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 /1 hour energy** continuing education requirements."

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

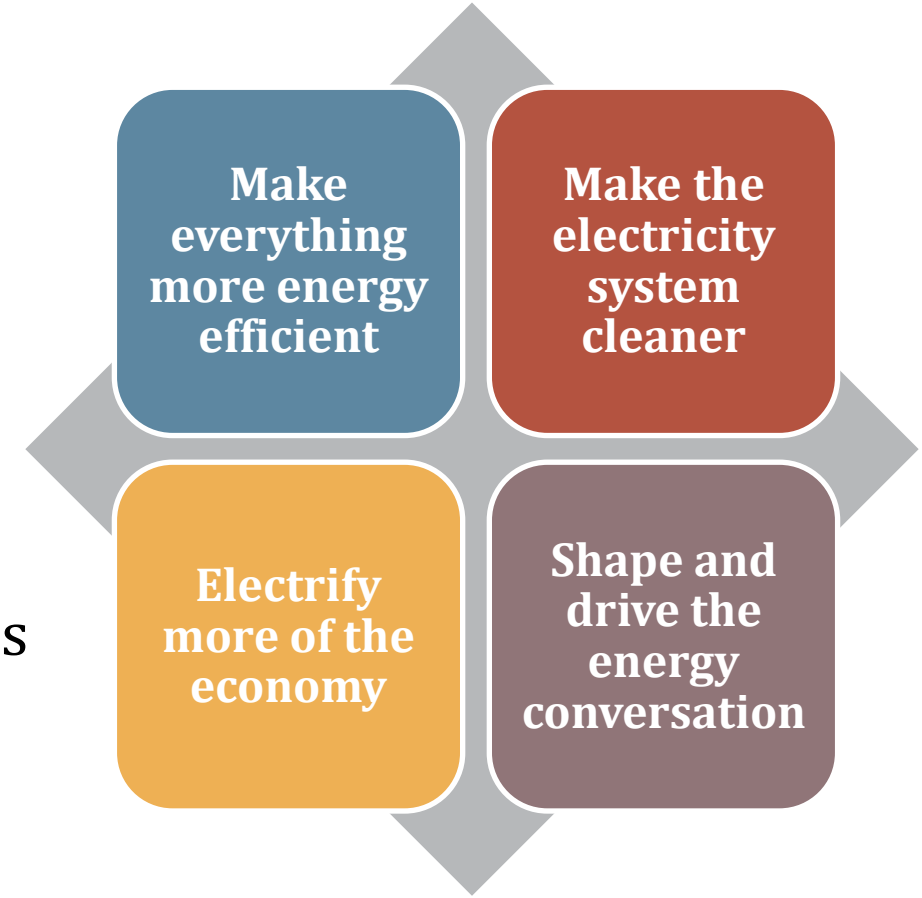
Minnesota Energy Code Compliance Collaborative and Statewide Code Update

Ben Rabe
Duluth Energy Conference
February 27, 2019

Fresh Energy

About Fresh Energy

- Founded 26 years ago
- Speeding the transition to a clean energy economy
- Focus on market driven policies
- In-depth research and analysis
- Energy policy experts



Fresh Energy Programs

- Renewable Electricity
- Global Warming Solutions
- Energy Performance
- Energy Access and Equity
- Better Buildings
- Electric Cars and Buses
- Center for Pollinators in Energy
- Energy News Network

Better Buildings

Highly efficient homes and commercial buildings make Minnesota a great place to live and do business. Fresh Energy is identifying new data-driven opportunities that save money – for home owners, renters, and companies – and improve the health of our communities.

What We'll Cover:

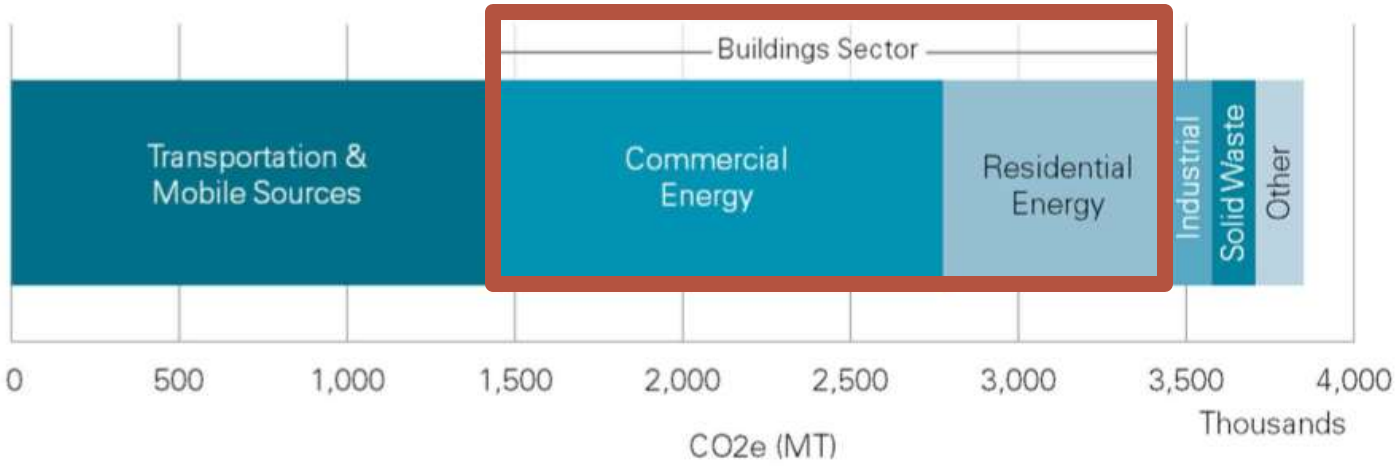
1. Buildings Climate Impact
2. Energy Code Efficiency Over Time
3. Minnesota Codes Compliance Collaborative
4. State Code Adoption Process
5. Stretch Codes

