit, based upon temperature difference and time, used in estimating fuel consumption and specifying nominal cooling load in summer. For any one day when the mean temperature is more than $65^{O}F$, there exist as many Cooling Degree Days as there are Fahrenheit degrees difference in temperature between the mean temperature for the day and $65^{O}$.

This term was included in the definitions developed by the Building Codes Division in the original rules. This calculation is used in the calculation procedures delienated in 6 MCAR § 2.2510. It is needed in order to designate the base temperature ($65^{O}F$) from which degree days are calculated. That temperature is reasonable since it is the standard used by the National Oceanic and Atmospheric Administration.

G. Economic Feasibility. For the purpose of these rules, the test of economic

feasibility is met when the savings in energy procurement costs, based on residential energy costs as certified by the commissioner or the director in the State Register, or on local fuel costs, exceed the cost of acquiring and installing each individual program measure, as amortized over the subsequent 10 year period.

This definition is included in the statute Minn. Stat. 116H.129, Subd. 1. It is included in the rules so that evaluators and other persons, who may not have access to the statute, may be aware of this requirement.

The Agency publishes current energy costs semi-annually in the State Register. Because energy costs vary so widely across the state, and because prices are so variable over time, the Agency has not published projected average residential energy costs. The effect of using current average energy costs is to provide homeowners with conservative estimates of savings resulting from improving their residence. It is generally expected that as energy costs rise, the savings by making residences more energy efficient will also rise. By using a simple payback calculation based on current costs, potential errors will cause more conservative estimates which is more prudent than the alternative of possibly over-stating possible savings.

H. Energy Conservation Measure. "Energy conservation measure" means any of the following measures in a residential building:

1. Cauking, consisting of pliable materials used to reduce the passage of air and moisture by filling small gaps located at fixed joints on a building, underneath baseboards inside a building, in exterior walls at electric outlets, around pipes and wires entering a building, and around dryer vents and exhaust fans in exterior walls. Caulking includes, but is not limited to, materials commonly known as "sealants," "putty," and "glazing compounds."
2. Weatherstripping consisting of narrow strips of material placed over or in movable joints of windows and doors to reduce the passage of

air and moisture when the windows and doors are closed.

3. Furnace efficiency modifications consisting of:

a. A furnace or boiler, including a heat pump, which replaces an existing furnace or boiler of the same fuel type and which reduces the amount of fuel consumed due to an increase in combustion efficiency, improved heat generation, or reduced heat losses.

b. A furnace replacement burner (oil) which atomizes the fuel oil, mixes it with air, and ignites the fuel-air mixture, and is an integral part of an oil-fired furnace or boiler including the combustion chamber, and uses less oil than the device it replaces.

c. An automatically operated damper installed in a gas-fired furnace (often called a vent damper) which is installed downstream from the drafthood and conserves energy by substantially reducing the flow of heated air through the chimney when the furnace is not in operation.

d. An electrical or mechanical ignition device which, when installed in a gas-fired furnace or boiler automatically ignites the gas burner and replaces a gas pilot light.

4. A central air conditioner which replaces an existing central air conditioner of the same fuel type and which reduces the amount of fuel consumed due to an increase in efficiency.

5. Ceiling insulation consisting of a material primarily designed to resist heat flow which is installed between the conditioned area of a building extends to the roof, the term "ceiling insulation" also applies to such material used between the underside and upperside of the roof.

6. Wall and foundation insulation consisting of a material primarily designed to resist heat flow which is installed within or on the

walls between conditioned areas of a building and unconditioned areas of a building or the outside.

7. Floor insulation consisting of a material primarily designed to resist heat flow which is installed between the first level conditioned area of a building and an unconditioned basement, crawl space, or the ground beneath it. Where the first level conditioned area of a building is on a ground level concrete slab, the term "floor insulation" also means such material installed around the perimeter of or on the slab. In the case of mobile homes, the term "floor insulation" also means skirting to enclose the space between the building and the ground.

8. Duct insulation consisting of a material primarily designed to resist heat flow which is installed on a heating or cooling duct in an unconditioned area of a building.

9. Pipe insulation consisting of a material primarily designed to resist heat flow which is installed on a heating, cooling or hot water pipe in an unconditioned area of a building.

10. Water heater insulation consisting of a material primarily designed to resist heat flow which is suitable for wrapping around the exterior surface of the water heater casing.

11. Storm or thermal window consisting of:

    a. A window or glazing material placed outside or inside an ordinary or prime window, creating an insulating air space, to provide greater resistance to heat flow than the prime window alone; or

    b. A window unit with improved thermal performance through the use of two or more sheets of glazing material affixed to a window frame to create one or more insulated air spaces. It may also have an insulating frame and sash.

12. Storm or thermal door consisting of:

    a. A second door, installed outside or inside a prime door, creating an

insulating air space;

b. A door with enhanced resistance to heat flow through the glass area created by affixing two or more sheets of glazing materials; or

c. A primary exterior door with an R-value of at least two.

13. Heat reflective and heat absorbing window or door material consisting of a window or door glazing material with exceptional heat-absorbing or heat-reflecting properties or reflective or absorptive films and coatings applied to an existing window or door which thereby result in exceptional heat-absorbing or heat-reflecting properties.

14. Devices associated with electric load management techniques consisting of consumer-owned or leased devices that control the maximum kilowatt demand of the residence on an electric utility and which are any of the following:

a. Part of a radio, ripple or other utility controlled load switching system located on the customer's premises;

b. Clock-controlled load switching devices;

c. Interlocks, and other load actuated, load limiting devices; or

d. Energy storage devices with control systems.

15. Clock thermostat consisting of a device which is designed to reduce energy consumption by regulating the demand on the heating or cooling system in which it is installed, and which uses:

a. A temperature control device for interior spaces incorporating more than one temperature control level, and

b. A clock or other automatic mechanism for switching from one control level to another.

16. Rim joist insulation consisting of a material primarily designed to resist heat flow which is installed along either side of the rim joist.

The definitions of these energy conservation measures is one portion of the state rules (6 MCAR § 2.2301 G) which implement federal rules (10 CFR § 456.105F) which implement the federal law, 42USC 8211.

The state statute (116H.129, Subd. 7) requires that the HED disclosure report meet the same standards as the federal energy audit program. These measures are therefore a necessary component of the disclosure report, and must be defined.

I. Energy Conservation Practice. "Energy conserving practice" means any of the following measures in a residential building:

1. Furnace efficiency maintenance and adjustments, consisting of cleaning and combustion efficiency adjustment of gas or oil furnaces, periodic cleaning or replacement of air filters on forced-air heating or cooling systems, lowering the bonnet or plenum thermostats to 80°F on a gas or oil forced-air furnace, and turning off the pilot light on a gas furnace during the summer.

2. Nighttime temperature setback by manually lowering the thermostat control setting for the furnace during the heating season to a maximum of 55°F during sleeping hours.

3. Reducing thermostat settings in winter by limiting the maximum thermostat control setting for the furnace to 68°F during the heating season.

4. Raising thermostat setting in summer by setting the thermostat control for an air conditioner to 78°F or higher during the cooling season.

5. Water flow reduction in showers and faucets accomplished by placing a device in a shower head or faucet to limit the maximum flow to three gallons per minute, or replacing existing shower heads or faucets with those having built-in provisions for limiting the maximum flow to three gallons per minute.

6. Reducing hot water temperature by manually setting back the water heater thermostat setting to 120°F; and reducing the use of heated water for clothes washing.

7. Reducing energy use when a home is unoccupied by reducing the thermostat setting to 55 °F when a home is empty for four hours or longer in the heating season, turning an air conditioner off in the cooling season when

no one is home, and lowering the thermostat setting of the water heater when a home is vacant for two days or longer.

8. Plugging leaks in attics, basements, and fireplaces, by installing scrap insulation or other pliable materials in gaps around pipes, ducts, fans, or other items which enter the attic or basement from a heated space, installing fireproof material to plug any holes around any damper in a fireplace, and adding insulation to an attic or basement door.

9. Sealing leaks in pipes and ducts by installing caulking in any leak in a heating or cooling duct, tightening or plugging any leaking joints in hot water or steam pipes, and replacement of washers in leaking water valves.

10. Efficient use of shading by using shades or drapes to block sunlight from entering a building in the cooling season, to allow sunlight to enter during the heating season, and to cover windows tightly at night during the heating season.

The definitions of energy conserving practices is necessary because federal law (42 USC 8211), as implemented by federal rules (10 CFR 456.105(g) requires that information about these practices be included in the audit. Because the statute (Minn. Stat. 116H.129, Subd. 7) requires that the audits meet the same standards, this definition is necessary.

J. Fireplace stove. "Fireplace stove" means a chimney-connected, solid fuel-burning stove having part of its fire chamber open to the room.

This definition is necessary because one of the standards in 6 MCAR § 2.2503 requires a positive shut-off for these devices. The definition was developed by the Building Codes Division for the original rules setting minimum efficiency standards. It is reasonable to continue with the same definition to avoid confusing building owners.

