2019

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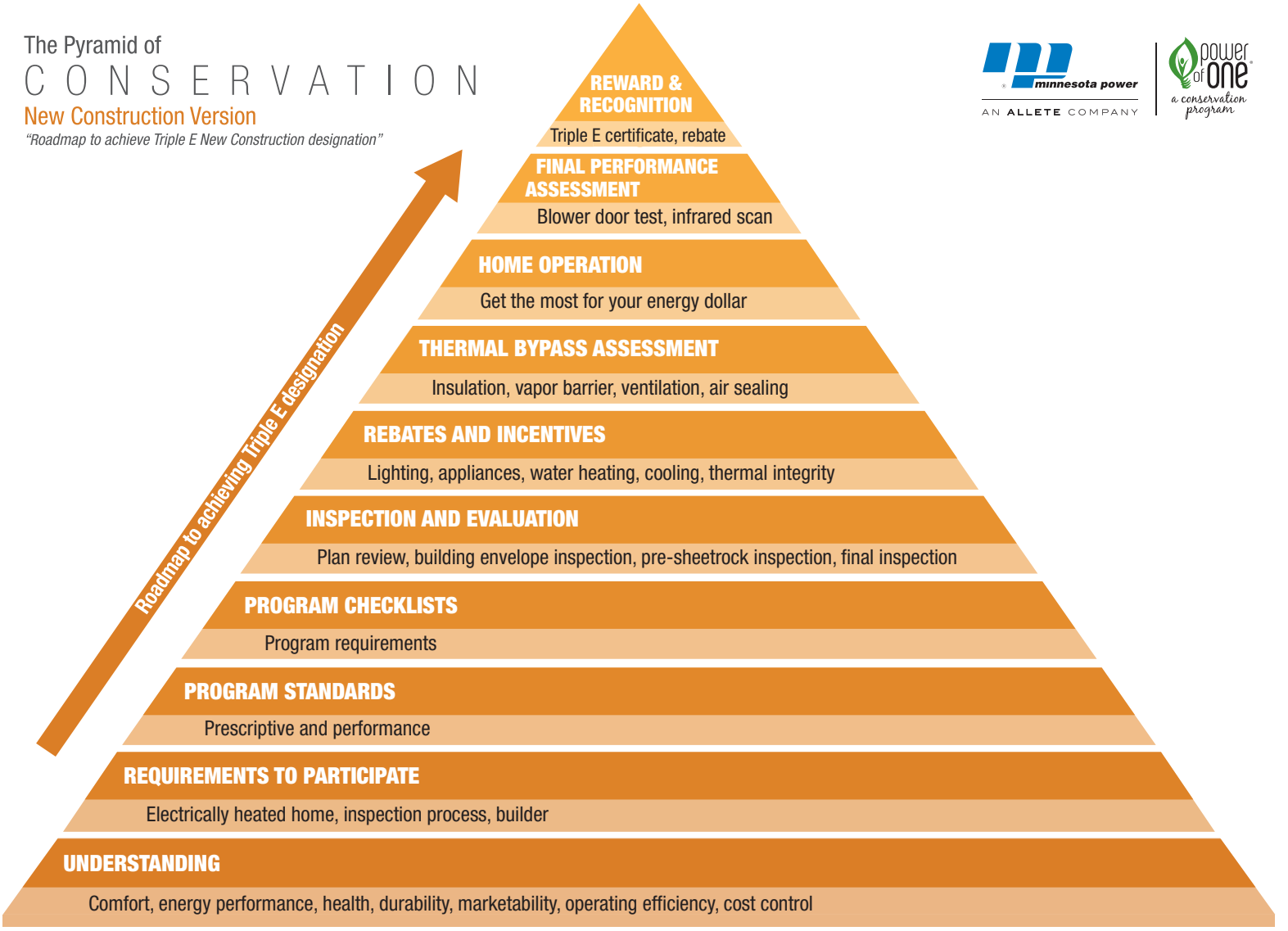
Triple E New Construction Guide

Energy Efficiency | Education | Evaluation

www.mnpower.com/TripleE

The Pyramid of
CONSERVATION
New Construction Version

"Roadmap to achieve Triple E New Construction designation"



www.mnpower.com/TripleE

Building a New Home–where do I begin to get the most for my energy dollar?

Think of your home as an energy-efficient system that can be optimized to deliver the outcomes you desire, from comfort and durability to energy performance and operational efficiency and cost control. The above New Construction Pyramid provides you and your builder a roadmap, or action plan, for acheiving the benefits of Triple E New Construction designation. Based on meeting specific prescriptive and performance standards, fulfilling the requirements for participation, and completing the inspection and evaluation process, you may qualify for up to $2,000 in incentives. Triple E homes have proven to average a 25% reduction in space heating costs compared to conventional new construction.

