



# Building New Homes Above the Energy Code:

Rewards, Rebates, and Incentives



In accordance with the Department of Labor and Industry's statute 326.0981, Subd. 11,

“This educational offering is recognized by the Minnesota Department of Labor and Industry as satisfying **1.5 hours** of credit toward **Building Officials and Residential Contractors code/energy** continuing education requirements.”

For additional continuing education approvals, please see your credit tracking card.



# Introduction

- Phil Anderson
  - Neighborhood Energy Connection
- Aaron Riendeau
  - St. Croix Energy Solutions Inc.



# Topics

- Minnesota Code built homes
- What buyers are looking for in new homes
- What are Energy Ratings
- Updates to Utility Rebates and Incentives
- Examples of Improvements Builders Can Make
- How Builders can reduce callbacks

# Current Minnesota Energy Code

## Insulation levels:

**TABLE R402.1.1 INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT**

CLIMATE ZONE	FENESTRATION U-FACTOR <sup>b</sup>	SKYLIGHT U-FACTOR <sup>b</sup>	GLAZED FENESTRATION SHGC <sup>b,e</sup>	CEILING <sup>j</sup> R-VALUE	WOOD FRAME WALL R-VALUE <sup>f</sup>	MASS WALL R-VALUE <sup>i,g,h</sup>	FLOOR R-VALUE	BASEMENT WALL R-VALUE <sup>c,i</sup>	SLAB R-VALUE AND DEPTH <sup>d</sup>	CRAWL SPACE WALL R-VALUE <sup>c,i</sup>
6	0.32	0.55	NR	49	20, 13+5	15/20	30e	15	10, 3.5 ft	15
7	0.32	0.55	NR	49	21	19/21	38e	15	10, 5 ft	15

Source:

<http://codes.iccsafe.org/app/book/toc/2015/Minnesota/2015%20Minnesota%20Energy%20Code%20with%20ASHRAE/index.html>



# Current Minnesota Energy Code

## Blower door testing, what is ACH50?

- 3 Air Changes Per Hour at 50 pascals or 3 ACH50 is Minnesota maximum air leakage rate for new residential construction
- Example: 3 ACH50 in a 3,000 sq. ft. house with a volume of 27,000 cu. ft. would have a blower door reading of 1,350 CFM@50pascals
- $ACH50 = (\text{Blower Door CFM} * 60 \text{ minutes}) / \text{Volume}$

## Balanced Ventilation

- Recommend heat recovery ventilator (HRV) or an energy recovery ventilator (ERV)
- Have quality HRV or ERV system rated for our climate installed, tested, and balanced
- Good home buyer education or maintenance plan is the key to home staying as new

## Ductwork inside the envelope

- All ductwork running outside the house envelope must meet tightness requirements
- Tough test to pass, best to find way to move ductwork into the inside of the home