K. Heating Degree Day. "Heating degree day" means a unit, based upon temperature difference and time, used in estimating fuel consumption

and specifying nominal heating load of a building in winter. For any one day, when the mean temperature is less than $65^{O}F$, there exist as many Heating Degree Days as there are Fahrenheit degrees difference in temperature between the mean temperature for the day and $65^{O}F$.

This definition was incorporated into the rules originally developed by the Building Codes Division. This calculation is used in the calculation procedures. It is necessary in order to designate the temperature ($65^{O}F$) base from which degree days are calculated. That temperature is reasonable since it is used by the National Oceanic and Atmospheric Administration.

L. Positive shut-off. "Positive shut-off" means a manual shut-off device which can be utilized to produce a seal to inhibit the flow of air when a fireplace or fireplace stove is not operating, i.e., damper in fireplace, damper at top of flue, damper in connector pipe, or doors (glass or other) on fireplace or fireplace stove.

This definition is necessary because one of the standards in 6 MCAR § 2.2503 requires that fireplace stoves be fitted with these devices. This definition was incorporated into the original rules adopted by the Building Codes Division. It is reasonable to continue with the same definition to avoid confusing building owners and to ensure that owners who have already made a good faith effort to comply with the standards are not required to meet a different, more restrictive standard.

M. Program measures. "Program measures" means all energy conservation measures and renewable resource measures included in the minimum energy efficiency standards for existing residences.

This term is needed in order to simplify references in the energy evaluation. The definition encompasses both types of measures - renewable and conservation which are referred to in the standards and the evaluation.

N. "R" Value. "R" value means the measure of resistance to heat flow through a material or the reciprocal of the heat flow through a material expressed in British thermal units per hour per square foot per degree Fahrenheit at 75°F mean temperature.

This term is needed because it is frequently used in the calculation procedures outlined in 6 MCAR § 2.2510. This definition was included in the original rules developed by the Building Codes Division, and is used by the American Society of Heating, Refrigerating and Air Conditioning Engineers, also in the ASHRAE Handbook, 1977 Fundamentals.

O. Renewable resource measures. "Renewable resource measures" mean the following measures installed in or connected to a residential building:

1. Solar domestic hot water systems (DHW) designed to absorb the sun's energy and to use this energy to heat water for use in a residential building other than for space heating, including thermosiphon hot water heaters.

2. Passive solar space heating and cooling systems that make efficient use of, or enhance the use of, natural forces - including solar insolation, winds, night time coolness and opportunity to lose heat by radiation to the night sky - to heat or cool living space by the use of conductive, convective or radiant energy transfer. Passive solar systems include only:

   a. Direct gain glazing systems consisting of south-facing panels of insulated glass, fiberglass, or other similar transparent substances that admit the sun's rays into the living space where the heat is retained. Glazing is either double-paned, or single-paned equipped with movable insulation.

   b. Indirect gain systems consisting of panels of insulated glass, fiberglass, or other transparent substances that direct the sun's rays into south facing specifically constructed thermal walls, ceilings, rockbeds, or containers

of water or other fluids where heat is stored and radiated.

c. Solaria/sunspace systems consisting of structures of glass, fiberglass or similar transparent material which is attached to the south-facing wall of a structure which allows for air circulation to bring heat into the residence, and which is able to be closed off from the residential structure during periods of low solar insolation.

d. Window heat gain or loss retardants consisting of mechanisms which significantly reduce summer heat gain of wintertime heat loss through windows by the use of devices such as awnings, insulated rollup shades (external or internal), metal or plastic solar screens, or moveable rigid insulation.

3. Wind energy devices that use wind energy to produce energy in any form primarily for use in the residence.

4. Replacement solar swimming pool heaters which are used solely for the purposes of using the sun's energy to heat swimming pool water and which replace a swimming pool heater using electricity, gas or another fossil fuel.

5. Active solar space heating equipment designed to absorb the sun's energy and to use this energy to heat living space by use of mechanically forced energy transfer such as fans or pumps.

This definition of renewable resource measures is one portion of the federal rules 10 CFR § 456.105 (v) which implement federal law 42 USC 8211. The state statute (Minn. Stat. 116H.129, Subd. 7) requires that the disclosure report include the same standards as the federal audit program. Therefore it is necessary to include this definition in the rules.

P. Residence. "Residence" means any dwelling used for habitation during all or a portion of the months of December through March, or permanently by one or more persons. For rental buildings, "residence" means any dwelling use

for habitation during all or a portion of the months November through April. A residence may be owned or rented and may be part of a multi-unit building, multi-family dwelling or multi-purpose building, but "residence" shall not include buildings such as hotels, hospitals, motels, dormitories, sanitariums, nursing homes, schools and other buildings used for educational purposes, or correctional institutions. Each dwelling unit in a rental building shall be considered as a residence. A mobile home as defined in Minn. Stat. § 168.011, Subd. 8, shall be a residence for purposes of these Rules.

This term is taken directly from the statute (Minn. Stat. 116H.129, Subd. 2 and 3). It is necessary and reasonable to include it in the rules so that persons not having access to the statute can be aware of the implications of the remainder of the rules.

Q. Rim Joist. "Rim joist" means that part of the residential structure between the top of the foundation wall and the sub-floor immediately above the perimeter of the floor joists.

This definition is needed to precisely identify this component of the residential structure. This component is occasionally referred to as the band joist, header joist, or the ribbon joist. Because this definition was included in the original rules adopted by the Building Codes Division, it is reasonable to continue with the same terms to avoid confusion for evaluators.

R. Seasonal Efficiency. "Seasonal efficiency" means the calculated efficiency of a heating system based on the estimated peak (tuned up) steady state-efficiency corrected for cycling losses.

This item is included in the calculation procedures used by evaluators in their performance of the disclosure report. The calculation of seasonal efficiency is one component of the federal energy audit program as implemented by 10 CFR 456.307(b)7 which is implemented by state rule (6 MCAR § 2.2303 C1d).

Because Minn. Stat. 116H.129 requires the same standards as the federal energy audit program, it is necessary to include this definition.

S. South-facing. "South facing" means plus or minus 45° of true south. This term is needed to provide evaluators with a precise definition as they evaluate the residence for the solar equipment standards. This definition of south facing is used in the federal energy audit program and it is therefore, necessary to use the same definition for this disclosure program.

6 MCAR § 2.2503. Minimum Energy Efficiency Standards.

This section establishes minimum energy efficiency standards for existing residences. The statute (Minn. Stat. 116H.129, Subd. 1) specifically requires that standards be adopted for one to four family dwellings, apartment buildings, mobile homes, condominium buildings, with distinctions made for type of ownership. Because of the existence of many residence types, many relevant standards, and purposes for the standards, a table summarizing the application of those standards was deemed appropriate. By examining the table, a person can easily determine which standards apply to a particular type of residence.

A. Compliance. The minimum energy efficiency standards listed in B. shall be applied to residences according to Exhibit 6 MCAR § 2.2503 A.-1. Pursuant to Minn. Stat. § 116H.129, subds. 5 and 7, the standards listed under "Disclosure at time of sale" shall only be used to evaluate the energy efficiency of existing residences built prior to January 1, 1976, at the time of sale. Time of sale means the time when a written purchase agreement, is executed by the buyer, or, in the absence of a purchase agreement, the time of execution of any document providing for the conveyance of a residence. Pursuant to Minn. Stat. § 116H.129, subds. 2 and 3, all residences constructed prior to January 1, 1976, which are renter occupied during all of a portion of the months of November through April shall have been in compliance with standards adopted pursuant to Minn. Stat. § 116H.129, subd. 1 pertaining to caulking and weahterstripping by

January 1, 1980, unless those standards are determined to be economically infeasible. Effective July 1, 1983, all residences constructed prior to January 1, 1976, which are renter occupied during all or a portion of the months of November through April shall be in compliance with all standards listed under mandatory compliance and not determined to be economically infeasible. All building owners shall initially determine the economic feasibility of these standards using the calculation procedures adopted by the agency. Those determinations are subject to review and final determination by the Agency.

This paragraph is necessary to clearly indicate to residents the different purposes of the standards. Those standards listed under "Disclosure at time of sale" are for the purposes of evaluation and disclosure only; they are purely informational. There is no requirement that residents actually make improvements to upgrade their dwellings to these standards. An explanation and establishment of need for the standards will be included under Section B. The definition of "time of sale" is taken from Minn. Stat. 116 H.129 Subd. 2(b). It is included here to clearly indicate the requirements of the statute.

The paragraph also refers to dwelling units that are renter-occupied. Minn. Stat. 116H.129, Subd. 3 provides for these mandatory standards. This paragraph is taken directly from that statute, and is provided with the table so that rental property owners are easily made aware of how the standards apply to them.

For the standards of caulking and weatherstripping (currently mandatory) and the remaining standards (effective July, 1983) the rules provide for compliance unless the "standards are determined to be economically infeasible." This sentence is necessary to establish the burden of responsibility for compliance with the statute. This language is taken from the statute (Minn. Stat. 116H.129, Subd. 2(d) which provides "applicable energy efficiency standards" meaning

those standards established under subdivision 1 which are not shown to be economically infeasible for the building in question." The use of the double negative, "...not...economically infeasible..." clearly establishes the assumption that a building comply with the standard unless it can be shown to be economically infeasible. This portion of the rule is needed to clarify that intent.