Buildings Climate Impact

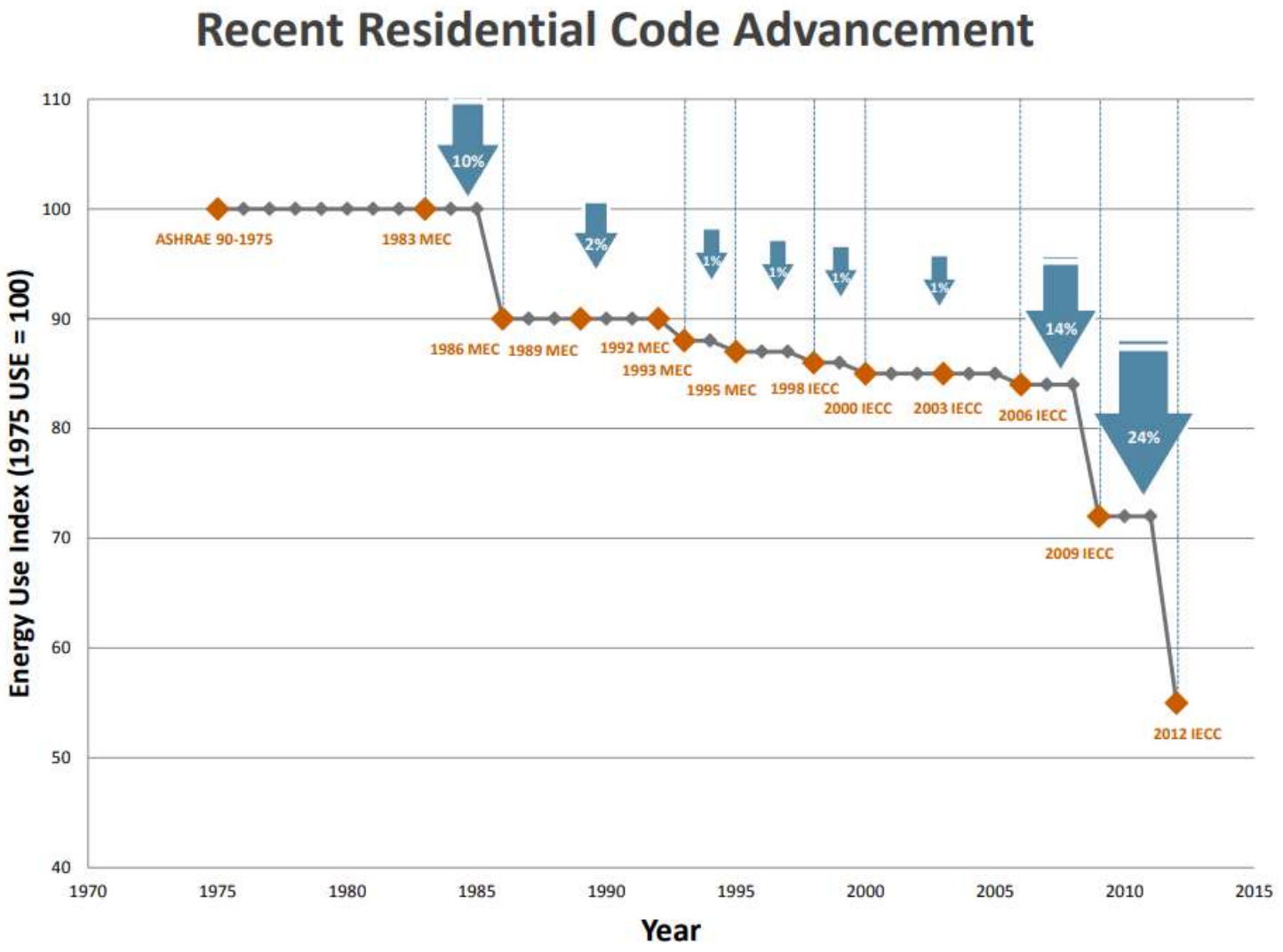
- Buildings are a big energy user – 52 percent in Saint Paul!

2015 Greenhouse Gas Inventory

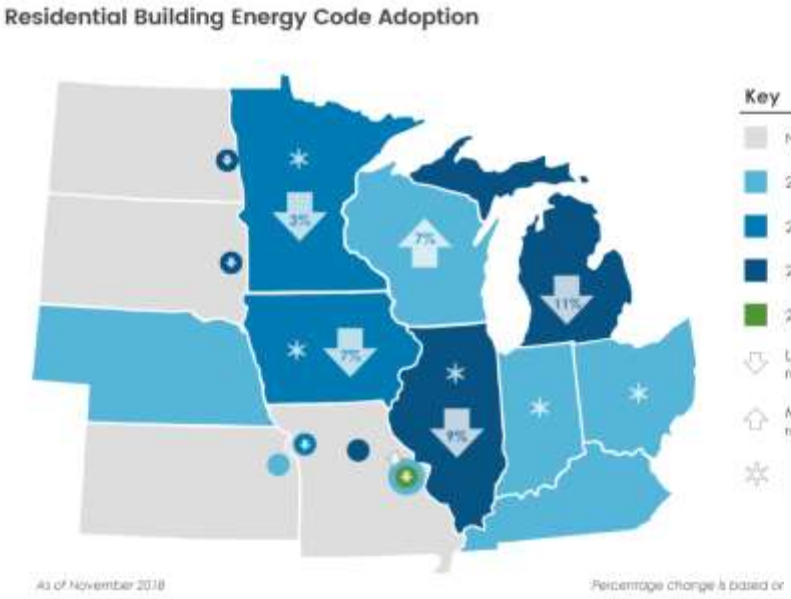
Xcel Energy®
PARTNERS IN ENERGY
An Xcel Energy Community Collaboration

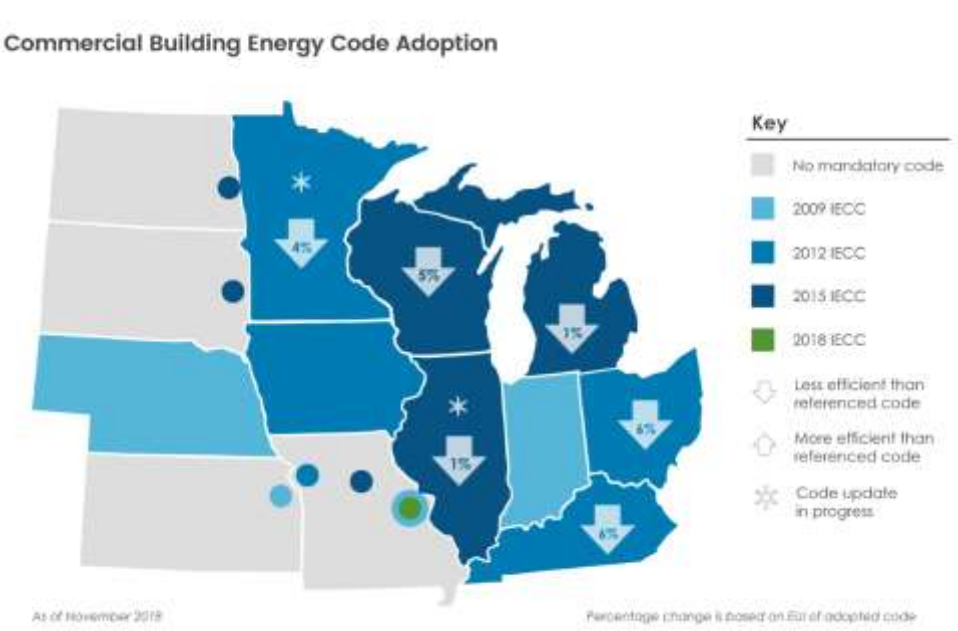


Building Codes and Energy Efficiency



Building Energy Codes in the Midwest





Minnesota Energy Codes Compliance Collaborative

www.mnenergycodecompliance.org

MINNESOTA ENERGY CODE COMPLIANCE COLLABORATIVE

2015 Minnesota Residential Energy Code (MR 1322) SIGNIFICANT CHANGES

INCLUDING CODE COMMENTARY (July 15, 2015 Update)

Note: The following information contains simplified explanations of significant changes to the 2012 International Energy Conservation Code (Residential Provisions) adopted with Minnesota Amendments on February 14, 2015, along with commentary explaining the intent of selected sections for clear understanding of the code. The commentary is advisory only.