# What are homebuyers looking for in new homes

- Comfort
- Clean Air
- Durability
- Low utility bills
- Simple maintenance

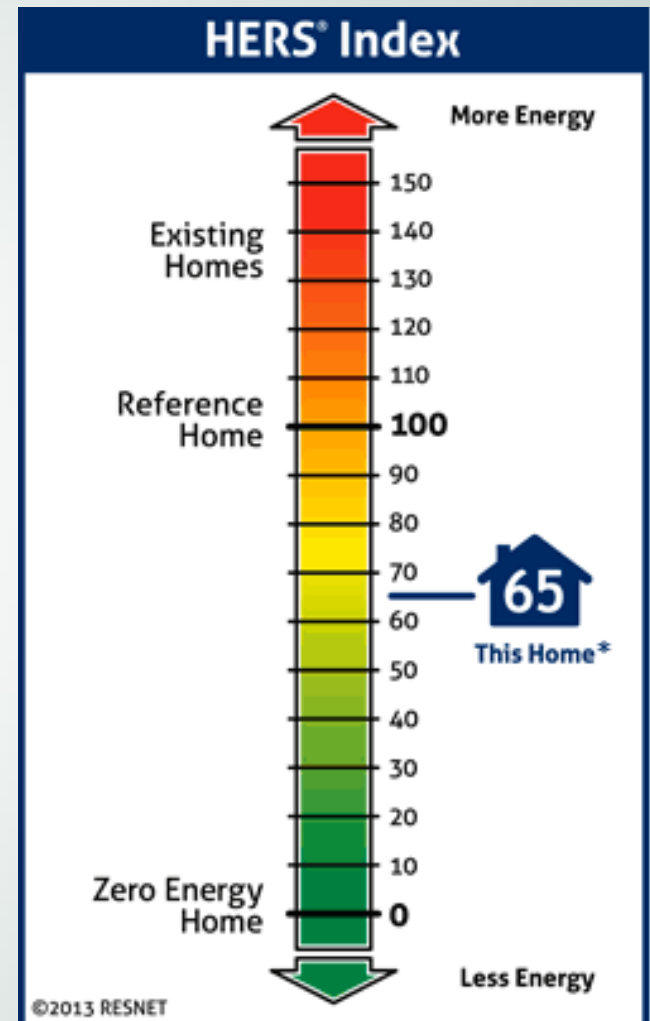


# What are Energy Ratings

- Three common energy rating types
  - RESNET - HERS Index Rating
  - ENERGY STAR New Homes
  - DOE Zero Energy Ready Homes

# RESNET Energy Rating - HERS Index

- RESNET certified energy rater makes 1-3 visits to home during construction
  - Framing
  - Insulation – Pre-drywall
  - Final – Blower door, duct test, document appliances
- Home is modeled through software to get HERS Index



\*Sample rating representation.



# RESNET Energy Rating - HERS Index

- Way to compare homes energy usage between homes
- HERS Index of 100 is a reference home, which is equivalent to a home built to 2004 IECC
- HERS Index 0 uses no energy
- Typical home built today in Minnesota can score between 45 and 60
- Of the 6,494 MN homes rated in 2016, the average score was 51
- More info at [www.resnet.us](http://www.resnet.us)



# ENERGY STAR New Homes

- EPA sponsored new home program
- Typically use 15-30% less energy
- ENERGY STAR certified energy rater makes 2-3 visits
- Builder and HVAC contractor go through training program
- HVAC contractor required to properly size systems, resulting in better comfort



# ENERGY STAR New Homes

- 3 key checklists followed:
  - Thermal Enclosure
  - HVAC Design and Quality Installation
  - Water Management
- ENERGY STAR has excellent brand recognition and good way for builder to set themselves apart from other builders
- More info at: [www.energystar.gov/newhomes](http://www.energystar.gov/newhomes)



# DOE Zero Energy Ready Homes

- Follow ENERGY STAR New Homes checklists
- Are at least 40-50% more efficient than new homes
- ENERGY STAR qualified appliances and fixtures
- Use high performance windows
- Meet IECC 2015 code levels for insulation
- Ductwork inside the envelope



# DOE Zero Energy Ready Homes

- Hot water distribution system that provides rapid hot water to the homeowner
- Indoor air quality certification through EPA's Indoor airPlus program
- Make home PV-ready if climate has significant solar insolation
- More info at:  
<http://energy.gov/eere/buildings/zero-energy-ready-home>





# Updates to Utility Programs and Incentives

- % better than baseline code home
- Stand alone rebates



# Natural Gas Utilities

- CenterPoint Energy
- XCEL Energy
- Minnesota Energy Resources
- Greater Minnesota Gas, Inc
- Comfort Systems-Duluth
- Great Plains Natural Gas Company



# Natural Gas Utilities

- 3 Largest Natural Gas Utilities
  - CenterPoint Energy
  - XCEL Energy
  - Minnesota Energy Resources



# 3 Largest Natural Gas Utilities

- % Better Than Baseline Code Home
  - REM/Rate energy modeling software used by RESNET raters
  - Developed and tested in partnership with utilities and Minnesota Building Performance Association (MBPA)



# % Better Than Baseline Code Home

- Energy Rating-RESNET
  - HERS Index
  - REM/Rate software most common energy rating tool
- More Info about RESNET and HERS Index:  
[www.resnet.us](http://www.resnet.us)



# % Better Than Baseline Code Home

- Process
  - Builder directly hires a RESNET certified rater
  - Rater makes a minimum of two site visits
    - Pre-drywall insulation visit
    - Final visit
  - Rater enters home info into REM/Rate software to see how well home performs
  - Rater uploads house information to utility
  - Utility pays builder amount based on rating