The rule further provides that it shall be the responsibility of the building owner to determine that specific standards are economically infeasible. The Agency contends that it is reasonable to interpret the statute to mean that the Agency is not responsible for determining economic feasibility for each rental unit in the state. By clearly laying the burden on the building owner to show evidence for non-compliance, the rule effectively implements the statute. The statute assumes that the rental unit shall comply with the standards unless the building owner demonstrates that it is economically infeasible to comply with each standard.

An additional justification for this rule is to make it clear that building owners must generally comply with all of the standards by July, 1983. By placing the burden on the building owner to show cause for non-compliance, it cannot be argued that since a disclosure report evaluating their property had not been done, they were not aware whether the building was in compliance or not. In the past, it may not have been totally clear that a building owner was required to comply with the applicable standards, whether or not a disclosure report was written. By clarifying the responsibility in the rule, building owners will be put on notice of the effect of the standards. It is reasonable to make this rule clear to avoid any confusion on this critical point.

EXHIBIT 6 MCAR S 2.2503 A.-1

Applicable Energy Efficiency Standards

from 6 MCAR S 2.2503 B.

| Type of residence | Purpose: Disclosure at time of sale | Purpose: Mandatory compliance |
|---|---|---|
| Owner occupied | | |
| Single family | Standards 1-4, 9-27 | None |
| Mobile home | Standards 1-4, 9-27 | None |
| Condominium building, 2-4 dwelling units | Standards 1-4, 9-27 | None |
| Condominium building, 5 or more dwelling units | Standards 1-8 | None |
| Renter occupied | | |
| Single family | Standards 1-27 | Standards 1-8 |
| Mobile home | Standards 1-27 | Standards 1-8 |
| Apartment building, 2-4 dwelling units | Standards 1-27 | Standards 1-8 |
| Apartment building, 5 or more dwelling units | Standards 1-8 | Standards 1-8 |

The use of the table graphically indicates the application of the different standards for the various housing types. The need for the two columns indicating purpose for the standards (disclosure and mandatory compliance)was established in the preceding paragraphs.

The composition of the column "Type of Residence" closely follows the designations stipulated in Minn. Stat. 116H.129, Subd. 1. The major housing types are listed and distinguished by type of ownership, i.e., renter versus owner-occupied. The only variance from the statutory provision is the isolation of

single family dwellings from the category "one to four family dwellings." Although the same standards apply to both single family and two to four dwelling unit structures, it is reasonable to isolate that residence type since it is such a major component of the housing stock.

The statement of need for the different standards for the various housing types will be included in the following section.

B. Enumeration. The following shall be the minimum energy efficiency standards for existing residences constructed prior to January 1, 1976. These standards shall be used as indicated in Exhibit 6 MCAR § 2.2503 A.-1.

1. Install weatherstripping between exterior operable window sash and frames. Weatherstripping is not required on storm doors or storm windows.

2. Caulk, gasket or otherwise seal accessible exterior joints between foundation and rim joist; around window and door frames; between wall and roof; between wall panels; at penetrations for utility services through walls, floors, and roofs and all other openings in the exterior envelope.

3. Install storm windows on all single glazed exterior window units enclosing conditioned space.

4. Install storm doors on all exterior door openings into conditioned spaces unless a single door, enclosed porch, vestibule, or other appurtenance provides a double door effect or provides an "R" value of 2 or more.

5. Install positive shut-offs for all fireplaces or fireplace stoves, unless an existing damper provides a positive shut-off.

6. Install insulation in accessible attics to achieve a minimum total "R" value of the insulation of R-19. If there is insufficient space for the installation of the recommended "R" value, then the recommendation by the evaluator shall be based on installing insulation to fill the available space, providing for appropriate ventilation.

7. Install insulation in all accessible rim joist areas to achieve minimum total "R" value of the insulation of R-11. If there is insufficient space for the installation of the recommended "R" value, then the recommendation by the evaluator shall be based on installing insulation to fill the available space.

8. Install insulation in accessible walls and floors enclosing conditioned spaces to achieve a minimum total "R" value of the insulation of R-11 when there is no insulation in a substantial portion of the exterior walls, or floors over an unconditioned space. Accessible walls shall include above grade foundation walls of basements, cellars, or crawl spaces. If there is insufficient space for the installation of the recommended "R" value, then the recommendation by the evaluator shall be based on installing insulation to fill the available space.

9. Install insulation in accessible floors over unconditioned spaces and in rim joists to achieve a minimum total "R" value of the insulation of R-19. For slab on grade construction, insulation shall be installed to achieve a minimum total "R" value of the insulation of R-11. If there is insufficient space for the installation of the recommended "R" value, then the recommendation by the evaluator shall be based on installing insulation to fill the available space.

10. Install ceiling insulation to achieve a minimum total "R" value of the insulation of R-44 when the existing "R" value of the ceiling insulation, excluding construction materials, is R-30 or less. If there is insufficient space for the installation of the recommended "R" value, then the recommendation by the evaluator shall be based on installing insulation to fill the available space, providing for appropriate ventilation.

11. Install wall and foundation insulation to achieve a minimum total "R" value of the insulation of R-11, when there is no insulation in a substantial portion of the exterior walls or foundation walls. If there

is insufficient space for the installation of the recommended "R" value, then the recommendations by the evaluator shall be based on installing insulation to fill the available space.

12. Install insulation to achieve a minimum total "R" value of the insulation of R-5 on all water heaters when the remaining useful life of the heater appears to be three years or greater and space is available around the water heater to install insulation.

13. Install insulation to achieve a minimum total R-value of the insulation of R-11 on all accessible heating and cooling ducts in unconditioned spaces.

14. Install insulation to achieve a minimum total "R" value of the insulation of R-5 on all accessible heating, cooling or hot water pipes in unconditioned spaces.

15 Install a clock thermostat when the residence has a thermostat on the existing furnace or central air conditioner that is compatible with a clock thermostat.

16. Install a replacement furnace or boiler with a unit of the same fuel type that has a minimum seasonal efficiency of 80%, when the existing unit is five years old or older and has a seasonal efficiency of less than 80%.

17. Replace the oil burner of an existing furnace or boiler with an oil burner that uses less oil than the device it replaces.

18. Install a vent damper on a gas fired boiler or furnace when the furnace combustion air is taken from a conditioned space.

19. Install an electrical or mechanical ignition system on a gas fired boiler or furnace, when the furnace or boiler is located in a conditioned space.

20. Replace all or part of the existing central air conditioner that is five years old or older that has an EER of less than 8.2 with one of the same fuel type to obtain an energy efficiency rating of 8.2 or greater.

21. Install load management devices when the electric utility serving the residence offers a residential rate which reflects any difference in the utility's cost of service between peak and off-peak periods.

22. Install heat reflective/heat absorbing window and door material when the affected rooms of the residence are air conditioned and the cooling degree days for the region exceed 700.

23. Install a solar domestic hot water system when there is a South facing site that exists on or near the residence that has a prime solar fraction exceeding 0.6.

24. Install a passive solar space heating and cooling system when there is a South facing site that exists on or near the residence that has a prime solar fraction exceeding 0.7.

25. Install an active solar space heating system when there is a South facing site that exists on or near the residence that has a prime solar fraction exceeding 0.8.

26. Install a wind energy system when the region's average annual wind speed is equal to or greater than ten miles per hour and there is sufficient unrestricted access to the wind.

27. Install a solar swimming pool heater where a swimming pool is present and it is heated with electricity, gas or another fossil fuel and the prime solar fraction exceeds 0.8.

Standards one through eight coincide with the original eight standards developed by the Building Codes Division. As indicated in the table, these eight standards are mandatory for all rental units; the first two have been mandatory since January 1, 1980, the remainder will take effect in July 1983. These standards are needed since Minn. Stat. 116H.129, Subd.3

requires such standards.

It is reasonable to continue with these mandatory standards for a number of reasons. First, rental building owners, examining the standards previously developed by the Building Codes Division, may have already taken actions to bring their buildings up to those standards, even though six of the standards do not become mandatory until July, 1983. To make the standards more stringent after such good faith efforts would be unfair to those building owners.

Second, the standards proposed in the rules do not conflict with the State Building Code for new construction. It is unreasonable to require owners of rental buildings constructed before 1976 to have to meet higher standards than owners of more recently built units.

The final reason is in regard to the last three of the mandatory standards which require the installation of insulation. Although increasing the levels of insulation will result in increased energy savings, the rate at which those savings occurs decreases with additional levels of insulation. The effect of raising the minimum level is to increase the possibility that for many buildings, the higher costs associated with meeting higher standards, may result in a determination that the standard is not economically feasible and does not apply. In that event, the building owner is not required to increase the energy efficiency of his/her building at all, with respect to that standard.

Agency staff estimate than in increasing an attic to an R-value of 44, at least three-fourths of the energy savings accrue by raising the R-value of the attic insulation from R-1 to R-19. Although increasing the R-value even highe will result in additional energy savings, they will accrue at a decreasing rate. However, because the costs of the additional insulation remain constant, the economic feasibility of the higher minimum decreases. The Agency will review these standards periodically and will reconsider them

if the State Building Code is upgraded.