Triple E program updates and changes:

- All new construction homes are now eligible for a free plan review. Electrically heated homes could then continue with the Triple E program and be eligible for up to $2,000 in incentives, while all others will get information on standard residential rebates.
- Homes that are primarily heated with gas are not eligible for incentives.
- Gas backup furnaces need to be 90% AFUE with an ECM and gas boilers need to be 90% AFUE.
- R-5 thermal break at all concrete outside of the house (attached garages, porches, patios, etc.).
- Six-sided cavities on all non-spray foam stud cavities.
- Fire breaks in double stud walls.
- Water heater cyclers need to be programmable.
- No ductwork under slabs.
- A passive radon mitigation system must be installed. A vent pipe is installed into aggregate beneath the basement slab or under a crawl space and extended through the roof. An electrical junction box is required to be roughed in to the attic near the pipe, so that an active system with a fan can be added easily in the future, if needed.
- All forced air systems must be fully ducted and sealed with mastic.
- Mechanical rooms need to be a part of the conditioned living space.

Thinking about solar?

Minnesota Power offers a variety of programs, including rebates, for customers who are interested in solar energy for their homes and businesses. There is no better time to consider solar than when designing and building a new home. There are many aspects of a solar system that may be incorporated into the design and build phases of a project that will ease the installation and cost of solar. This will improve the overall energy performance of the home.

Solar energy systems require consideration of orientation of roof lines, structure of the building, materials used in roofing, the path of the energy output into the building, and placement of equipment. It is also important to be aware of the process for connecting a solar system to Minnesota Power's distribution system. There are many great resources available to get you started in thinking about how to incorporate solar into you project. Visit our webpage: **www.mnpower.com/Environment/CustomerSolar**

The **New Construction Guide to Triple E Homes** is a resource for licensed builders, owner-builders, designers and new homeowners. It sets standards for building energy-efficient, comfortable, healthy and durable new homes. These standards include both **prescriptive** (i.e., thermal efficiency, moisture control, air quality, heating and domestic hot water) and **performance** (i.e., heating and air-tightness) measures. Although the Triple E Program provides flexibility from a design perspective, these standards ensure consistency in the Triple E home(s) performance. Based on builder and homeowner input and Minnesota Power's desire to continuously improve building practices, the Triple E Program provides minimum program standards to follow. Builders and homeowners are encouraged to upgrade specific thermal efficiency specifications and to meet increased air tightness standards. By exceeding air tightness standards, Minnesota Power offers increased incentives.

We encourage licensed builders, owner-builders and potential new homeowners to take advantage of the educational aspects of the program. Minnesota Power offers energy-efficient construction and design seminars and product exhibits designed to help you make informed decisions that affect the long-term operating costs, comfort, marketability and durability of your new home.

An energy-efficient home benefits you and your family directly through lower energy bills, enhanced building durability, improved resale value, and higher levels of comfort. It benefits society by saving energy and helping the environment.

For more information on any of the topics presented in this guide, please talk with your local Minnesota Power representative, or call 218-355-2843 and ask for a Triple E Program representative.

Your Energy Partner,

Minnesota Power

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SIX REASONS TO BUILD AN ENERGY-EFFICIENT HOME

Comfort

Triple E's high insulation requirements and air-tightening techniques can reduce heat loss and drafts, providing even temperatures throughout the home. High insulation levels and sealing air bypasses also provide a quieter living environment.

Health

The latest in ventilation techniques and a continuous vapor barrier can enhance air quality, and at the same time, reduce excess moisture and indoor pollutants in your home.

Energy Performance

Triple E homes can use less energy for space heating than conventional homes. Triple E homes show an average of a 25 percent reduction in space heating costs in comparison to conventional new construction. Lower heating requirements and more effective heating systems can reduce both first cost and operating cost of the system installed.

Durability

In its effort to minimize heat loss, the Triple E Program promotes tight-fitting, high-quality windows and doors with high R-values. Superior air-tightening techniques prevent warm moist air from entering and condensing in wall, ceiling and rim joist areas. The controlled ventilation and air-tightness requirements of the program can reduce the potential for moisture problems.

Marketability

A home which provides the owner lower energy costs, improved comfort, health, and durability, will naturally increase in market value and resale potential. A Triple E certification can provide an owner or builder greater recognition for the design and construction of a high-performance home.

Operating Economy and Financing

Better energy performance can also mean lower operating costs. Buyers wishing to stretch their mortgage (dollars) can take advantage of bank programs that reward energy-efficient construction.