# CenterPoint Energy

- High Efficiency Homes

CenterPoint Energy Gas Customers	
10-14% gas savings better than baseline (Homes without natural gas water heaters capped at this level)	\$500
15-19% gas savings better than baseline	\$750
20-24% gas savings better than baseline	\$1,000
25-29% gas savings better than baseline	\$1,500
30-34% gas savings better than baseline	\$2,000
35-39% gas savings better than baseline	\$2,500
40-44% gas savings better than baseline	\$3,000
45-49% gas savings better than baseline	\$3,500
50% and above gas savings better than baseline	\$4,000
Note: Gas savings will be rounded down to the nearest percentage point	



# CenterPoint Energy

- Stand Alone Equipment Rebates

## *New home construction rebates*

New homes will still be eligible for the two tiers of thermostats, fireplace and laundry rebates, if they participate in CenterPoint Energy High Efficiency Homes™. If the home doesn't participate in the program, they will be eligible for heating system and water heater rebates as well as the thermostat, fire, and laundry rebates.

### *Heating systems*

Efficiency rating	Rebate
<b>Forced-air furnace</b>	
92 - 94.9% AFUE	\$50
≥95% AFUE	\$350

### **Boiler**

83.5 - 90.9% AFUE	\$300
≥91% AFUE condensing boiler	\$500

### **NEW! *Combination unit***

Efficiency factor	Rebate
<b>Tankless water heater + air handling unit</b>	
≥90 EF	\$250

### **NEW! *Programmable thermostats***

Qualifying thermostats		
Tier 2	\$25	Wi-Fi enabled
Tier 3	\$50	Learning

### *Fireplaces*

Rebate	Equipment
\$75	Direct-vent natural gas fireplace
	Insert
	Free-standing stove with electronic ignition





# CenterPoint Energy

- Stand Alone Equipment Rebates

## Natural gas water heaters

### Tank water heater

Energy requirement	Rebate
<b>Atmospheric</b>	
≥ .67 EF	<b>\$75</b>
<b>Power vent</b>	
≥ .67	<b>\$100</b>
≥ .78 EF (more than 55 gallons and ≥ 75,000 Btu/hr, when available in the market and listed on current AHRI or ENERGY STAR® website)	<b>\$250</b>
88% thermal efficiency commercial water heater in residential application	<b>\$250</b>
<b>Indirect</b>	
Indirect	<b>\$200</b>

**Note:** For rebate to apply, the new equipment must be listed and Energy Factor (EF) verified on the current Air Conditioning, Heating and Refrigeration Institute (AHRI) or ENERGY STAR® website. See [ahridirectory.org](http://ahridirectory.org) or [energystar.gov/products](http://energystar.gov/products).

### Tankless water heater

Energy requirement	Rebate
≥ .90 EF ENERGY STAR® qualified	<b>\$250</b>



## NEW! Laundry

Rebate	Equipment
<b>\$25</b>	ENERGY STAR® clothes washer
<b>\$75</b>	ENERGY STAR® natural gas clothes dryer

# XCEL Energy

- Efficient New Home Construction

<b>Xcel Energy Gas-only or Xcel Energy Gas/Electric Combo Customers</b>	
Total energy savings less than 10% better than baseline and/or negative therm savings	Not Eligible
Income-eligible home with positive gas savings and total energy savings better than 10%	\$500
Positive gas savings with at least 10% but less than 14.9% total energy savings better than baseline	\$250
15-19.9% total energy savings better than baseline	\$500
20-24.9% total energy savings better than baseline	\$1,000
25-29.9% total energy savings better than baseline	\$1,200
30-34.9% total energy savings better than baseline	\$1,500
35% and above total energy savings better than baseline	\$2,000
<b>Xcel Energy Electric-only Customers</b>	
Total energy savings less than 10% better than baseline and/or negative kwh savings	Not Eligible
Positive kwh savings and total energy savings 10% or better than baseline	\$100
<b>Xcel Energy Appliance Rebates</b>	
ENERGY STAR® rated Clothes washer	\$50
ENERGY STAR rated Refrigerator (must have Xcel Energy electric service)	\$15
Note: High Efficiency New Homes participation is required to be eligible for appliance rebates	