The other purpose for the standards is disclosure at time of sale. Because Minn. Stat. 116H.129, Subd. 7 requires the disclosure report to meet the standards of the federal energy audit program, these standards coincide with those adopted in 6 MCAR § 2.2301 and 2.2303. Standards one through four and nine through twenty-seven summarize the program measures stipulated in the Minnesota Plan for the one to four unit owner occupied dwellings, therefore, these standards are required to be evaluated.

The federal energy audit program does not apply to buildings with five or more dwelling units. For the purpose of disclosure, however, a set of standards is necessary. The federal energy audit was designed to specifically evaluate the energy efficiency of one segment of the housing stock (1-4 unit buildings). Construction methods for larger apartment buildings are usually different than small buildings with four or fewer units. In addition, the energy using systems are generally distinct from large to small buildings. It would be unreasonable to require a disclosure of standards designed for the evaluation of 1-4 unit buildings for buildings with five or more units. Standards one through eight, developed originally by the Building Code Division, are designed to provide a basic evaluation that is relevant to all residence types. For that reason it is reasonable to adopt standards 1-8 for evaluating condominium buildings with five or more units.

A distinct set of standards is needed for disclosure at the time of sale of renter occupied single family, mobile homes and apartment buildings with 2-4 dwelling units. These residence types must meet the mandatory standards for rental units, and therefore it is necessary and reasonable to disclose those eight standards at the time of sale. These residence types also fall within the eligibility criteria for the federal energy audit program.

Because Minn. Stat. 116H.129, Subd. 7 requires that the disclosure report meet the standards of the federal audit program, it is necessary to include those standards

as well. For some components (attic, wall, and rim joist insulation) the disclosure report will include dual standards. For example, for attic insulation, the owner will receive information on insulating both to R-19 and to R-44 (standards 6 and 10). This information will then make the owner aware of what is required to meet the mandatory rental standards, but also indicate the increased energy savings that would occur by voluntarily insulating to the higher standard.

For rental buildings with five or more units, the disclosure report will include standards one through eight. Because only buildings with four or fewer units are eligible for the federal audit program, there is no requirement to disclose standards nine through twenty-seven. In addition, those standards (9-27), developed for the federal audit program, were not designed for application in larger occupancy structures. Because construction methods vary between large apartment buildings and small ones, and because energy using systems are generally different, it would be unreasonable to require the federal energy audit program standards to be applied to larger apartment buildings. It is reasonable, however, to disclose standards one through eight, which are also the mandatory standards with which the building must comply.

6 MCAR § 2.2504. Conducting the Evaluation

This section sets forth the requirements for the performance of the evaluation. This section is necessary to ensure that all evaluations are performed consistently, and in accordance with the statute.

A. Disclosure reports. All evaluators shall use a disclosure report approved by the Agency. One copy of the entire completed report shall be given to the seller of the property. Evaluators shall submit reports as required by the Agency. Copies of completed disclosure reports shall be retained by evaluators for at least 5 years. The reports shall be available for review by the Agency.

This paragraph requires evaluators to use disclosure reports that are approved by the Agency. This is necessary to ensure that consistent information is

provided by all evaluators. Because the statute places the responsibility for providing the audit on the seller, the evaluator is required to provide the report to him/her.

In addition, this paragraph requires evaluators to submit reports to the Agency. These reports are necessary in order for the Agency to determine if the evaluators are completing the evaluations as required, and to determine how frequently disclosure reports are completed on the sale of properties. It is reasonable to request this data so that the Agency can properly evaluate the effectiveness of the program.

The final requirement of this paragraph provides that evaluators retain copies of the completed reports for five years. This requirement is necessary because the statute (116 H.129 Subd. 7) provides that the disclosure report is valid for 5 years. Because the owner could misplace the report, it is reasonable to require evaluators to retain a completed copy of the entire report which could subsequently be made available to the owner.

B. Recommendations. The evaluator shall determine which of the energy conserving practices should save energy in the residence, and in the written report the evaluator shall make a recommendation regarding each practice.

A determination regarding energy conserving practices is required for the federal audit program, and is therefore also required to be included in the disclosure report.

The state rule implementing this federal requirement is 6 MCAR § 2.2303 C.I.

C. General duties of evaluators. Evaluators shall estimate energy savings and installation costs of each applicable program measure using the calculation procedures in 6 MCAR § 2.2510. An applicable program measure is any program measure which can be installed in the residence to meet the minimum energy efficiency standards in 6 MCAR § s.2503.

This provision is needed to ensure accurate and high quality evaluations for all

buyers of property in the state. By requiring that evaluators use Agency calculation procedures, consistent information will be generated in the disclosure reports. The second sentence distinguishes applicable program measures so that evaluators, using the standards in 6 MCAR § 2.2503, are not required to take time to make calculations for measures that do not apply in a particular residence. If a residence contains storm windows, the evaluator does not need to spend his or her time measuring and performing calculations for storm windows.

Evaluators shall:

1. Inspect and take actual measurements of the building shell, and inspect the space heating, space cooling and water heating equipment;

This provision is included in the state rules (6 MCAR § 2.2303 C 2 a) implementing the federal energy audit program. It is necessary to ensure that each evaluation provides information on the actual residence being evaluated, rather than a typical house.

2. Base economic calculations on local fuel prices, or on those prices provided by the Agency, as published in the State Register each August 1 and February 1.

This provision is required in the federal audit program as implemented in 6 MCAR 2303 C 2b. It is needed to ensure that evaluators will use the most up to date information available for the calculation of savings resulting from making improvements to the residence. It is reasonable to allow the evaluator to use either data published by the Agency, or to use local prices.

3. Base economic calculations for materials and installation of measures on prices provided by the Agency. Prices shall be made available to evaluators by:

   a. Publication in the State Register by the Agency of the most recent contractors and suppliers price survey; or

b. Direct mailing by the Agency of the most recent price survey to certified evaluators.

This provision requires evaluators to use data provided by the Agency regarding costs of construction materials and installation prices. This provision is required in the federal audit program as implemented by 6 MCAR § 2.2303 C.2.b. It is needed to ensure that evaluators use the most recent information available to calculate costs and savings for installing program measures. It is reasonable to allow the Agency to either publish the data in the State Register, or to provide the information directly to the evaluators. The Agency can then select the option that will make the information available in the most cost-effective manner.

4. Base calculation procedures for active solar domestic hot water and space heating systems on those contained in the HUD intermediate Minimum Property Standards Supplement, Solar Heating and Domestic Hot Water Systems 4930.2, 1977 Edition; and

5. Base any cost and savings estimate for applicable furnace efficiency modification to a gas or oil furnace or boiler on an evaluation of the seasonal efficiency or the Agency published default table, whichever is higher, of such furnace or boiler. Seasonal efficiency shall be calculated on an estimated peak (tuned-up) steady state efficiency corrected for cycling losses as follows:

   a. For oil furnaces or boilers, the steady state efficiency shall be derived by a flue gas analysis of the measured flue gas temperature and carbon dioxide content.

   b. For gas furnaces or boilers, the steady state efficiency shall be derived from manufacturer's design data. If the

manufacturer's design data do not exist, then a flue gas analysis, as described in a. shall be performed.

6. The auditor shall calculate the energy index for the residence using the procedures in 6 MCAR § 2.2510.

D. Solar water and space heating systems. Every evaluator assessing solar domestic hot water and active solar space heating systems shall include the following information:

1. An evaluation containing:

a. The square foot area of the solar collector;

b. The solar collector characteristics, including glazing materials and other solar collector materials;

c. Any storage system needed, including the capacity of storage;

d. Any freeze protection needed;

e. The estimated percent of the water heating load to be met by solar energy;

f. Any physical connections needed with existing heating systems;

g. The annual maintenance costs;

h. Any site preparation needed; or

2. Fact sheets developed by the Agency that provide the information in 1 for a typical residence.

E. Passive solar space heating systems. Every evaluator assessing passive solar space heating systems shall include the following information:

1. An evaluation which includes:

a. A general description and an illustration of the system;

b. The estimated percent of the maximum heating requirements of the residence that could be met by the system;

c. The approximate dimensions of the system;

d. The method employed by the system to store heat, including the heat capacity for heat storage; or

2. Fact sheets developed by the Agency that provide the information in 1 for a typical residence.

F. Wind energy devices. Every evaluator assessing wind energy devices shall include the following information:

1. An evaluation which includes:

   a. Installation cost estimates, based on the installation costs of a commercially available device with kilowatt ratings appropriate to the level of electricity consumed in the customer's residence;

   b. The evaluator's estimate of the average wind speed at the residence based on data available at the nearest wind measurement station;

   c. The specifications of the device under consideration;

   d. Estimates of energy cost savings, based on average yearly wind speeds and the specification of the selected wind device; or

2. Fact sheets developed by the Agency that provide the information in 1 for a typical residence.

G. Disclosure. A disclosure, using the following language or similar language, shall be included in the report:

"The energy cost savings estimates you receive are based on systems which may be somewhat different from the ones you purchase. Also, these estimates were not determined using actual conditions but by using simulated measurements. Therefore, the cost savings we have estimated may be different from the savings which actually occur."