R103 Construction Documents. Include the following:

A. Insulation materials and R values
B. Fenestration U factors and SHGCs
C. Area-weighted U factor and SHGC calculations
D. Mechanical system design criteria
E. Mechanical and service water heating system and equipment types, sizes and efficiencies.
F. Equipment and system control
G. Fan motor horsepower and controls
H. Duct sealing, and the location and insulation of ducts and pipes
I. Lighting fixture schedule with wattage and control narrative
J. Air sealing details

Interpretation Documents

CODE INTERPRETATION (DRAFT)

DATE: 7/21/17

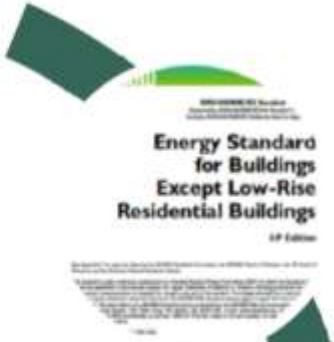
SUBJECT: Interpretation on Intermittent Ventilation

CODE: 2015 Minnesota Residential Energy Code Section R403.5.5

Question: Can certain exhaust fans that are being used as intermittent ventilation according to Section R403.5.4 of 2015 Minnesota Residential Energy Code (MREC) also be used as a ventilation component to comply with Section R403.5.2 of the MREC?

Answer: Yes, by using the exception in Section R403.5.5, if a balanced heat recovery ventilation (HRV) system or energy recovery ventilation (ERV) system is installed to meet the continuous ventilation rate of Section R403.5.3, as long as the requirements in Table R403.5.1 and Section R403.5.5 are satisfied. Table R403.5.1 requires minimum fan efficacies and Section R403.5.5 requires surface mounted fans to have a maximum 1.0 sone rating according to HVI Standard 915. In addition, the airflow verification requirements of Section R403.5.6.1.3 shall be met.