# XCEL Energy

- Stand alone new home rebates

2017 Xcel Energy MN Residential Rebates			
<b>Cooling</b>			
Equipment	Customer Requirement	Efficiency	Rebate
AC or ASHP	Electric	13 SEER / any EER	\$ 150.00
AC or ASHP	Electric	15 SEER / 12.5 EER	\$ 350.00
AC or ASHP	Electric	16 SEER / 13 EER	\$ 450.00
Ductless Mini-Split	Electric	15 SEER / 9 HSPF	\$ 200.00
<b>Heating</b>			
Equipment	Customer Requirement	Efficiency	Rebate
Furnace - New Construction	Natural gas	95% AFUE	\$ 100.00
Furnace - New Construction	Natural gas	96% AFUE	\$ 150.00
Furnace - New Construction	Natural gas	97% AFUE	\$ 200.00
Hot Water Boiler	Natural gas	84% AFUE	\$ 100.00
Hot Water Boiler	Natural gas	90% AFUE	\$ 300.00
Hot Water Boiler	Natural gas	95% AFUE	\$ 400.00
ECM - New Furnace	Electric		\$ 100.00
<b>Water Heating</b>			
Equipment	Customer Requirement	Efficiency	Rebate
Tank Water Heater	Natural Gas	.67 UEF	\$ 75.00
Tank Water Heater	Natural Gas	.7 UEF	\$ 150.00
Tankless Water Heater	Natural Gas	.9 UEF (90%)	\$ 250.00



# Minnesota Energy Resources

- Home Energy Excellence Program

<b>Rebate Eligibility Level</b>	<b>Natural Gas Heating &amp; Water Heating</b>
Positive gas savings with less than 20% Total Energy Savings overcode	\$0
20-24.99% energy savings better than code	\$500
25-29.99% energy savings better than code	\$750
30-34.99% energy savings better than code	\$1,000
35-39.99% energy savings better than code	\$1,500
Over 40% energy savings better than code	\$2,000



# Minnesota Energy Resources

- Stand alone new construction rebates

Equipment	Minimum efficiency	Home Energy Excellence rebate eligibility list	Rebate
Natural gas furnace	95% AFUE	No	\$200
Natural gas furnace	97% AFUE	No	\$300
Natural gas boiler	90% AFUE	No	\$200
Integrated natural gas space and water heating system	92% AFUE	No	\$250
Advanced thermostat	automatic programming	Yes	\$100*
Natural gas water heater	.62 EF	No	\$45
Natural gas water heater	.64 EF	No	\$75
Natural gas water heater	.67 EF	No	\$125
Natural gas water heater (storage or tankless)	.82 EF	No	\$250
Natural gas water heater (storage or tankless)	.90 EF	No	\$300
Drain water heat recovery (DHR) device		Yes	\$150
Clothes washer	ENERGY STAR® certified	Yes	\$45
Dishwasher	ENERGY STAR certified	Yes	\$30
Natural gas hearth/fireplace		Yes	\$75



# Greater Minnesota Gas, Inc.

## Three Tiers Beyond Minnesota Energy Code

### Basic Recovery Ventilation Savings Package \$400

Heat Recovery Ventilation (HRV)/Energy Recovery Ventilation (ERV)\*

95% AFUE or higher Natural Gas Furnace

ACH50  $\leq$  2.5: this is an air tightness calculation that our building analyst can provide you after testing.

### Intermediate Energy Savings Package \$600

HRV/ERV\*

96% AFUE or higher Natural Gas Furnace

.67 Energy Factor or better natural gas power vented domestic hot water

ACH50  $\leq$  2

### Advanced Energy Savings Package \$1000

HRV/ERV\*

96% AFUE or higher Natural Gas Furnace

.67 EF+ DHW

ACH50  $\leq$  1

\*HRV must have a rating of 60% or higher sensible heat recovery.