MISSION

Triple E seeks to promote building practices and applied technology that upgrades the energy-efficiency, comfort, health and durability of the new construction market in and around Minnesota Power's service territory. It will do this by establishing energy-efficiency standards, conducting on-site inspections and completing home performance tests on all Triple E homes. The Triple E Program also provides ongoing education and incentives, and building a network of industry professionals committed to energy-efficient new construction and design.

OBJECTIVES

1. To work in partnership with the building industry to develop the capability to construct and market quality housing that is both energy efficient and cost effective.

2. To achieve average space heating requirements in new homes built to Triple E guidelines that are 25 percent lower than standard new homes in our area.

3. To monitor and evaluate Triple E homes over a period of time to identify optimum construction techniques, performance of heating and ventilation systems, indoor air quality, end-use energy consumption and home-owner satisfaction.

4. To incorporate building components in the Triple E home that address the issues of indoor air quality, moisture and mold.

5. To meet or exceed current Minnesota State Energy Code.

6. To offer education and training programs to building contractors, subcontractors, homeowners and industry support people (i.e., suppliers, code officials, bankers, realtors, architects, and engineers) to meet continuing education requirements and assist all parties' understanding of the long-term benefits of energy-efficient, environmentally sound home construction.

7. To continually improve the energy efficiency of Triple E homes via innovative products and practices, increased standards, ongoing training and evaluation, and research and development.

8. To work with manufacturers, builders, subcontractors, distributors and vendors to increase the market acceptance and availability of new products and building materials.

PROGRAM DESCRIPTION AND SCOPE

The Triple E New Construction Program is voluntary. It is designed to identify advanced building practices and techniques and new innovative technologies that result in cost-effective, energy-efficient new home construction. The minimum specifications for Triple E homes are intended to meet or exceed Minnesota State Energy Code guidelines. In any case where federal, state or local codes/regulations exceed the requirements herein, that code or regulation shall apply. Additional technical specifications related to thermal efficiency, moisture control, air quality, and space/water heating are incorporated into the program to improve the energy efficiency, comfort, health and durability of a new home.

Triple E stands for **E**NERGY-EFFICIENCY, **E**DUCATION and **E**VALUATION. Through the interaction of these components, Minnesota Power, in conjunction with building contractors and homeowners, will create a systematic approach to energy-efficiency in residential new construction (i.e., single family and 2–4 unit dwellings) that optimize cost-effective construction.

The Triple E New Construction Program is based on the concept of the "**House as a System**" (how all building components interact and affect the overall energy usage and comfort of the new home). The program encourages efficiency through specific **prescriptive** and **performance** standards (see Appendix 1). Minnesota Power believes minimum thermal standards and specific performance standards will result in improved building practices, optimum energy efficiency and greater customer satisfaction.

The Triple E Program's emphasis on energy-efficiency standards, education, and ongoing evaluation results in continuous improvement in the quality and operating costs of homes built in our area. Triple E New Construction information is available electronically at **www.mnpower.com/TripleE**.

PARTICIPATION REQUIREMENTS

1. New custom homes, spec homes, pre-built factory homes, and multiple-dwelling buildings up to four units are all eligible to participate in the Triple E Program.

2. All homes, regardless of home heating type, are eligible for a free plan review during the design stage of construction. In order to be designated as a Triple E certified home and be eligible for up to $2,000 in incentives, the home must have electric heat (i.e., dual fuel, firm, storage heat or heat pump). Non-electrically heated homes may be eligible for our standard residential rebates.

3. The builder/owner agrees to participate in the following inspections/reviews:
    - A plan review prior to construction
    - Up to two on-site inspections during construction
    - A final home performance inspection that includes a building air-tightness (blower door) test and infrared thermal scan

Triple E rebates/incentives are tied to the completion of each of the inspections. (See Appendix 2 for a complete listing of rebates.) The builder/owner is required to notify the Triple E representative at least one week in advance of each inspection.

4. Builders may complete up to three Triple E homes in a calendar year, subject to the discretion of the Minnesota Power representative and the availability of funds. Minnesota Power reserves the right to reject a builder application based on continued failure to meet program standards. Program offerings are subject to change at any time.

TRIPLE E PRESCRIPTIVE AND PERFORMANCE STANDARDS

Non-electrically heated homes are encouraged to build to these standards but are not eligible for Triple E prescriptive or performance incentives. For a list of incentives you may be eligible for, see Appendix 2.

PRESCRIPTIVE STANDARDS (R-values listed for insulation only)

(≥ means equal to or greater than, ≤ means equal to or less than)

1. **Foundation/basement wall and slab on grade foundation wall:** Minimum R-20 to footings. Insulation must extend to top of foundation wall and be securely attached. Required protection of exterior foam from sunlight and physical abuse and the installation of drainage materials along exterior walls to keep water away from the foundation.

   Minimum R-20 on entire foundation wall.
   Note: All designs need to be engineered to be frost protected.