Compliance Paths



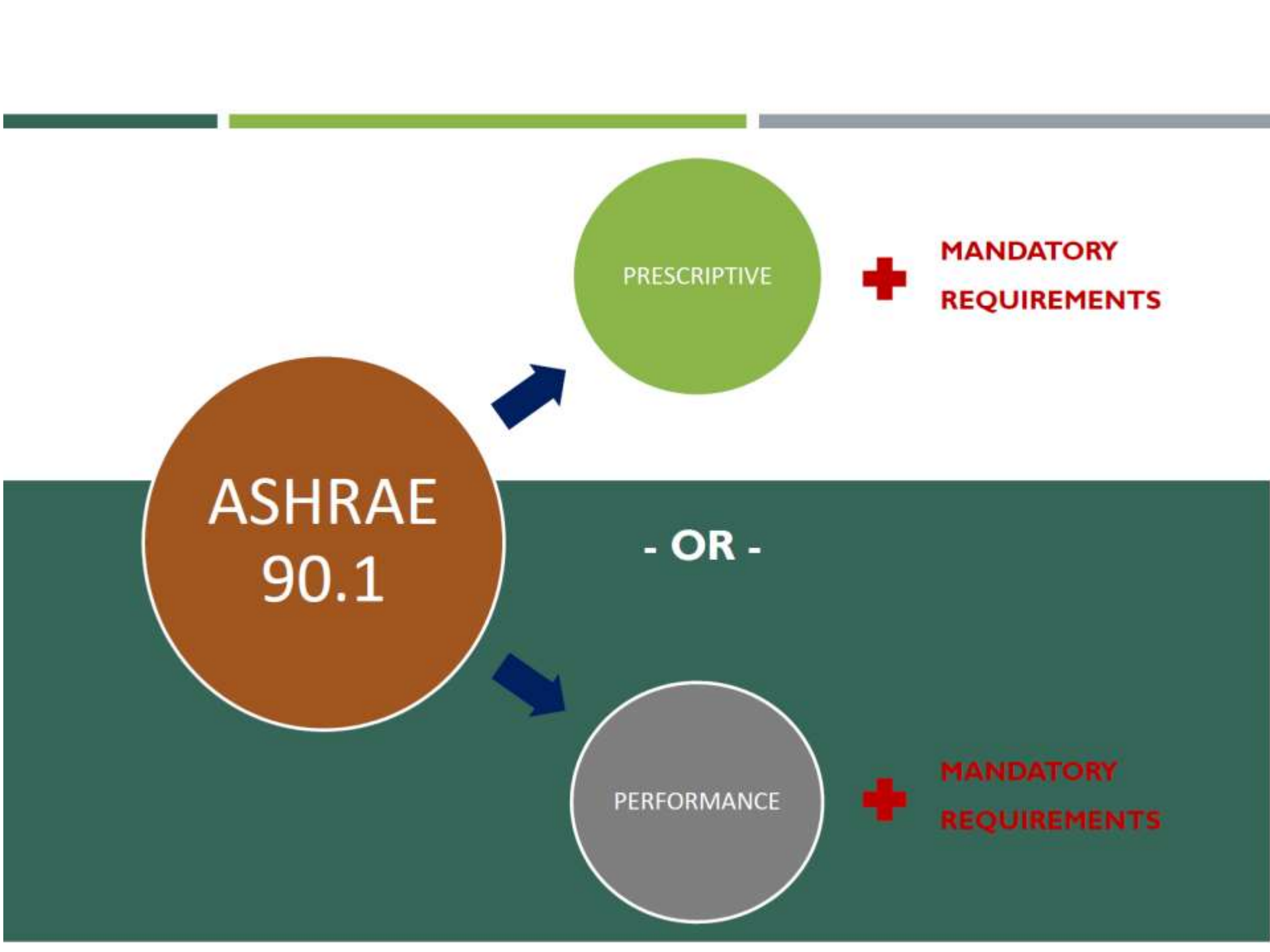
OPTION 1 + MANDATORY REQUIREMENTS

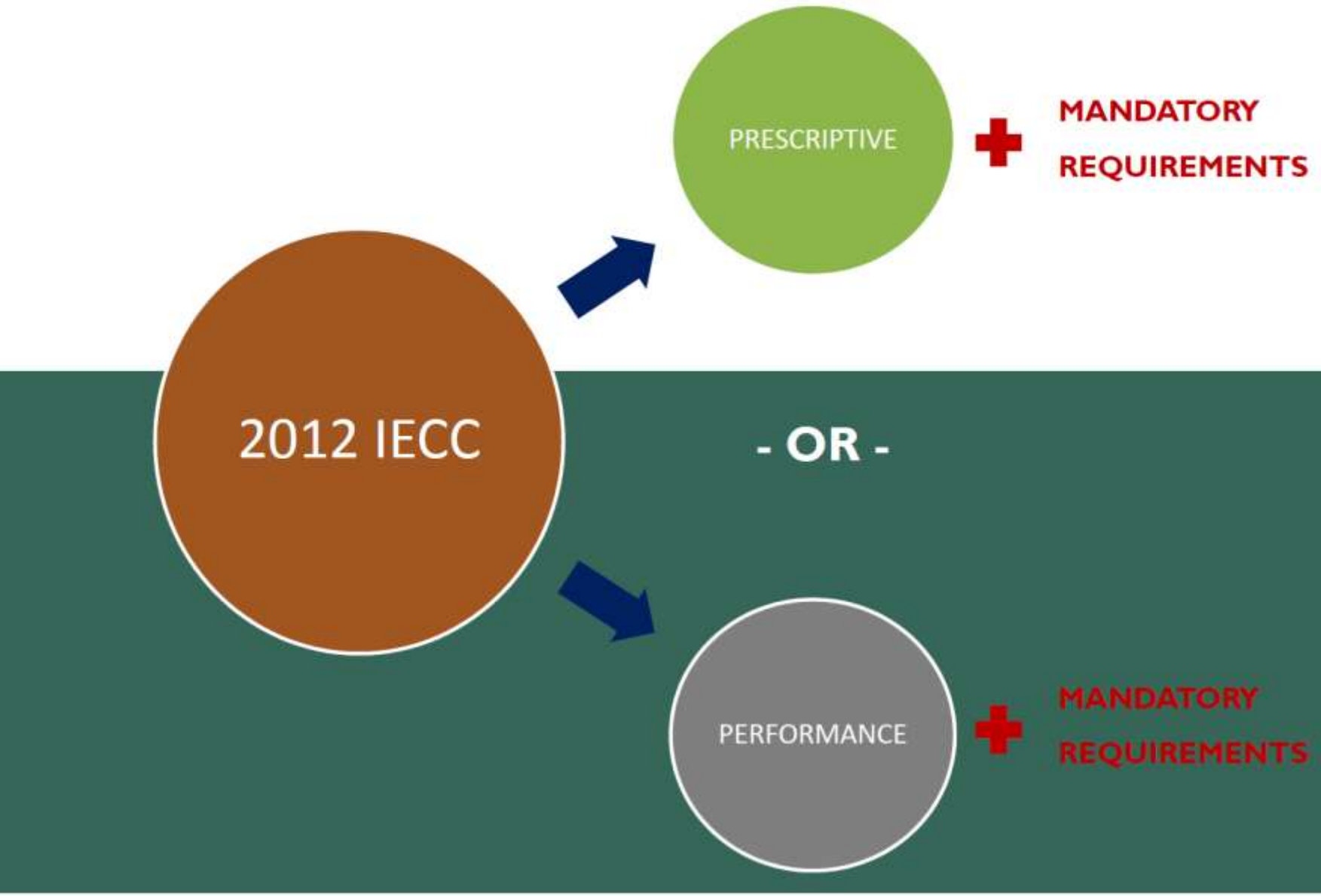
ASHRAE 90.1 - 2010

COMcheck

OPTION 2 + MANDATORY REQUIREMENTS

2012 IECC


PRESCRIPTIVE
MANDATORY
REQUIREMENTS
ASHRAE
90.1
- OR -
PERFORMANCE
MANDATORY
REQUIREMENTS

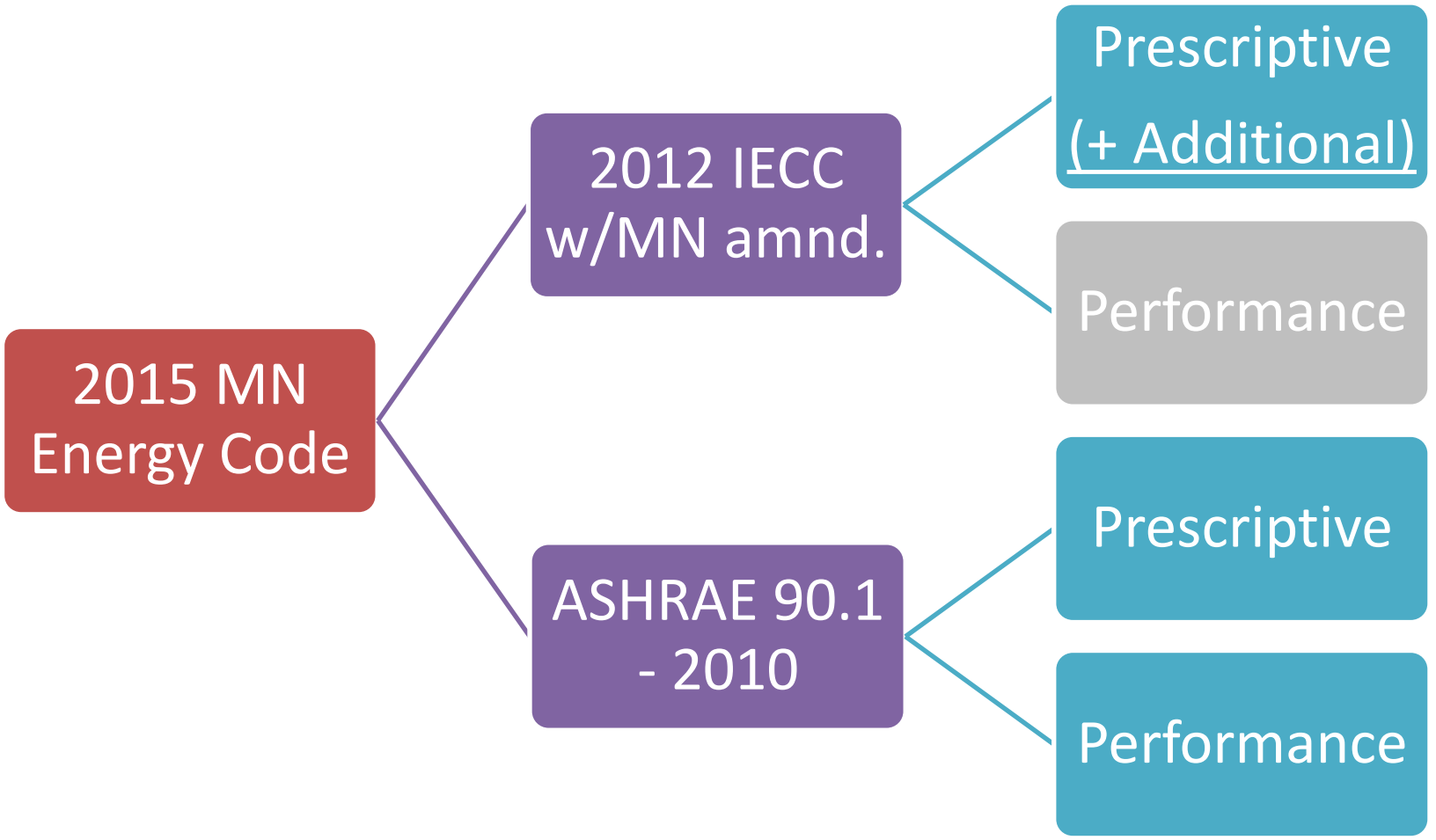

PRESCRIPTIVE
MANDATORY
REQUIREMENTS
2012 IECC
- OR -
PERFORMANCE
MANDATORY
REQUIREMENTS

PRESCRIPTIVE

- Section C402
- Section C403
- Section C404
- Section C405
- Section C406 (select one)
  - Section C406.2
  - Section C406.3
  - Section C406.4