These sections provide for information to be included in the evaluation regarding renewable resource measures. This information is required in the federal energy audit program as implemented by Agency rule 6 MCAR § 2.2303 C and 2.2303 D. Because the statute (Minn. Stat. 116 H.129 Subd. 7) requires that the disclosure report meet the standards of the federal program, these provisions are necessary.

6 MCAR § 2.2505 Presentation of Evaluation Results

This section outlines the requirements that evaluators must meet as they take the information gathered during the evaluation and provide it to the seller or the seller's agent.

Upon completion of the evaluation, the evaluator shall provide all of the following information in writing to the seller or the seller's agent:

A. An estimate of the total cost for materials and labor of installation by a contractor expressed in a range of dollars, within a range of plus or minus 20 percent, of each applicable program measure addressed in the evaluation;

B. An estimate of the total cost of installation by the owner expressed in a range of dollars, within a range of plus or minus 20 percent, of each applicable program measure addressed in the evaluation; however, the evaluator shall not provide an estimate to an owner of the cost of installation by the owner of replacement central air conditioners, wall insulation, furnace efficiency modifications, devices associated with load management techniques, or wind energy devices.

C. An estimate of the savings in energy costs expressed in a range of dollars, within a range of plus or minus 20 percent, which would occur during the first year from the installation of each applicable program measure addressed by the evaluation.

D. An estimate of the payback period, measured in years, from the energy cost savings of each of the applicable program measures installed individually.

E. A disclosure, using the following language, or similar language: "The procedures used to make these estimates are consistent with the Minnesota Energy Agency criteria for residential energy audits. However, the actual installation costs you incur and energy cost savings you realize from installing these measures may be somewhat different from the estimates contained in this audit report. Although the estimates are based on assumptions which may not be appropriate for your household."

F. Sample calculations of the effect of the federal and state energy tax incentives on the cost to the owner of installing one applicable energy conservation program measure and one applicable renewable resource program measure.

G. If the evaluation is of rental property, a separate list of those improvements necessary to bring the residence into compliance with Minn. Stat. § 116H.129, Subd. 3.

These requirements are included in the federal energy audit program as implemented by state rules in 6 MCAR 2.2303 E 1. Because the statute requires that the disclosure evaluation report meet the standards of the federal report, it is necessary to include these requirements.

6 MCAR § 2.2506 Prohibitions:

This section describes prohibitions and requirements of evaluators as they provide disclosure reports. Generally, these requirements are necessary to prevent evaluators, who are very knowledgeable about energy conservation, from using that information to sway homeowners to purchase specific brands. It is reasonable to require that the evaluator provide an unbiased report.

A. Recommendations and Endorsements. The evaluator shall not recommend or discuss any supplier, contractor or lender to any owner. The evaluator shall not endorse the use of specific brand names of materials or products, persons, firms, or contractors which may be used to meet any specific standard. The evaluator shall not make any statements relating to the standards which may be interpreted as an endorsement of any specific material or product.

This provision is needed so that evaluators do not use their expertise to unfairly sway homeowners into contracting with specific suppliers, contractors or lenders. Because many homeowners lack a great understanding of specific steps needed to conserve energy, the presence of an evaluator can have a great influence on their behavior. It is therefore critical that evaluators be neutral in the course of their evaluations. The effect of the prohibition is to assure that the integrity of the evaluation will not be questioned by the owner because of evaluator's biases or recommendations. This disclosure is required in the federal audit program as implemented in Agency under (6 MCAR § 2.2303 F1).

B. Exclusion of Measures. The evaluator shall not exclude any applicable program measures in the presentation of the audit to the owner.

This provision is required in the federal audit program, and is included in the agency rules (6 MCAR 2.2303 F2). It is needed to assure that the evaluator will provide information on all applicable program measures.

C. Costs of certain products. The evaluator shall not include in the written evaluation costs or energy cost savings of installing any product which is not defined as a program measure.

This provision is required in the federal audit program and is included in the Agency rules regulating that program (6 MCAR § 2.2303 F3). It is needed to assure that evaluators do not take advantage of owners to induce them to install measures that have not been proven to conserve energy.

D. Required disclosure. The evaluator shall provide the owner with a written statement of any interest which the evaluator or the evaluator's employer has, directly or indirectly, in the sale or installation of any program measure, or in the sale of the residence to be evaluated.

This provision, in part, requires evaluators to disclose any interest they might have in the measures that are included in the energy audit program. This disclosure is required in the federal program, and is included in state rules implementing that program (6MCAR 2.2303G).

The rule allows any person who completes the necessary training, passes the certification examination, and meets the other requirements in 6 MCAR § 2.2507 to become a certified evaluator. The proposed rule permits persons with specific interests in the evaluation and the outcome to perform those evaluations. Persons with specific interests, such as realtors and contractors or suppliers would be required to disclose that interest, in writing, to the seller. By requiring the disclosure, the owner will be placed on notice if the evaluator has any potential to gain by the recommendations that are made.

This provision balances the needs of those involved in the evaluation program. First, the owner is made aware of any interest that the evaluator has in either the sale of the property or in the program measures that are included in the evaluation. The owner is protected through other provisions of these proposed rules. In 6 MCAR § 2.2506 evaluators are prohibited from endorsing, recommending or discussing any contractor, supplier, or product that might be used by the owner to make the residence more energy efficient. 6 MCAR 2.2509 E provides for de-certification of evaluators who violate these rules regulating the program. With this provision, the agency can decertify any evaluator who improperly takes advantage of his or her background to influence owners to use the products or services which they provide.

This proposed language permits all persons to potentially become certified evaluators. The provision permits two professions, realtors and contractors, who have significant involvement in the housing industry, to participate as certified evaluators. Because realtors have such an integral role in real estate transactions, permiting them to perform the evaluations themselves could significantly increase the number of evaluations that are completed.

Similarly, contractors that might have an interest in the products that would be included in the evaluation could be a valuable addition to the pool of available evaluators because of their intimate involvement in installing or selling the very measures that are to be evaluated; they can speak with authority and knowledge in completing the disclosure reports. Thus, permitting all persons, regardless of their professional background, to be eligible to become certified evaluators, broadens the expertise of available evaluators, and could lead to an increase in the number of disclosure reports actually done. The Agency concludes that sufficient safeguards exist to protect against the few realtors, contractors or other persons who might take unfair advantage of their position as an evaluator. First, there is clear language in the rules (6 MCAR § 2.2506 A-C) prohibiting references to specific products, firms, etc.

Second, the Agency provides for decertification of evaluators who violate these rules (6 MCAR 2.2509 E), which includes not performing complete evaluations, endorsing or recommending firms or products, or failing to disclose any interest in those products or the property being evaluated. In addition evaluators are required to carry errors and omissions insurance (6 MCAR § 2.2507 C.3). This protection will enable owners who discover that they have received faulty information from an evaluator to have an avenue of compensation.

Third, and finally, it is the Agency's position that because the evaluation is procured by the seller of the property, there is little opportunity for influencing the owner to complete the recommendations of the evaluator. Sellers are unlikely to be interested in making additional improvements to the property, just before they move. The party that would be most interested in making changes to the residence, the new owner, is not generally present during the evaluation and receives the information in the written disclosure report. It is clearly more difficult to unfairly sway and influence owners by providing only written information which can easily be reviewed for accuracy by third parties.

The Agency therefore contends that this provision, broadening the eligibility criteria for certification, is both needed and reasonable.

6 MCAR § 2.2507 Qualification Procedures for Evaluators

This section describes the requirements and the process for persons seeking to become certified evaluators. These requirements are essential in order for the Agency to be certain that quality evaluations are being provided to buyers of residences in the state. Unless there is a general belief that the information provided in the disclosure reports is accurate and useful, the demand for the program will be minimal.

A. Prohibition of discrimination. No person shall be denied the right to become an evaluator on the basis of race, religion, nationality, creed, sex, age or sexual preference.

This provision is self-explanatory. It is needed to assure that the Agency does not discriminate in its training, testing, and other certification requirements.

B. Training.

1. Except as provided in 2., no person shall be eligible for certification pursuant to C., unless he or she has first participated in a training course which has been approved by the Agency and which covers the subject matter tested in the evaluator certification examination.

This provision is necessary to require all persons who want to become evaluators to first participate in a training course. Because of the large amount of information that an evaluator must know, comprehensive training is critical for the program to be successful.

The Agency has developed a curriculum for these training courses. Because the evaluation will coincide with the audit provided under the federal program, several training programs are already in place. These courses are generally about eighty hours in length. The courses may be taught by several private firms, as well as many area vocational technical institutes across the state.

2. The following persons shall be permitted to take an appropriate Agency approved orientation session, in lieu of the requirements of 1.

a. Any HED evaluator certified before July 1, 1981;

b. Any person successfully completing an approved 30 hour training course for the HED program prior to July 1, 1981;

c. Registered architects and registered engineers with work experience in energy auditing or the design of institutional, commercial, residential or industrial buildings;

d. Any person who has six months' energy auditing experience and who has completed 25 energy audits for a non-profit organization;

e. Members of the American Institute of Real Estate Appraisers, the Society of Real Estate Appraisers, the Independent Fee Appraisers or other associations determined by the Agency to have applicable training requirements for their members;

f. Certified evaluators for Truth in Housing Programs;

g. Building officials certified by the Building Codes Division of the Minnesota Department of Administration.