2. **Slab on grade:** Floating slab—R-20 under entire slab and R-20 on slab edge.

3. **Basement slab or concrete floor:** Minimum R-20 under entire slab. Continuous vapor barrier/retarder under entire slab for moisture and radon control.

4. **Floors over exterior/unheated space:** R-30 plus R-5 continuous (rigid foam). Continuous air barrier required.

   Floors over heated space (i.e., heated crawl space and heated garages): R-30 cavity and continuous air barrier required.

5. **Exterior walls (insulation only):** R-21 cavity plus R-5 continuous or R-20 continuous.

6. **Exterior wind barrier (house wrap):** Continuous or sealed wrap applied on the exterior of the structure, extending from bottom of rim joist to the bottom of the exterior soffit. Also, the house wrap should cover all exterior sheathing material and cover cantilevered floors and bay windows. All seams must be taped with a high quality builder tape. The house wrap shall have a perm rating of greater than 1.0. (See Appendix 5 for perm ratings of common building materials.)

7. **Ceiling/attic (insulation only):** Must meet winter design performance criteria as specified by Minnesota State Energy Code with energy truss or raised heel.

   R-60 blown

   a. Warm air bypasses (i.e., soil stacks, electrical penetrations, chimney and vent chaseways, etc.) should be sealed to maintain the integrity of the vapor barrier/retarder and to minimize heat loss and condensation in cold attic.

   b. A solid wind wash barrier shall be provided at the exterior edge of attic insulation to prevent air intrusion into the attic insulation.

8. **Rim Joist:** R-20 cavity plus R-5 continuous or R-20 continuous. Continuous vapor/air barrier sealed in place on all rim joist areas.

9. **Windows:** $\leq$ U .30 (overall unit value).
   Maximum allowable window area: 18% (total window area to conditioned floor area ratio).

10. **Moisture Control**
    A continuous vapor barrier of less than 1.0 perm rating shall be installed on the winter warm side of exterior walls, ceilings and floors over unconditioned space. All bypasses caused by electrical and plumbing installations must be sealed to maintain the integrity of the vapor barrier. Also, a 6 mil polyethylene or other approved vapor barrier material must be installed under the entire surface area of the slab. (Appendix 5 lists the perm rating of common building materials.)

11. **Air Quality Control/Ventilation**
    The provision of adequate ventilation in residential buildings can only be assured with a central, whole house, pressure balanced, mechanical ventilation system. There is a need to assume a minimum continuous ventilation rate to control the level of indoor air and pollutants generated by occupants or by sources with no fixed or identifiable location. This is accomplished by ensuring a minimum level of makeup air. There is also a need to remove some contaminants that are generated at fixed locations, such as kitchens and bathrooms.

    The minimum rate for whole house ventilation, considering mechanical ventilation capacity and natural air leakage, is .35 ACH. Spot ventilation (kitchen and bathrooms) provided on an intermittent basis must be capable of 100 cfm in the kitchen and 50 cfm in the bathrooms.

    11.1 **Required Ventilation Options**
    Heat Recovery Ventilator (HRV) or Energy Recovery Ventilator (ERV), also known as air-to-air heat exchangers or whole house mechanical ventilation systems. System balancing is required and an optional incentive is available for the presence of a balancing verification label on the unit.

    Minimum apparent sensible effectiveness $\geq$ 80% at -13˚F. (See Appendix 4 for a listing of minimum requirements for ventilation systems.)

12. Space Heating and Domestic Hot Water

12.1 Space Heating

Electric space heating on the firm, Dual Fuel or storage/off peak rate (i.e., baseboard, slab heat, boiler, furnace, storage units, ground source heat pump, etc.). Ground source heat pumps must be ENERGY STAR® rated as listed at **www.energystar.gov**.

Backup Gas Space Heating: Minimum 90% AFUE for furnaces with ECM motors and 90% AFUE for hot water boilers. Note: Forced air systems must be fully ducted and no under slab ductwork is allowed.

All ductwork must be in conditioned living space.

12.2 Fossil Fuel Appliances

Combustion appliances (i.e., wood stoves, water heaters) must have an independent source of air directly connected to the combustion chamber (sealed combustion). Houses with wood and corn pellet stoves must meet code requirements.

12.3 Domestic Hot Water

The builder/owner is required to install a high-efficiency hot water heater and meet all state requirements for water conservation related to toilets, showerheads and faucet aerators. It is also recommended to install pipe wrap insulation on the hot and cold pipes leading to and from the water heater.

(See Appendix 1 for water heater efficiency requirements.)

13. ENERGY STAR® Lighting and Appliances

The home must have a minimum of five (5) ENERGY STAR light fixtures and the refrigerator, dishwasher, and clothes washer must be ENERGY STAR rated.