# Comfort Systems-Duluth

- Furnace 90% and greater AFUE \$200
- Boiler 90% and greater AFUE \$200
- Boiler 83.5% and greater AFUE \$50



# Great Plains Natural Gas Company

- Stand alone new construction rebates

## Residential Heating Program

Natural Gas Heating:	Rebate
94% or greater AFUE Furnace	\$300
96% or greater AFUE Furnace	\$400
84% or greater AFUE Boiler	\$300
91% or greater AFUE Boiler	\$500

## Residential Water Heating Program

Natural Gas Water Heater:	Rebate
.64 Energy Factor (EF) or greater	\$85
.67 Energy Factor (EF) or greater	\$100
.82 Energy Factor (EF) or greater (tankless water heater)	\$250

## Residential Pilotless Fireplace Program

Great Plains residential natural gas customers who purchase and install a new pilotless natural gas fireplace, or retrofit their existing natural gas fireplace qualify for a rebate of \$75.





# Electric Utilities

- Minnesota Power
- XCEL Energy
- Great River Energy – Coops
- Otter Tail Power Company
- Other Coops and Municipalities



# Minnesota Power

- Triple E New Construction Program

Prescriptive Standards	Rebate Incentive Amount	
	Electric Heat	Gas Heat
Minimum Requirements	\$800	N/A
Plan Review Completion	\$100	N/A
First On-site Inspection	\$100	N/A
Second On-site Inspection	\$100	N/A

Performance Standards	Rebate Incentive Amount	
	Electric Heat	Gas Heat
Air Tightness Standard		
≤ .25 cfm/ft <sup>2</sup> at 50 pascals	\$0	N/A
≤ .20 cfm/ft <sup>2</sup> at 50 pascals	\$500	N/A
≤ .10 cfm/ft <sup>2</sup> at 50 pascals	\$800	N/A



# Minnesota Power

- Triple E New Construction Program (cont.)

- **ENERGY STAR® appliance rebates:** \$25 on a refrigerator and \$40 on a clothes washer and \$10 on an ENERGY STAR® dehumidifier and \$50 rebate on electric water heater with 2.5 Energy Factor or greater
- **ENERGY STAR® qualified LED Fixtures:** \$10 rebate per indoor fixture and \$20 per outdoor fixture
- **Central Air Conditioning:** \$50 rebate for the proper installation of a central air conditioning system (SEER rating must be  $\geq 14.5$ )
- **Drain Water Heat Recovery (DWHR) rebate** for homes with electric hot water heaters
- **Air Source Heat Pumps (ASHP) Rebates**



# Minnesota Power

- Triple E New Construction Program (cont.)

## Optional Incentives

- **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.
- **Drain Water Heat Recovery Unit:** [\\$400 rebate](#) on qualifying products installed in homes with electric water heaters.
- **Ground Source Heat Pump:** [\\$200 per ton rebate on closed loop systems and \\$100 per ton rebate on open loop systems](#). The heat pump must be ENERGY® rated as listed.
- **Air Source Heat Pump (ASHP):** Rebates for both [Standard Split, Furnace Integrated \(\\$300\)](#) (must be ENERGY STAR® qualified) and [Mini-Split Ductless Units \(\\$500\)](#) systems.
- **Window Upgrade:** \$300 rebate on windows with a total unit U-value of .28 or less.
- \$50 rebate for label to verify air-to-air heat exchanger balancing.
- [Solar Incentives](#)



# Other Electrical Co-op's

- Great River Energy
- Otter Tail Power Company
- Other Co-op's and Municipalities
  
- Not set-up or available at time of presentation, contact directly for current rebates and incentives

# Air Leakage

Go from tight to super tight.

1.5 ACH50 instead of 3 ACH50 will result in a **6-10%** energy savings.

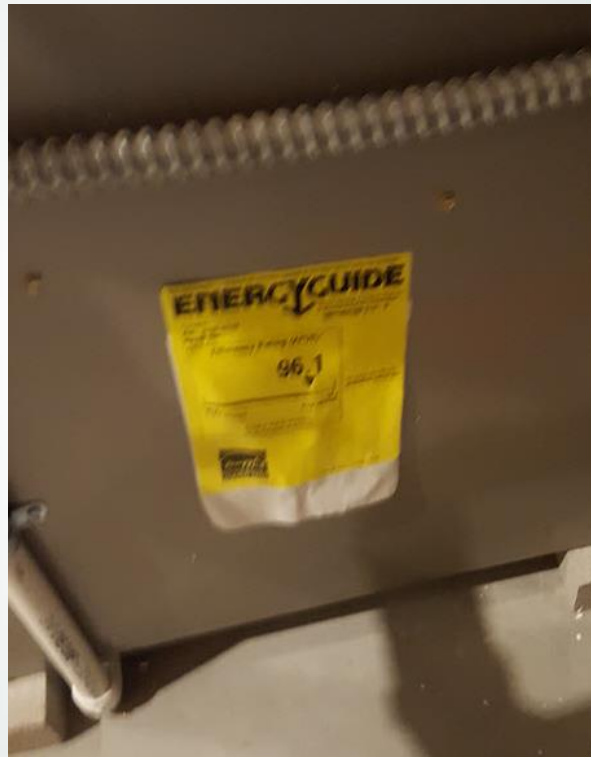
- Attic air seal
- Sealed combustion appliances
- Exterior wall stair cases
- HRV motorized dampers
- Inline dampers on bath exhaust fans