This provision is necessary to allow the comprehensive training requirements to be waived for certain groups of people who already have some background training. The full training course required in the previous provision assumes little background in energy evaluations. However, there are many people who have extensive involvement in residential energy auditing, construction, structural evaluation and appraising. These groups of people already possess much of the expertise and knowledge that is taught in the comprehensive course.

A. HED evaluators certified before July 1, 1981 have already received 30 hours of training required under the rules adopted by the Department of Administration. This groups does not need to be re-trained on basic concepts that comprise a great portion of the comprehensive course. It is generally expected that these people will take an orientation course of between 25 to 40 hours which includes the calculation procedures for the additional standards, background on renewable resource measures, and conducting flue gas analysis.

B. There are many people who have taken and passed the 30 hour training course required under the program administered by the Department of Administration. Because of this training, these people do not need to

be retrained on all of the basic materials that are covered in the comprehensive course. The orientation course outlined above will provide an adequate but thorough background necessary to perform quality evaluations.

C. Registered architects and engineers with experience in energy design concepts for building construction unquestionably have a thorough background in the concepts of energy evaluations. However, some type of training is necessary to ensure that they are familiar with the calculation procedures, and with the procedures used in actually conducting the evaluation. An orientation session in which these procedures are reviewed is a reasonable requirement to ensure that all evaluators provide consistent and accurate disclosure reports.

D. Persons who have completed 25 energy audits and have 6 months experience working for a non-profit weatherization program also have much of the experience and knowledge necessary for performing disclosure reports. These persons receive training in residential structures, the inspection process and some calculation of heat loss theory. They do not need the comprehensive training outlined in the previous section. However, some training is necessary to present the calculation procedures used in the calculation procedures used in the evaluation, as well as background in renewable resource measures. An orientation course is a reasonable requirement to ensure that all evaluators provide consistent and accurate disclosure reports.

E. Real estate appraisers also possess much of the background and knowledge necessary to become evaluators. They generally have a strong expertise in residential construction and in the procedures for completing comprehensive inspections and evaluations. However, training is generally needed in energy evaluation procedures, and for renewable resource measures, an orientation course is a reasonable method to provide that necessary information.

The American Institute of Real Estate Appraisers, the Society of Real Estate Appraisers, and the Independent Fee Appraisers are all professional associations that represent appraisers. Because that industry is so fluid, other organizations may exist which represent qualified appraisers who may desire to become certified evaluators. It is reasonable to allow members of other similar organizations to have access to these orientation sessions, because of their similar backgrounds, experience, and training.

F. Certified evaluators for "Truth in Housing" Programs perform comprehensive inspections of the structural components of residences to be sold in several cities. Because of their training and experience in housing construction and evaluations, they do not need the comprehensive training required in the previous section. However, training is needed for energy evaluation calculation procedures, and in renewable resource measures. The orientation session training is a reasonable requirement for Truth in Housing Evaluators to ensure that quality evaluations are performed under this program.

G. Building officials certified by the Building Codes Division of the Minnesota Department of Administration also possess many of the skills and knowledge necessary to become certified evaluators. Because of their familiarity with housing construction and inspection techniques, orientation training in energy evaluation procedures and calculations and in renewable resource measures is necessary.

C. Certification: Only those persons who satisfy all of the following conditions shall be certified:

Minn. Stat. 116H.129, Subd. 6 provides for the certification of evaluators. These provisions are needed to ensure that only qualified persons provide disclosure reports.

1. All persons must take and pass a certification examination conducted by the Agency. The certification examination shall test for the following qualifications:

   a. A general understanding of the three types of heat transfer and the effects of temperature and humidity on heat transfer;

   b. A general understanding of residential construction terminology and components;

   c. A general knowledge of the operation of the heating and cooling systems used in residential buildings, including the need and provision for combustion air;

   d. A general knowledge of the different types of each applicable program measure, of the advantages and disadvantages and applications of each, and of the DOE installation standards;

   e. The capability to conduct the HED energy evaluation including: a working knowledge of energy conservation practices, the ability to determine the applicability of each of the program measures, and proficiency in the auditing procedures for each applicable program measure established in 6 MCAR § 2.2504;

   f. A working ability to calculate the steady state efficiency of furnaces or boilers;

   g. An understanding of the nature of solar energy and its residential applications including: insolation, shading heat capture and transport, and heat transfer for hot water;

h. An understanding of the nature of wind energy and its residential applications including: wind availability; effects of obstruction; wind capture; power generation; and interfaces with residential and utility power lines; and

i. A working knowledge of building and fire codes related to the installation and safety of wood burning appliances.

Each person completing the comprehensive or orientation session training must successfully pass a certification exam in order to become certified. This exam is necessary to ensure that each person has learned the information presented during the training, and that they possess the knowledge necessary to perform accurate and thorough evaluations.

Minn. Stat. 116H.129, Subd. 6 provides that persons be certified only if they meet the requirements provided in the federal energy audit program. These requirements are described in the adopted Agency rules implementing the federal program in 6 MCAR § 2.2307 B 2.

This provision in the proposed HED rules describing the minimum knowledge and skills is the same as that included in the federal program. This is necessary because the statute (Minn. Stat. 116H.129, Subd. 6) requires that evaluators be certified only if they meet all of the requirements for conducting audits under the federal program.

2. All persons shall submit a $50 certification fee to the Minnesota Energy Agency. However, no certification fee shall be charged for certified municipal building officials who are directly employed by a municipality as defined in Minn. Stat. 16.84, Subd. 3, or for employees of private non-profit community-based organizations, when the evaluations are performed as part of the employee's normal job responsibilities.

This provision is needed because Minn. Stat. 116H.129, Subd. 6 requires the setting of a fee for the certification of evaluators which is sufficient to cover the ongoing costs of the program once it is established. It is reasonable to set the fee at $50 because the Department of Administration had set the charge at that level as it administered the program. To change that level would be unfair to people who have already paid that fee to become certified.

The provision exempts two groups from having to pay the certification fee. It is necessary to waive the certification fee for certified municipal building officials so that they may evaluate residences owned by that municipality without the additional expenditure of public funds. The provision also has the affect of encouraging municipalities engaged in other types of evaluations of residences to perform this evaluation as well. It is also reasonable to continue this rule which was originally adopted by the Department of Administration, in order to avoid confusion over the requirements of the program.

The second group, employees of private non-profit community-based organizations is also waived from this provision. This provision is necessary because Minn. Stat. 116H.129, Subd. 6 provides for the encouragement of the certification of existing groups of trained municipal personnel and qualified individuals from community based organizations and public service organizations. By waiving the certification fee, it is hoped that individuals from such organizations will be encouraged to become certified. Because of the high visibility and credibility of many of these organizations, it is believed that a greater number of evaluations might be performed which will contribute to the success of the program.

In addition, many community based organizations commit their resources on low income people by either providing services directly to them, or by providing training for employment. The waiver of the certification fee may induce the training of evaluators, and may result in lower cost evaluations for persons served by these organizations.

This provision only provides for the waiver of the certification fee when the municipal building official or the individual from the community-based organization performs the evaluations as part of their normal job responsibilities. These groups would not be exempted from the fee if evaluations were performed as a secondary source of income for the individual. This provision is intended to encourage municipalities and certain organizations to offer the evaluation as one component of other services that are offered to their constituents.

a. No certification fee shall be charged for those persons upgrading their certification who were certified prior to July 1, 1981.

This provision is needed because Minn. Stat. 116H.129 Subd. 6 stipulates "the director may eliminate the examination fee for persons seeking upgraded certificates." In order to encourage evaluators certified by the Department of Administration to upgrade their certificates in order to continue in the program after January 1, 1982, the rule provides for the elimination of the fee. This provision is reasonable in order to reduce the cost evaluators will face as they decide whether to seek upgraded certificates. The Agency does not intend to charge an examination fee per se. Because the evaluation performed under this program meets the standards of the audit under the federal program, the certification examination is identical. Under the federal audit program, the Agency does not charge an examination fee. When an individual completes the necessary training and requests to take the certification examination, it is impossible to determine whether that person will be certified in this program, the federal program, or both. Therefore, it is not possible to charge an examination fee.

However, the statute (Minn. Stat. 116H.129 Subd. 6) does provide for the setting of a fee for the certification of evaluators. When a person successfully completes the certification examination, and applies for certification in the HED program, they will be charged this fee, if applicable.

b. The Energy Agency may charge a fee for those persons seeking to be recertified.

This provision is needed because the statute (Minn. Stat. 116H.129 Subd. 6) requires the setting of a fee for the certification of evaluators sufficient to cover the ongoing costs of the program once it is established. Because the same subdivision provides for establishing requirements for continuing education, periodic recertification, and revocation of certificates, it is necessary for a recertification fee to be established to support the costs of administering the program.