14. Building Orientation (optional)

Forty percent of glass area must be within 30 degrees south facing for optimum solar gain. This is an optional standard that qualifies for an additional $200 rebate. (Patio and slider doors are considered as window area.)

15. Drain Water Heat Recovery Unit (optional)

A drain water heat recovery unit captures heat from the drain water and uses it to preheat incoming cold water. Power Pipe, GFX unit or equivalent qualifies for an additional $400 rebate. This is an optional standard.

PERFORMANCE STANDARDS

1. Air Tightness Performance Standard

Not to exceed .20 cfm/ft^2 at 50 pascals.
Note: Acheiving air tightness levels of .10 cfm/ft^2 or greater results in an additional rebate amount.

Blower door analysis (depressurization technique) is completed during the final inspection.

EVALUATION OF TRIPLE E HOMES

1. **Plan Review/Blueprint Evaluation:** The builder/owner shall complete a plan review prior to construction. A $100 incentive is available for the completion of the review.

2. **First On-site—General Building Envelope Inspection:** The home shall be inspected after the shell is complete to pre-view insulation, air sealing, ventilation design, ductwork layout, etc. A $100 incentive is available for the completion of this inspection.

3. **Second On-site—Pre-sheetrock Inspection:** The home shall be inspected to assess installation of insulation, vapor barrier, air sealing and ventilation details, etc., prior to the installation of the drywall. This will determine compliance with Triple E prescriptive standards. A $100 incentive is available for the completion of this inspection.

4. **Final Inspection:** The builder/owner must be present for the walk-through final inspection. An air infiltration analysis (blower door) and infrared thermal scan will be completed to determine the overall air-tightness or infiltration rate of the home, and to check insulation levels and quality of installation. The results of the blower door analysis will help the builder/owner identify any areas of air leakage requiring remedial action.

   The builder and his/her subcontractors must ensure the ventilation system meets minimum air change standards and that there is sufficient makeup air in the home to prevent negative pressure. (Appendix 3 details the evaluation process.)

BUILDER AND HOMEOWNER REBATE INCENTIVES

State-licensed builders or owner-builders can qualify for specific incentives based on meeting or exceeding Triple E **prescriptive** and **performance** standards. Additional rebate incentives are available for installing qualifying ground source or air source heat pumps, ENERGY STAR® rated appliances and lighting fixtures, ECM motor in a forced air furnace, and a drain water heat recovery unit.

During the final inspection, a Minnesota Power representative signs the Triple E Project Report (Appendix 3) and indicates rebates achieved. The builder and owner receive a Triple E Home Certificate of Completion summarizing all the energy-saving details.

Appendices

Triple E Program Requirements

Minimum Insulation Requirements (Prescriptive & Performance Standards)	
Attic	R-60
Exterior Walls	R-21 cavity plus R-5 continuous or R-20 continuous
Rim Joist Continuous	R-20 cavity plus R-5 continuous or R-20 continuous
Foundation/Basement Wall	R-20
Slab Perimeter	R-20
Under Slab	R-20
Floor Over Exterior/Unheated Space	R-30 cavity plus R-5 continuous
Floor Over Heated Space	R-30 cavity
Air Tightness	≤ .20 cfm/ft^2 @ 50 pascals

Window Requirements	
Window U-value	≤ .30
Window Distribution	≤ 62.5%
Max Window Area	max 18%

Minimum Equipment Requirements (HVAC)	
Backup Gas Furnace Heating (forced air)	≥ 90% AFUE with ECM motor
Backup Gas Boiler Heating (hot water)	≥ 90% AFUE
Electric Heating	any
Electric Cooling (SEER)	≥ 14.5
Air-to-Air Heat Exchanger	≥ 80% HRV or ERV
Thermostats for Forced Air	ENERGY STAR® Programmable (communicating)

Water Heater Requirements	Electric	Gas
40 Gallon	0.93	0.62
50 Gallon	0.92	0.59
60 Gallon	0.91	0.57
80 Gallon	0.89	0.53
Gas Instantaneous (tankless)	n/a	any

Additional Requirements	
Compliance with Thermal Bypass Checklist	yes
Duct Location	conditioned space only
Duct Insulation	R-8
ENERGY STAR® Lighting	5 fixtures required
ENERGY STAR® Dishwasher	required
ENERGY STAR® Clothes Washer	required
ENERGY STAR® Refrigerator	required

Visit **www.mnpower.com/TripleE** for more details or to reference the Program Standards Section.