- PLUS
  - **MANDATORY REQUIREMENTS**

Commercial Energy Code Path



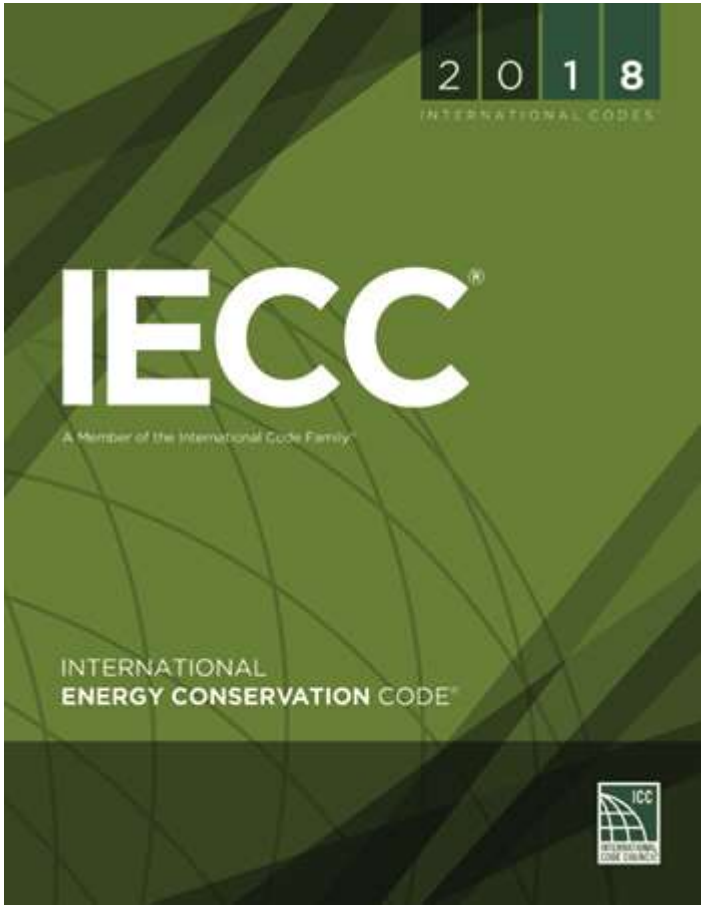
Baseline Compliance Study

- Characterize the energy efficiency in Minnesota for new and renovated buildings
- Identify specific opportunities for increased energy savings for programs supporting existing energy codes
- Identify specific program opportunities for measures that go beyond existing energy code

COMMERCE DEPARTMENT

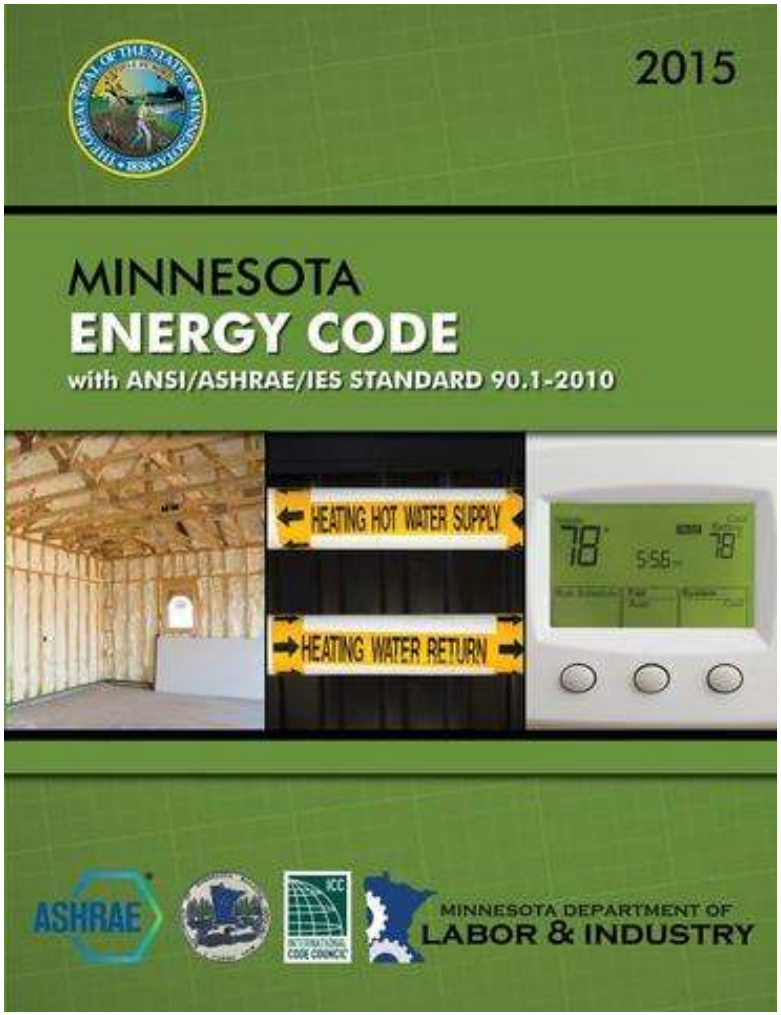
slipstream

Code Update Process



- National model codes voted on every 3 years by International Code Council (ICC)
- 15 different codes
  - IECC – International Energy Conservation Code
- IECC allows for ASHRAE as an alternative
- Separate commercial and residential provisions
- States adopt codes based on the model codes
- Home rule states sometimes adopt by city

Minnesota Energy Code



- Minnesota adopted the 2012 IECC model code in 2015 with amendments
- Consistent with MN Statute
- 6 year code adoption cycle in 2015 (5 year first cycle)
- Led by Dept. of Labor and Industry
- Enforcement is decided at city level and completed by municipal code officials