3. All persons shall provide evidence satisfactory to the Agency of liability and of errors and omissions insurance. The minimum value of protection in each category shall be $50,000 and the insurance shall be of the "occurrence" variety where coverage is based on the date when the evaluation is made. Coverage shall not be required for evaluators who are employed by municipal governments and who perform evaluations as part of their normal job responsibilities. Certified evaluators who have provided a bond to the State as required by the Building Code Division of the Department of Administration shall not be required to obtain the protection required by this paragraph until that bond expires. Bonds shall not be renewed for the purposes of the HED program. In addition, each insurance policy shall:

   a. Name the State of Minnesota as a coinsured party.

   b. Be written by a corporate surety licensed to do business in the State of Minnesota.

This provision is needed in order to protect owners of residences who suffer loss because of the information provided to them in the disclosure report. For example, if the residence is sold to a buyer who intends to rent it out, and the disclosure report indicates that the residences complies with the mandatory standards, the buyer could face unexpected expenses if that evaluation is faulty. The requirement for errors and omissions insurance is, therefore, reasonable to ensure that the buyer has recourse in the event of a faulty disclosure report.

This provision also requires liability insurance, which is needed to ensure that evaluators have some protection in the event they are injured during the course of performing the evaluation. Evaluators face some risk as they perform their inspection of the residence. For example, there is a risk of falling from ladders as attics and other components are evaluated.

The provision further requires insurance of the occurrence variety. This type of insurance is necessary to ensure that the owner is protected from errors by the evaluator, even if the evaluator later cancels the policy. In many instances, it may be several months before an error is found. Unless insurance coverage is based on the date on which the evaluation is made, the owner may have little recourse.

The provision waives the insurance requirement for municipal employees. This exemption is reasonable because this group is protected by insurance protection through their employers.

The provision also permits evaluators in the program previously certified by the Building Codes Division of the Department of Administration to obtain the insurance once their performance bond expires. This provision is reasonable so that evaluators who have, in good faith, and in accordance with the rules promulgated by the Department of Administration, obtained the performance bond, are not required to suffer any financial loss due to the changes in the rules regulating the program. Those bonds would typically be renewed automatically; however, the premium must generally be paid at least once a year. It is at that point that an evaluator would be required to convert his or her protection from the land to the insurance policy.

The requirement that the state be named as a coinsured party is needed to protect the state against suit in the event an owner suffers loss and claims that the state program prompted or caused the loss. The provision requiring that the policy be written by a corporate surety licensed to do business in Minnesota, is needed to ensure that only authorized companies write the insurance policies.

D. Certification examinations. Examinations shall be conducted by the agency and offered at the following times:

1. Within two days after the completion of each state-sponsored training course or orientation session, or

2. Once a month, until June 1982, with a minimum of two examinations per year afterward.

3. This recertification shall occur annually, for the life of the program.

This provision is needed to clarify the process of recertifying evaluations. Minn. Stat. 116H.129 Subd. 6 provides for the continuing education of evaluators. Because the evaluation that is performed is so technical and complex, refresher courses, additional training in specific technical areas, or update courses for notifying evaluators of changes may be needed. The agency intends to make use of the network of private institutions and area vocational technical institutes to provide these continuing education courses.

It is reasonable for the Agency to waive the additional training if it is determined that none is needed. In this event, the Agency intends to notify evaluators that no substantive changes have been made, and that certification will be renewed automatically. The rule also provides for the life of the program, to ensure that the process will be systematic.

C. Personnel from other states. Any person who is certified to conduct Residential Conservation Service audits in another state shall not be required to take the training course established in 6 MCAR § 2.2507 B.1, but shall be required to pass the evaluator certification examination.

This provision is needed to allow auditors certified in other states to take advantage of their training and experience and participate in the HED program. Because the disclosure report and the training are the same as that provided for in the federal energy audit program, it is reasonable to allow persons certified in other states to be waived from the training requirements. They will be required to successfully pass the certification examination, so that the Agency is assured that the individuals are capable of providing accurate and reliable disclosure reports.

6 MCAR § 2.2509 Decertification of Evaluators:

This section is needed so that the Agency can remove from the program those evaluators who are no longer eligible to provide the disclosure reports. Provision for this section is included in Minn. Stat. 116H.129 Subd. 6.

A. Insurance. Certification shall be revoked upon cancellation or expiration of the insurance protection required in 6 MCAR § 2.2507 C.3.

This provision is needed so that the Agency is assured that only evaluators with the appropriate insurance protection are providing disclosure reports for homeowners. Without this protection, the owner has little recourse in the event of a defect in the disclosure report.

B. Training. Certification shall be revoked for any HED evaluator certified before July 1, 1981, who does not successfully complete the appropriate training course required in 6 MCAR § 2.2507 B, and the certification examination required in 6 MCAR § 2.2507 C.1.

This provision is needed in order to decertify any evaluator who was certified by the Department of Administration who does not complete the upgrading training and pass the certification examination. All evaluators certified by that department have been notified that the Energy Agency has been given the responsibility for administering the program, that the evaluation will be changed, and that evaluators must receive additional training and pass the certification examination prior to January 1, 1982.

C. Recertification. Certification shall be revoked for any evaluator not meeting the recertification requirements of 6 MCAR § 2.2508.

This provision is needed to put evaluators on notice that if they fail to comply with the recertification requirements, that they will be decertified.

D. Non-sufficient fund checks. Certification shall be revoked for any evaluator whose check or draft issued for payment of the certification fee is returned for non-sufficient funds.

This provision is needed so that the Agency can decertify any individual whose check or draft used to pay the certification fee is returned for non-sufficient funds. Because the processing of checks is occasionally lengthy, it would be unreasonable to withhold certification until the Agency was assured that a check or draft had cleared the financial institution. Returning of checks by those institutions occurs so seldomly that it is administratively more expedient to issue certification without delaying the process by waiting for checks to clear.

E. Wrongful acts. Certification shall be revoked when reasonable evidence indicates an undisclosed conflict of interest, a violation of these rules, unethical practices, or negligent performance of duties as an evaluator. In such instances, the Agency will, if requested, provide a review to determine whether the revocation was proper. Such a review shall consist of the following procedures:

1. The evaluator shall make a written request for a review to the Agency.
2. The Assistant Director, Conservation Division, shall determine a time to review the request.
    a. The evaluator may present testimony in person or in writing.
    b. The evaluator may present witnesses on the evaluator's behalf.
    c. Agency staff may present written or oral testimony, as well as witnesses.
3. The Assistant Director, Conservation Division shall make a judgement based on the information presented in the review hearing. That judgment shall be presented in writing to the evaluator within three working days of the review.

This provision is needed so that evaluators are put on notice that their certificates can be revoked if they violate the rules regulating the program, engage in unethical practices related to performing the evaluation or perform negligently as an evaluator.

The agency intends to review and maintain records of all complaints against evaluators. The Agency recognizes, however, that the evaluation is complex, and that, in some sense each residence is different, which requires some subjective judgment by the evaluator. If a pattern of complaints regarding negligence develops, though, the Agency will notify the individual of their decertification, and their right to appeal.

A violation of these rules, including failure to provide the appropriate disclosure for conflicts of interest will result in immediate notice of decertification by the Agency. This provision is needed to ensure that evaluators will provide thorough and accurate evaluations and disclosure reports.

This provision of the rules also outlines the process by which an evaluator who has been decertified can appeal that decision. The provision is needed to allow a right of appeal to any individual who believes that the decertification was unfounded. The proposed process is a reasonable method in order for both the individual and the Agency to present evidence, testimony and witnesses. The Assistant Director, Conservation Division, who is uninvolved in the decision to decertify, is designated as the person who would review the information and reach a decision. This review process is a reasonable method by which to promptly and fairly review the circumstance surrounding a decertification of an evaluator.

F. Failure to Report: Certification shall be revoked if the reports required in 6 MCAR § 2.2504 A. are not submitted to the Agency as requested.

This section is necessary to ensure that reports that are required by the Agency be submitted by evaluators. Those reports are needed in order to evaluate the effectiveness of the program overall and to determine if evaluators are properly and accurately completing the disclosure reports.

6 MCAR § 2.2510 Calculation Procedures.

The following procedures shall be the basis for calculating energy savings for program measures. This section is needed to outline the basic calculation procedures that are used in performing the evaluation and completing the disclosure report. These procedures are the same that are used to complete the audit in the federal energy audit program. These estimates and calculations are derived from either the American Society of Heating, Refrigeration and Air Conditioning (ASHRAE) journals, or from the Department of Energy RCS Model Audit.

A. Energy Conserving Measures

1. General energy savings equations. The following equation will be used to calculate energy savings for the practices and measures listed below, except for those that are already termed in E.

Equation #1. $$\Delta E = \frac{\Delta H \times D \times 20.4}{N \times V}$$

Where:

$\Delta E$ = The quantity of annual energy savings in the appropriate energy units, e.g. hundreds of cubic feet of natural gas, gallons of fuel oil, or kilowatt hours of electricity.

$\Delta H$ = The difference in design heat loss per degree Fahrenheit between the improved condition and the existing condition for infiltration and/or thermal transmission. Equations for calculating H are listed in subsequent subsections.