Triple E Program Requirements Checklist

(intended for builders and customers)

				Proposed Home
Minimum Insulation Requirements (Prescriptive & Performance Standards)				
☐	Attic	R-60		
☐	Exterior Walls	R-21 cavity plus R-5 continuous or R-20 continuous		
☐	Rim Joist Continuous	R-20 cavity plus R-5 continuous or R-20 continuous		
☐	Foundation/Basement Wall	R-20		
☐	Slab Perimeter	R-20		
☐	Under Slab	R-20		
☐	Floor Over Exterior/Unheated Space	R-30 cavity plus R-5 continuous		
☐	Floor Over Heated Space	R-30 cavity		
☐	Air Tightness	≤ .20 cfm/ft² @ 50 pascals		
Window Requirements				
☐	Window U-value	≤ .30		
☐	Window Distribution	≤ 62.5%		
☐	Max Window Area	max 18%		
Minimum Equipment Requirements (HVAC)				
☐	Backup Gas Furnace Heating (forced air)	≥ 90% AFUE with EMC motor		
☐	Backup Gas Boiler Heating (hot water)	≥ 90% AFUE		
☐	Electric Heating	any		
☐	Electric Cooling (SEER)	≥ 14.5		
☐	Air-to-Air Heat Exchanger	≥ 80% HRV or ERV		
☐	Thermostats for Forced Air	ENERGY STAR® Programmable (communicating)		
Water Heater Requirements		**Electric**	**Gas**	
☐	40 Gallon	0.93	0.62	
☐	50 Gallon	0.92	0.59	
☐	60 Gallon	0.91	0.57	
☐	80 Gallon	0.89	0.53	
☐	Gas Instantaneous (tankless)	n/a	any	
Additional Requirements				
☐	Compliance with Thermal Bypass Checklist	yes		
☐	Duct Location	conditioned space only		
☐	Duct Insulation	R-8		
☐	ENERGY STAR® Lighting	5 fixtures required		
☐	ENERGY STAR® Dishwasher	required		
☐	ENERGY STAR® Clothes Washer	required		
☐	ENERGY STAR® Refrigerator	required		

Visit **www.mnpower.com/TripleE** for more details or to reference the Program Standards Section.

Triple E Rebate Incentives

The **prescriptive** and **performance** incentives are available for electric heat homes only. Minnesota Power's Conservation Improvement Programs (CIP) rebate incentives are relative to the amount of electric energy savings. The associated value of the plan review, site inspections, and final home analysis is estimated to be between $600 and $1,900 based on performance.

Prescriptive Standards	**Rebate Incentive Amount $**
	Electric Heat
Minimum Standards	$800
Plan Review Complete	$100
First On-Site Inspection	$100
Second On-Site Inspection	$100

Performance Standards	**Rebate Incentive Amount $**
Air Tightness Standard	**Electric Heat**
$\leq$ .25 cfm/ft^2 @ 50 pascals	$0
$\leq$ .20 cfm/ft^2 @ 50 pascals	$500
$\leq$ .10 cfm/ft^2 @ 50 pascals	$800

Optional Incentives

1. **Building Orientation—$200** rebate for south facing glass area. Must have a minimum of 40 percent of glass area within 30 degrees south facing for optimum solar gain. Glass doors included in total area. This is an optional incentive.
2. **Window Upgrade—$300** rebate on windows with a total unit U-value of .28 or less.
3. **Verification Label on Air-to-Air Heat Exchanger—$50** rebate for verification of air-to-air heat exchanger balancing.
4. **Water Heater*—$50** rebate on a high-efficiency, heat pump electric water heater (2.5 EF or greater, 50 gallon maximum).
5. **Drain Water Heat Recovery*—$400** rebate on installation of a Drain Water Heat Recovery unit installed by a participating installer (customer must have an electric water heater).
6. **Ground Source Heat Pump—$200** per ton on closed loop systems; **$100** per ton on open loop systems. The heat pump must be ENERGY STAR® rated as listed at **www.energystar.gov**.
7. **ECM (electronically commutated motor) in Forced Air Furnace*—$200** rebate for qualifying ECM motor.
8. **ECM Circulator*—$200** rebate for qualifying ECM circulator.
9. **Central Air Conditioning*—$50** rebate for the proper installation of a central air conditioning system with a SEER $\geq$14.5.
10. **Air Source Heat Pump (mini-split ductless)—$500** rebate for mini-split ductless ASHP with electricity as the primary heating source. (Must have a SEER of 15 and HSPF of 8.5.)
    - **Cold Climate ASHP—$1,000** rebate for ASHP that heat at higher efficiencies in increasingly lower outdoor temperatures. For a list of qualifying models, please visit www.neep.org/initiatives/high-efficiency-products/emerging-technologies/ashp/cold-climate-air-source-heat-pump and download the current ccASHP Specification Listing.
11. **ENERGY STAR® Appliances*:**
    Refrigerator—$30 rebate on ENERGY STAR® qualified refrigerator.
    Freezer—$30 rebate on ENERGY STAR® qualified freezer.
    Dehumidifier—$10 rebate on ENERGY STAR® qualified dehumidifier.
    Refrigerator and Freezer Recycling—$50 reward for pickup and recycling of qualifying refrigerators and freezers ($35 for the second refrigerator or freezer).
12. **ENERGY STAR® Lighting—$3–$15*** rebates on ENERGY STAR® qualified LEDs, LED fixtures, and ceiling fans with LED light kit.
13. **Smart Thermostat—$50** rebate on communicating thermostat (must allow ability to access set points and schedule from anywhere using a smart device) for electric heat.
14. **Solar Electric (PV)**—Visit **www.mnpower.com/SolarSense** for more information.