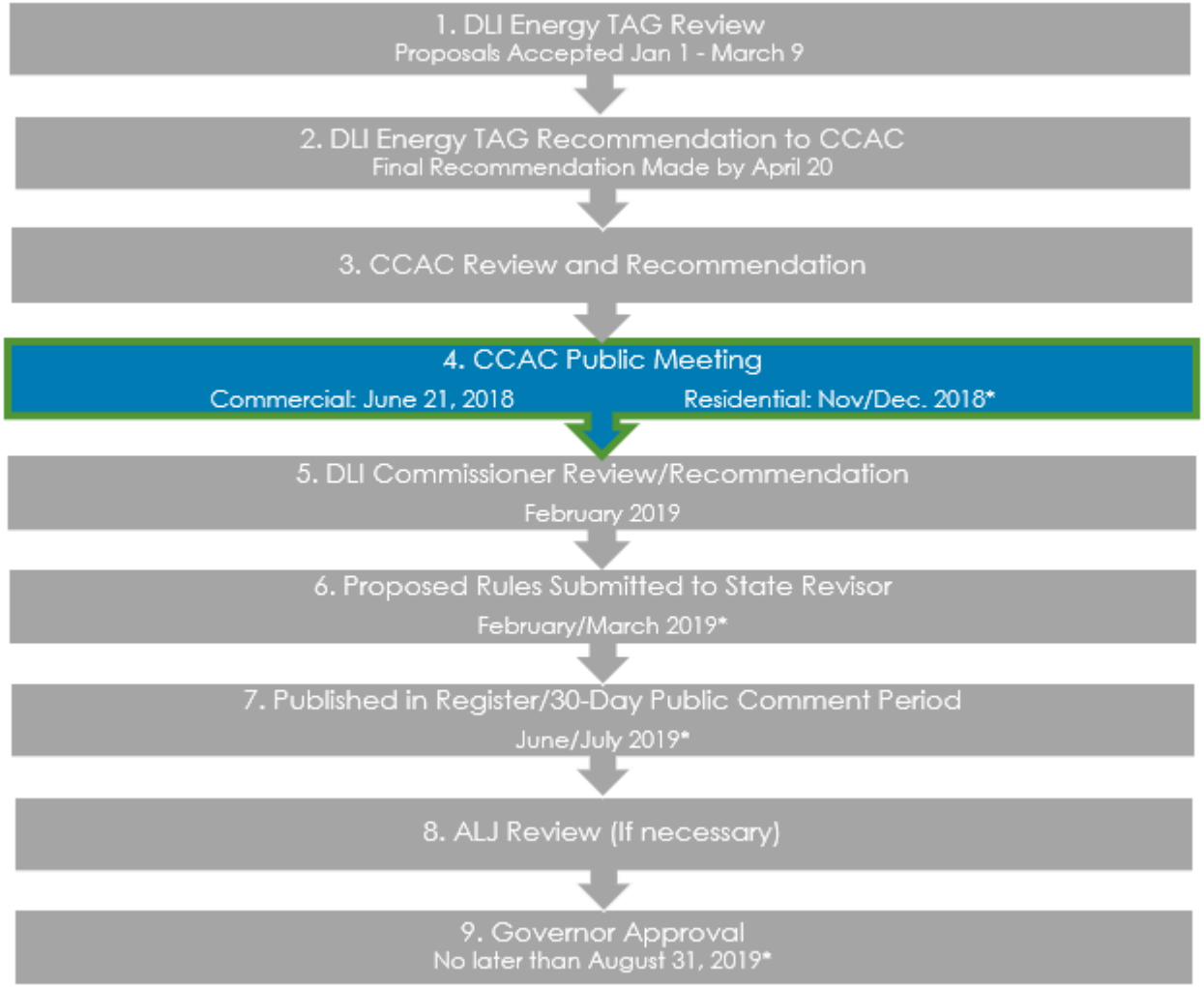
Minnesota Building Code Statute

Section 326B.106

- (c) Beginning with the 2018 edition of the model building codes and every six years thereafter, the commissioner shall review the new model building codes and adopt the model codes as amended for use in Minnesota, within two years of the published edition date. The commissioner may adopt amendments to the building codes prior to the adoption of the new building codes to advance construction methods, technology, or materials, or, where necessary to protect the health, safety, and welfare of the public, or to improve the efficiency or the use of a building.

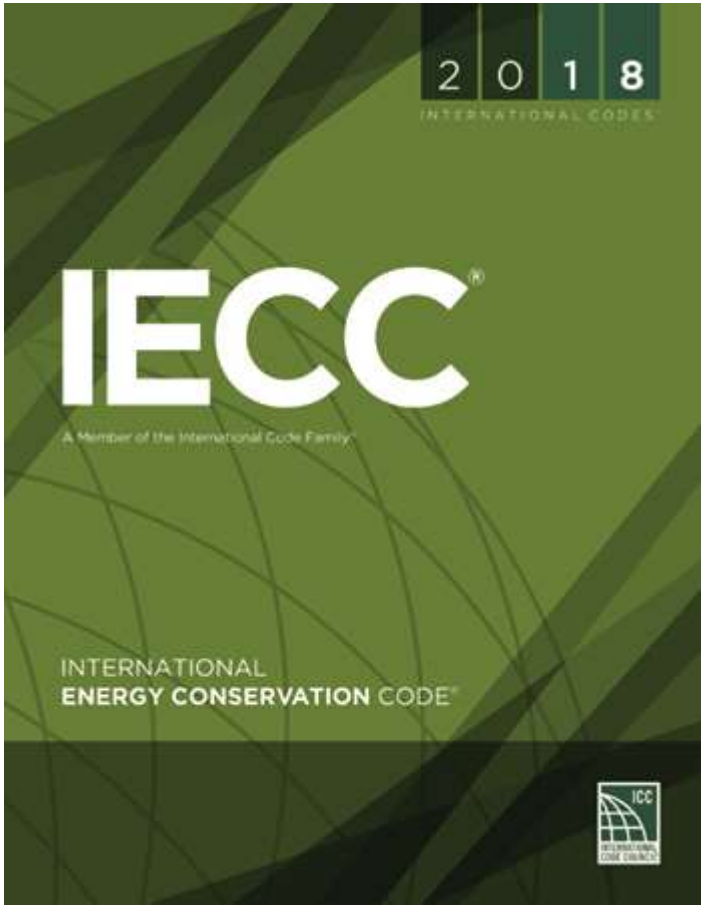
- (d) Notwithstanding paragraph (c), the commissioner shall act on each new model residential energy code and the new model commercial energy code in accordance with federal law for which the United States Department of Energy has issued an affirmative determination in compliance with United States Code, title 42, section 6833. The commissioner may adopt amendments prior to adoption of the new energy codes, as amended for use in Minnesota, to advance construction methods, technology, or materials, or, where necessary to protect the health, safety, and welfare of the public, or to improve the efficiency or use of a building.

Current Code Adoption Process To Date



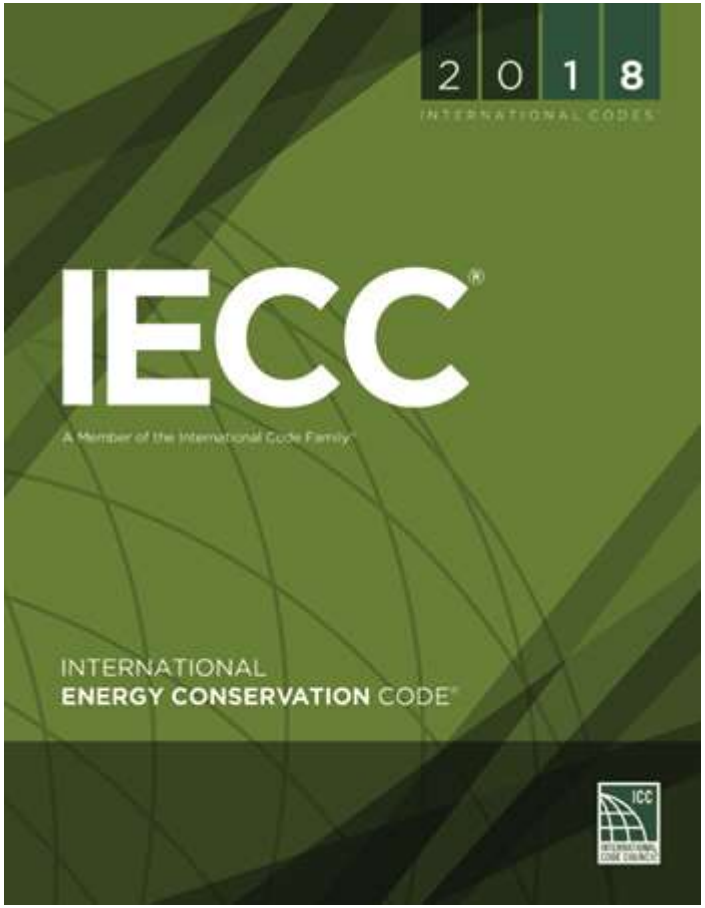
*** Dates tentative**

2018 IECC – Commercial Lighting



- Reduced Lighting Power Allowance
  - Primarily based on improved efficacy of LED lighting
  - Exterior lighting power reduced an average of 30%
  - Interior space-by-space reduced an average of 26%
  - Decorative & Retail display reduced ~25%
- Open office areas now require occupancy sensors
  - Simple control of lighting fixtures by occupancy sensor
  - Advanced layered lighting control system

2018 IECC – Other Updates



- Renewable Energy Cost Reduction
  - maximum on-site renewable energy cost reduction of 5%
- Shower head Flow Rate
  - 2.0 gpm at 80 psi
- Heated Slab Insulation
  - R-5 insulation requirement
- Garage Door Glazing
  - U-factor of .31 requirement
- Airspace Thermal Properties
  - Calculated as part of wall assembly
  - Must be unvented to minimize airflow

BUILDING ENERGY CODES

Big Savings for Minnesota

Q

How do building energy codes benefit Minnesota residents?