# Higher High Efficiency Heating

Going from a basic 92% to 96% with an ECM blower motor will impact the savings by **4-6%**

- ECM blower is good electrical savings
- Two stage can improve comfort



# Wall Insulation

Grade 1 instead of Grade 2 wall insulation will result in **2-4%** energy savings  
Adding R5 exterior insulation along with Grade 1 insulation would improve by **5-8%**

- Densepacked cellulose
- Blown-in-blanket fiberglass
- Spray foam





# Mechanical Ventilation


Properly sizing the HRV to run at the continuous rate instead of intermittent rate can reduce the homes energy use by **4-6%**

- Speed settings to allow the HRV to operate at the low continuous rate
  - Increases heat recovery
  - Reduces total wattage
- Pressure taps for easy testing and balancing



# Windows

0.25 U-value instead of code max of 0.32 U-value will save **3-5%**

 National Fenestration Rating Council® CERTIFIED		AND-N-2-01534-00001 Vinyl-Clad Wood Frame, Dual-Pane Low-E HeatLock Glazing with Argon and FL Product Type: Projecting
ENERGY PERFORMANCE RATINGS		
U-Factor <b>0.25</b> <small>(U.S./I-P)</small>	1.42 <small>(Metric/SI)</small>	Solar Heat Gain Coefficient <b>0.28</b>
ADDITIONAL PERFORMANCE RATINGS		
Visible Transmittance <b>0.47</b>	-	

 National Fenestration Rating Council® CERTIFIED		Vinyl Frame Slid Glass, Triple glazed, Low E-coating, (p=0.066, 0.2 & 0.0), Argon-filled 1000 x 4000 x 1000
ENERGY PERFORMANCE RATINGS		
U-Factor (U.S./I-P) <b>0.15</b>	Solar Heat Gain Coefficient <b>0.39</b>	
ADDITIONAL PERFORMANCE RATINGS		
Visible Transmittance <b>0.48</b>	Condensation Resistance <b>79</b>	

# Water Heating

High efficient ( $>.68\text{Ef}$  gas or  $>.93\text{Ef}$  electric) water heater will result in **1-4%** energy reduction



# Improvement Savings Summary



## Individual Savings

1.5 ACH50 air infiltration **6-10%**

High Efficient furnace with ECM blower motor **4-6%**

Grade 1 wall cavity insulation **2-4%**

Correct sized HRV/ERV **4-6%**

0.25 U-value windows **3-5%**

High efficient water heater **1-4%**

## Package Savings

1. 96% Furn w/ ECM, 1.5 ACH50, & Sized HRV **14-22%**

2. 96% Furn w/ ECM, 1.5 ACH50, Sized HRV, G1 wall insul **16-26%**

3. 96% Furn w/ ECM, 1.5 ACH50, Sized HRV, G1 wall insul, 0.25 Windows **19-31%**

4. 96% Furn w/ ECM, 1.5 ACH50, Sized HRV, G1 wall insul, 0.25 Windows, High efficient water heater **20-35%**



# Live Demo of REM/Rate

- Go through some energy improvements and see what these changes do in REM/Rate for savings.



Questions?



# Thank You!

## **Phil Anderson**

- Neighborhood Energy Connection
- [phila@thenec.org](mailto:phila@thenec.org)
- 651-789-5713

## **Aaron Riendeau**

- St. Croix Energy Solutions Inc.
- [aaron@scenergysolutions.com](mailto:aaron@scenergysolutions.com)
- 715-531-1500