D = The normalized annual degree days as published by the National Oceanic and Atmospheric Administration (NOAA).

N = The seasonal operating efficiency of the heating system.

V = The heating value of the fuel type, consistent with $\Delta E$ and $\Delta H$.

2. Caulking.

Equation #2. $$\Delta H = .018 \times \Delta I \times Vol$$

Where:

$\Delta I$ = change in infiltration rate in air changes per hour

Vol = volume of heated space in cubic feet

3. Weatherstripping. Use Equation #2.

4. Furnace efficiency modifications.

a. Replacement furnaces or boilers.

Equation #3. $$\Delta E = E_h \left(1 - \frac{N_o}{N_1}\right)$$

b. Furnace replacement burner.

Equation #4. $$\Delta E = .14\ E_h$$

c. Flue Opening Modifications

Equation #5 $$\Delta E = .08\ E_h$$

d. Install electronic ignition system.

(1) If pilot is turned off during the summer.

Equation #6. $$\Delta E = \frac{3600Fp}{V}$$

(2) If pilot is left on in the summer.

Equation #7. $$\Delta E = \frac{7300Fp}{V}$$

Where:

$E_h$ = Total annual energy used for space heating, in units of fuel.

$N_o$ = The seasonal operating efficiency of the existing heating system.

$N_1$ = The seasonal operating efficiency of the proposed heating system.

$F_p$ = Rate at which pilot uses energy, in Btu per hours. (Typically 800 to 1000 Btu per hour).

V = Heating value of the fuel type in Btu per unit of fuel.

5. Replacement central air conditioner.

Equation #8. $$\Delta E = E_c \left(1 - \frac{PSE}{NSE}\right)$$

Where:

$E_c$ = Annual energy used by existing central air conditioner, in units of fuel.

PSE = Present seasonal efficiency.

NSE = New (proposed) seasonal efficiency.

6. Ceiling insulation.

Equation #9. $$\Delta H = \left(\frac{1}{R_o} - \frac{1}{R_1}\right)A$$

Where:

$R_o$ = Total R-value of existing insulation and existing construction materials in present condition.

$R_1$ = Total R-value of proposed condition to include total recommended R-value of the insulation and construction materials.

A = Area for which additional insulation is being proposed.

7. Wall insulation. Use Equation #9 for above grade walls.

8. Floor insulation. Use Equation #9.

9. Duct insulation.

Equation #10.
$$\Delta E = \frac{\left(\frac{1}{R_o} - \frac{1}{R_1}\right)(T_2 - T_1)\ A \times HRS}{NV}$$

Where:

$R_o$ = The total R-value of the ducts before improvement.

$R_1$ = The total R-value of the ducts after improvement to include total recommended R-value of the insulation and construction materials.

$T_2$ = Average temperature of air inside ducts during an on cycle of the heating system.

$T_1$ = Average temperature of the unconditioned space the ducts pass through.

A = Duct area for which insulation is proposed.

HRS = Number of hours the heating system operates in a heating season.

N = Seasonal operating efficiency of the heating system.

V = Heating value of fuel in Btu per unit of fuel.

10. Pipe insulation.

Equation #11.
$$\Delta E = \frac{(Q_1 - Q_o)\ L \times HRS}{NV}$$

Where:

$Q_1$ = Heat loss in Btu/hr. ft. before improvement

$Q_o$ = Heat loss in Btu/hr. ft. after improvement

L = Length of uninsulated pipes in unconditioned space.

HRS = Number of hours per year the heating system operates in a heating season.

N = Seasonal operating efficiency of the heating system.

V = The heating value of the fuel in Btu per unit of fuel.

11. Water heater insulation.

a. If water heater is in an unconditioned space.

Equation #12.

$$\Delta E = \frac{8760A\left(\frac{1}{R_o} - \frac{1}{R_1}\right)(T_w - T_a)}{N_r V}$$

b. If water heater is in a conditioned space.

Equation #13.

$$\Delta E = \frac{H \times A \times \left(\frac{1}{R_o} - \frac{1}{R_1}\right)(T_w - T_a)}{N_r V}$$

Where: A = Area of water heater to be insulated.

$R_o$ = Total R-value of the existing insulation and existing construction materials of the water heater before improvement.

$R_1$ = Total R-value of the water heater after improvement to include total recommended R-value of the insulation and construction materials.

$T_w$ = Hot water temperature.

$T_a$ = Average air temperature of area surrounding water heater.

$N_r$ = Recovery efficiency of water heater.

V = Heating value of fuel type in Btu per unit of fuel.

H = Number of hours per year that the outside temperature is above $65^{o}$F.

12. Storm and thermal windows.

Equation #14.

$$\Delta H = \left(\frac{1}{R_o} - \frac{1}{R_1}\right) X A$$

Where:

$R_o$ = The R-value of the existing window assembly.

$R_1$ = The R-value of the proposed window assembly.

A = The area of the window assembly.

13. Storm and thermal doors. Use Equation #14 where:

$R_o$ = The R-value of the existing door assembly.

$R_1$ = The R-value of the proposed door assembly.

A = The area of the door assembly.

14. Heat reflective and heat absorbing window or door material.

Equation #15. $$\Delta E = \frac{A \times F_{ss} \times F_{es}}{N_{ac}}$$

Where:

A = Area of glazing

$F_{ss}$ = Summer shading factor

$F_{es}$ = Glazing orientation factor

$N_{ac}$ = Seasonal efficiency of the air conditioning system.

15. Load Management.

Each utility offering such system will provide E according to the particular system that the utility offers.

16. Clock thermostats.

Energy savings will be given for a single 8 hour night setback.

Equation #16a $\Delta E = .07_h$ for $5^{\circ}F$ setback

Equation #16b $\Delta E = .10E_h$ for $10^{\circ}F$ setback

Equation #16c $\Delta E = .11E_h$ for $15^{\circ}F$ setback

Where:

$E_h$ = Total annual energy used for space heating, in units of fuel.

17. Solar domestic hot water.

Equation #17. $$\Delta E = SSF \times E_{hw}$$

Where:

SSF = Solar saving fraction=fraction of hot water supplied by the solar system (Target SSF = .7)

$E_{hw}$ = Annual energy used for heating domestic hot water, in millions of Btus.

18. Passive solar systems.

a. Direct gain glazing, indirect gain-water well storage, indirect gain - trombe wall storage.

Energy savings for 100 square feet of double glazing with R-8 night insulation.

Equation #18. $$\triangle E = \frac{8 \times PSF \times F_o}{N}$$

b. Indirect gain-thermosiphon air panel.

Energy savings for 100 square feet of panels:

Equation #19. $$\triangle E = \frac{3 \times PSF \times F_o}{N}$$

c. Sunspace systems.

Energy savings for 100 square feet of vertical double glazing:

Equation #20. $$\triangle E = \frac{4 \times PSF \times F_o}{N}$$

Where:

$\triangle E$ is in million of Btu

PSF = Prime Solar Fraction, estimated by auditor.

$F_o$ = Orientation Factor, from tables.

N = Heating system seasonal efficiency.

d. Window heat gain retardants.

Same as Equation #14.

19. Wind energy devices.

a. Systems providing utility grade power that can be sold to the electric utility when the system provides excess power. A system will be chosen with an Annual Wind System Output (AWSO) equal to one half the current annual electric use.

Equation #21a $$\triangle E = 1.0 \text{ AWSO}$$

b. Systems providing variable voltage power for heating use only. A system will be chosen with an Annual Wind Systems Output (AWSO) equal to one half of the annual heat supplied by the space heating system.

Equation #21b $\Delta E = 1.0$ AWSO

Where:

AWSO = Annual Wind System Output in kwh

20. Replacement solar swimming pool heaters.

Equation #22 $\Delta E = SSF \times E_{sp}$

Where:

SSF = Solar Saving Fraction = Fraction of swimming pool heat supplied by the solar system. (Target SSF = .5)

$E_{sp}$ = Energy used to heat the pool for the months of May through September.

21. Install positive shut-offs for all fireplaces or fireplace stoves.

Equation #23 $\Delta H = 1.08 (Q_o - Q_1) A$

Where:

$Q_o$ = The infiltration value in cubic feet per minute per square foot for the existing condition before improvement.

$Q_1$ = The infiltration value after improvement with a positive shut-off.

A = The cross sectional area of the flue or connector in square feet.

B. Energy Index

Energy Index = $E \times F_w$

Where:

E is energy content of all fuel (including electricity) used during the months of November through April, in Btus.

$F_w$ is a weather adjustment factor.

It is the ratio of the number of degree days in an average heating season (Nov. 1 thru April 30) to the number of degree days for the heating season preceding the calculation.

This provision is needed because Minn. Stat. 116 H.129 Subd. 7 requires that only residential energy audits meeting the standards of 42 USC 8211 shall qualify as an energy disclosure report. That federal law is implemented in Minnesota through state rule 6 MCAR § 2.2300 - 2.2310. 6 MCAR 2.2310 specifically describes the calculation procedures for use by auditors completing audits under the federal program. It is necessary to use those same calculation procedures fot the home energy disclosure evaluations and reports in order to produce the same results as in the federal energy audit program.