A

- Lower energy bills
- Healthier indoor air
- Stronger state and local economies

If Minnesota updates to the Residential 2018 IECC, residents will save:

Consumer Energy Bill Savings
$65,016,568

Total Energy Savings (MMBTU)
4,902,988

Total CO_2e Savings (Tons)
427,383

Benefits of Residential Code Update

Comparison of Current Minnesota Code against the unamended 2018 IECC

If the 2018 IECC were adopted as written:

- **a future homeowner could** reduce energy use by 6%, save ~$140 annually, and achieve a positive cashflow in 3.5 - 4 years;
- **the statewide energy demand would** be reduced by 160,000 MMBTUs; and,
- **the state economy could** expect to gain $2 million in the first year.

	Reduced Energy Use Per Home	Annual Energy Cost Savings Per Unit	Simple Payback Period[2]	Net Positive Cash Flow[2]	Life-Cycle Cost Savings[2]
Climate Zone 6	6%	$135	15 years	4.2 years	$812
Climate Zone 7	6%	$146	14 years	3.4 years	$1,005
	Annual Statewide Economic Gain:[3] $ 2.0 million Annual Statewide Energy Savings: 160,000 MMBTU				

Changes in Tables

Requirement	MN 2012 IECC	2018 IECC
Tables 402.1.2/402.1.4		
Fenestration U-factor	.32	**.30**
Wood Frame Wall R-value/U-factor	20/ .048	**20+5 or 13+10/ .045**
Basement wall R-value/U-factor	15[cii]/ .050	**15/19/** .050
Slab R-value & depth	10, 3.5 ft	**10, 4 ft**
Crawl space wall R-value/U-factor	15[cii]/ .055	**15/19/** .055

What is a stretch building code?

In Minnesota, a “stretch energy code” would be a voluntary appendix to a mandatory statewide minimum energy code that allows municipalities to adopt a uniform beyond code option to achieve greater levels of energy efficiency.

Stretch codes around the country

- Massachusetts
  - Commercial: 20% beyond state minimum code
  - Residential: 65-70 Minimum HERS score rating
- California
  - Commercial & Residential: 2 tiers beyond minimum
- Vermont
  - Development along with minimum code stakeholder process
  - On site renewable and EV ready
- Boulder City and County
  - Commercial: 30% beyond ASHRAE 2010
  - Residential: 14-64% more efficient for based on sliding HERS score

Minnesota Rule: 1300.0030 Subpart 2 A

- Allows for one statewide building code that "supersedes the building code of any municipality"
- A more stringent code would need to be included as an Appendix to the existing code
- A stretch code comes at the digression of the Commissioner of the Department of Labor and Industry which could be directed through legislative action

Sustainable Buildings 2030

LHB PERFORMANCE DRIVEN DESIGN.

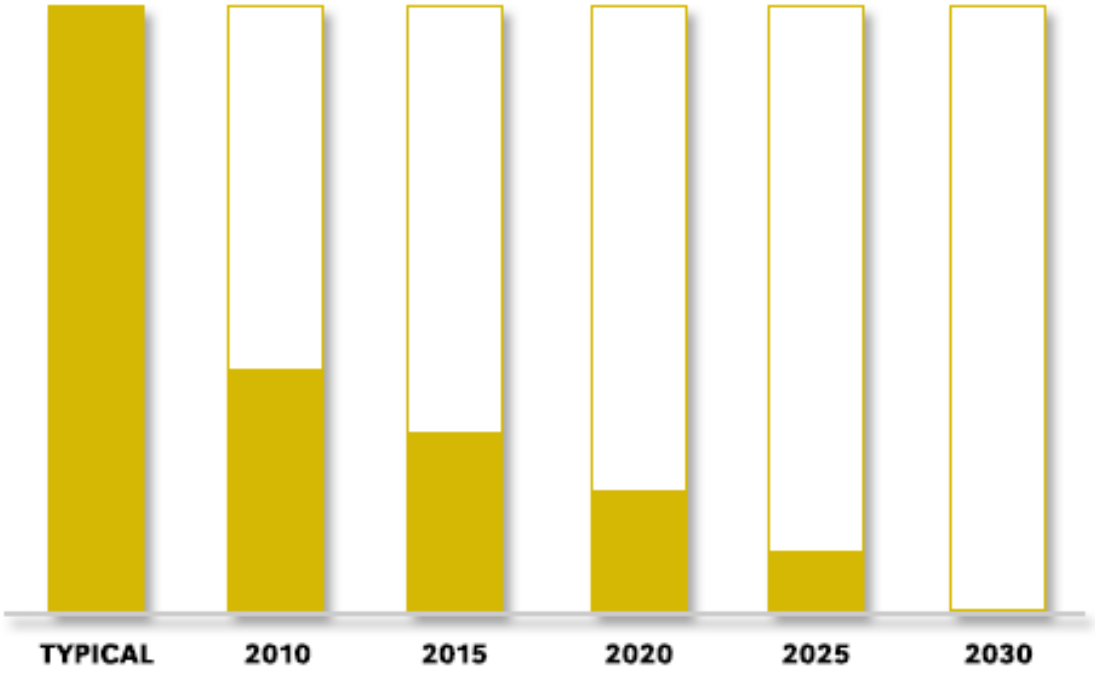
MINNESOTA DEPARTMENT OF COMMERCE
DIVISION OF ENERGY RESOURCES

Admin Minnesota
DEPARTMENT OF ADMINISTRATION

HERZOG/WHEELER & ASSOCIATES LLP

cee
Center for Energy and Environment

THE WEIDT GROUP®



CSBR
Center for Sustainable Building Research

SB 2030 Energy Standard

Building Energy Consumption from Carbon Producing Fuel

Fresh Energy

Sustainable Buildings 2030

- SB 2030 is an initiative to make all newly constructed and renovated buildings carbon neutral by 2030
- Voluntary program for private Minnesota buildings and requirement for all buildings receiving general obligation bond funding
- Has led to an approximate savings of 534 billion BTUs and $8.3 million per year (savings verified through energy tracking)

Tettegouche State Park Visitor Center

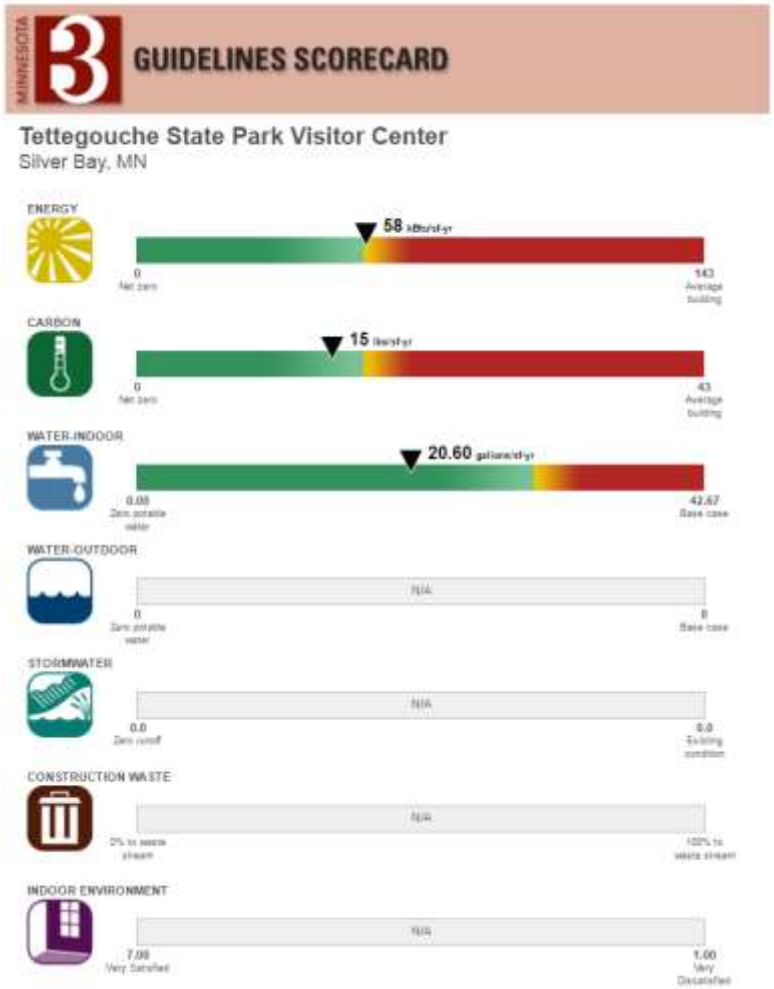
New Construction | 2014

Project Details:

- Location: Silver Bay, MN
- Construction Type: New Construction
- Building Type: Visitor Center
- Organization: MN DNR
- Owner: MN DNR, MN DOT
- Building Area: 11,259 sf
- Vegetated Area: 1.22 acres
- Number of Stories: 1
- Year of Occupancy: 2014

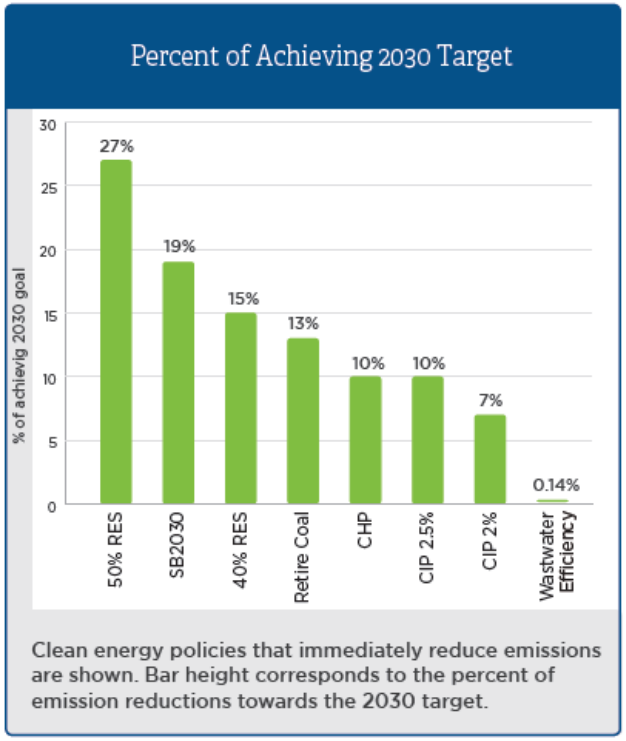
Design Team:

- Architect: Miller Dunwiddie
- Mechanical Engineer: LKPB Engineers
- Structural Engineer: MBJ Structural Engineers
- Civil Engineer: SRF

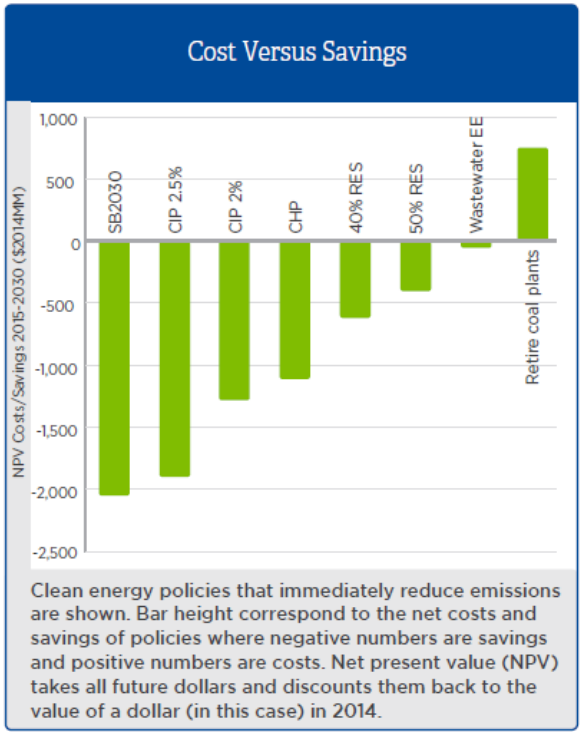


Climate Solution and Economic Opportunities Report

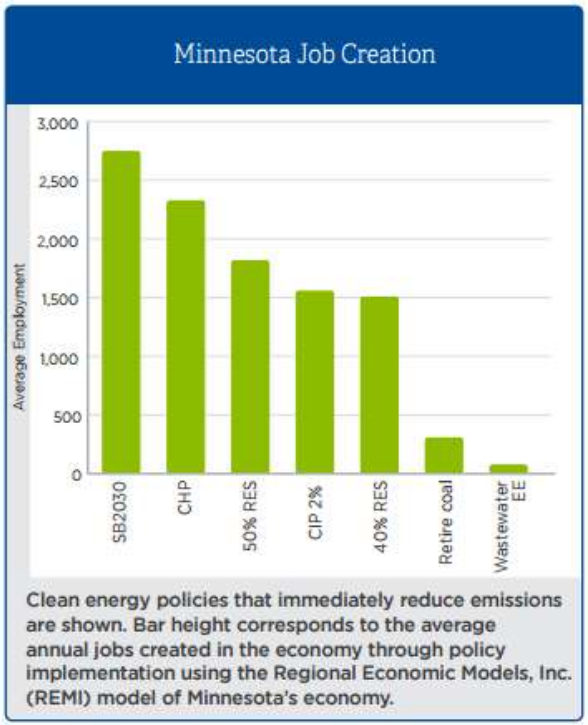
- Climate Action Policies: SB 2030
  - Second highest reduction (after 50% RES)
  - Most cost effective strategy (NPV)
  - Highest for job creation (>275K jobs)



Clean energy policies that immediately reduce emissions are shown. Bar height corresponds to the percent of emission reductions towards the 2030 target.



Clean energy policies that immediately reduce emissions are shown. Bar height correspond to the net costs and savings of policies where negative numbers are savings and positive numbers are costs. Net present value (NPV) takes all future dollars and discounts them back to the value of a dollar (in this case) in 2014.



Clean energy policies that immediately reduce emissions are shown. Bar height corresponds to the average annual jobs created in the economy through policy implementation using the Regional Economic Models, Inc. (REMI) model of Minnesota's economy.

SB 2030 as a Stretch Code

- DLI could allow Minnesota cities to implement SB 2030 as a more stringent energy code by adding it as an Appendix to the existing code
- Promoted in CSEO Report and Minnesota's 2025 Energy Action Plan – progressive nature
- CSEO identified 9.3 million tons of CO2-eq per year savings opportunity in 2030, with an estimated net present value of $2 billion from 2015 to 2030

SB 2030 – Cost Effectiveness

- Projects will incorporate any measure with less than a 15 year payback
  - Provides for an alternate path
- SB 2030 only marginally raises costs
- Uses cost-benefits tests for CIP (California Tests)
- CEE study: SB 2030 energy standard is cost effective in essentially every building type.
  - 94% of buildings were cost effective over 20 years life-cycle analysis

Any Questions?

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Fresh Energy