For detailed information on these rebates, visit **www.mnpower.com/rebates**.
*Indicates incentives a non-electrically heated home may be eligible for.

TRIPLE E PROJECT REPORT

Owner's Name _____ Phone _____

Project Site Address _____ Acct # _____

City _____ Zip _____

Customer (mailing) Address _____

City _____ Zip _____

General Contractor _____ Tax ID # _____

Builder _____ Phone _____

Enroll Date _____ Plan Review _____ 1st _____ 2nd _____ final _____

Foundation/Basement/Slab/Floors

Foundation Type

[ ]	Floating Slab	[ ]	Wood	
[ ]	Slab-on-grade w/footings	[ ]	Walk-out	
[ ]	Block Foundation	[ ]	ICF	
[ ]	Poured	[ ]	Other _____	

Foundation Insulation thickness _____

Slab-Vapor Barrier/Retarder Y / N Slab Insulation _____

Floors over unconditioned space insulation _____

Comments _____

_____

Rim joist—insulation and air seal _____

Walls

Wall type _____

Insulation type & thickness _____

Continuous Vapor Retarder Y / N Outlet Boxes _____

House Wrap _____ Cantilevers _____

Comments _____

Attic/Ceiling

Attic insulation type & thickness _____

Cathedral Ceiling type and thickness _____ % of ceiling _____

Energy Truss Y / N Wind wash barrier Y / N _____

Vapor Retarder Y / N Bypasses sealed _____

Ducting in unconditioned space: air seal and insulation _____

Comments _____

_____

Windows & Doors

Window type & brand _____ Direction facing _____

U-value _____ SHGC _____ Maximum Window area _____ %

PAGE 2: _____

Space & Water Heating/Cooling Systems

Heating system type _____ fuel type: Elec ☐ Nat ☐ LP ☐

Back-up heating system _____ fuel type: Elec ☐ Nat ☐ LP ☐

AC SEER rating _____

Ground Source Heat Pump _____ tons (loop - open ____ closed ____) model # _____

Water Heater brand _____ size _____ Model # _____

Energy Factor _____ Fuel Type _____

Ventilation System

Type & Brand _____ Model _____ Balanced Y / N

Heat Recovery Efficiency _____ %

ENERGY STAR Lighting & Appliances

of fixtures _____

Refrigerator: Make _____ Model _____

Clothes washer: Make _____ Model _____

Dishwasher: Make _____ Model _____

Building Performance Standards

House Volume _____ ft^3 _____ ft^2 Normalized ft^2 _____

Air tightness performance at 50 pascals _____ cfm/ft^2_____ AC/H

** Rebates for Electric Heating Only **

Prescriptive Standards met	[ ]$800	
Heating & Air tightness Performance* Met	[ ]$500	[ ]$800
*Air tightness: cfm/ft^2 @ 50 pascals	≤.20	≤.10

Optional Rebates (Electric Heating only)

Plan review complete	Y/N [ ] $100	Date _____
First On-Site Inspection	Y/N [ ] $100	Date _____
Second On-Site Inspection	Y/N [ ] $100	Date _____
Building Orientation	Y/N [ ] $200	
Drain water heat recovery unit	Y/N [ ] $400	
Ground Source Heat Pump	Y/N $200/ton Closed Loop	Total _____
Ground Source Heat Pump	Y/N $100/ton Open Loop	Total _____
Window Upgrade (≤U.28)	Y/N [ ] $300	
Verification label on HRV	Y/N [ ] $50	

TOTAL HOMEOWNER REBATE $ _____ TOTAL BUILDER REBATE $ _____

I have reviewed this document for completeness and accuracy. I approve the rebates listed above, based on Builder meeting specific Triple E standards.

_____ Date: _____

Triple E Third-Party Contractor

Minimum Requirements For Ventilation Systems

1. Ventilation system must be capable of providing .35 Air Changes Per Hour (ACH) based on the volume of the heated portion of the house. (Consistent with ASHRAE 62-81.)

2. System sizing and the continuous ventilation rate should be based on the following formula:
   total number of bedrooms + 1 X 15 cfm
   (e.g., 4 bedroom home = 4 + 1 = 5, 5 x 15 cfm = 75 cfm continuous ventilation rate)

3. Ventilation systems should be designed and installed to ensure that ventilation air is thoroughly mixed through the house without thermal discomfort.

4. Air-to-air heat exchangers must use minimum 6" ductwork on all supply and exhaust distribution.

5. Exhaust points must be installed in each high moisture/odor area such as bathrooms and kitchens.

6. Fresh air supplies should be ducted into each habitable room with the use of 6" rigid duct.

7. Ventilation systems must be installed in conditioned living spaces and cannot be installed in areas such as garages, attics and unconditioned crawl spaces.

8. All ductwork seams and joints should be taped with high quality tapes or mastic.

Perm Ratings For Common Building Materials

Type	Material	Permeance*
Vapor Barriers	1 mil aluminum foil	0.00
	6 mil polyethylene	0.06
Paint and Wallpaper	2 coats aluminum paint	0.5
	1 coat of Glidden "Insulaid" latex vapor barrier paint	0.6
	Vinyl wallpaper	1
	3 coats oil paint on wood	1
	2 coats oil paint on plaster	2
	3 coats latex paint on wood	10
	Ordinary wallpaper	20
Foam Insulation	1" Urethane	1.1
	1" Styrofoam	1.2
	1" Bead-board	4
	4" Urea formaldehyde	9
Fibrous Insulation	4" Blown insulation	30
Masonry	4" Brick	1
	8" Concrete block	2
Papers	Builder's foil	0.2
	15 lb. tar paper	18
	Builder's sheathing paper	40
Other	1/2" CDX plywood	0.5
	3/4" board	3
	Plaster	20
	Gypsum drywall	50
	1/2" insulating board	50

* 1 Perm = 1 grain H_2O/hr./sq. ft/inch Hg

A perm is a unit that designates the degree of permeability of a material to moisture. The higher the number, the more porous the material will be; and conversely, the lower the number, the more effective a moisture barrier the material will be. To be an effective vapor barrier, a material should have a perm rating of less than 1.0.

Definition of Terms

Air-to-Air Heat Exchanger: A factory-assembled unit which contains elements in which heat is transferred between two isolated air streams and a means to circulate air for ventilation. Also known as a Heat Recovery Ventilator (HRV).

Conduction: Transfer of heat from a warm area to a cold area through a solid material.

Degree-Days (DD): The mean inside/outside daily temperature over the day with the inside assumed to be 65°F for heating (HDD) and 75°F for cooling (CDD). A degree day is the mean inside/outside daily temperature subtracted from 65° base. Degree days are totaled for monthly and annual purposes.

Exhaust Air: Air removed from a space and not reused within a dwelling unit.

House Wrap: Drainage plan that protects the house from exterior bulk moisture and is designed to reduce wind washing and air infiltration.

Infiltration: Involves the loss of heated or conditioned air from a building and replacement of that lost air with cold or unconditioned air infiltrating the building envelope. Infiltration is the result of two factors acting on a building. The most significant is the stack effect which is driven by the temperature differential. The second important cause of infiltration is wind. Infiltration is usually calculated in terms of air changes per hours (ACH).

Makeup Air: Outdoor air supplied to replace exhaust air. Also known as combustion air to provide adequate oxygen and draft for fossil fuel appliances.

Perm: A unit that designates the degree of permeability of a material to moisture. The higher the number, the more porous the material will be; and conversely, the lower the number, the more effective a moisture barrier the material will be. To be an effective vapor barrier, a material should have a perm rating of less than 1.0.

Vapor Barrier/Retarder: Installed on the winter warm side of the house. It must have a perm rating of less than 1.0.

Ventilation: The process of supplying and/or removing air by natural or mechanical means to and from any space. Such air may or may not be conditioned.

Volume of a Home: Total cubic foot measurement of heated space.

Triple E New Construction
Space Heating Costs Comparisons

Category	$/ft²/yr
Triple E Homes	$.11 – $.19
Standard New Construction	$.31 – $.42
Poor New Construction (poorly installed insulation, high air leakage rate, poor quality windows, high water table on heated slab, etc.)	$.52 – $.95

1. Square footage includes all heated areas including basements.
2. Costs are based on Minnesota Power's current Dual Fuel heating rates of 5.47 cents per kWh. This rate is used for illustration purposes only and to provide a reasonable estimate of electric energy costs. Actual rate information based on your particular use is available on your electric bill.

For more information on turning the benefits of energy-efficiency into dollars, visit www.mnpower.com/EnergyConservation or call 218-355-2843 (opt. 1).

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