ETA Forum: Shaping the Future of New Construction

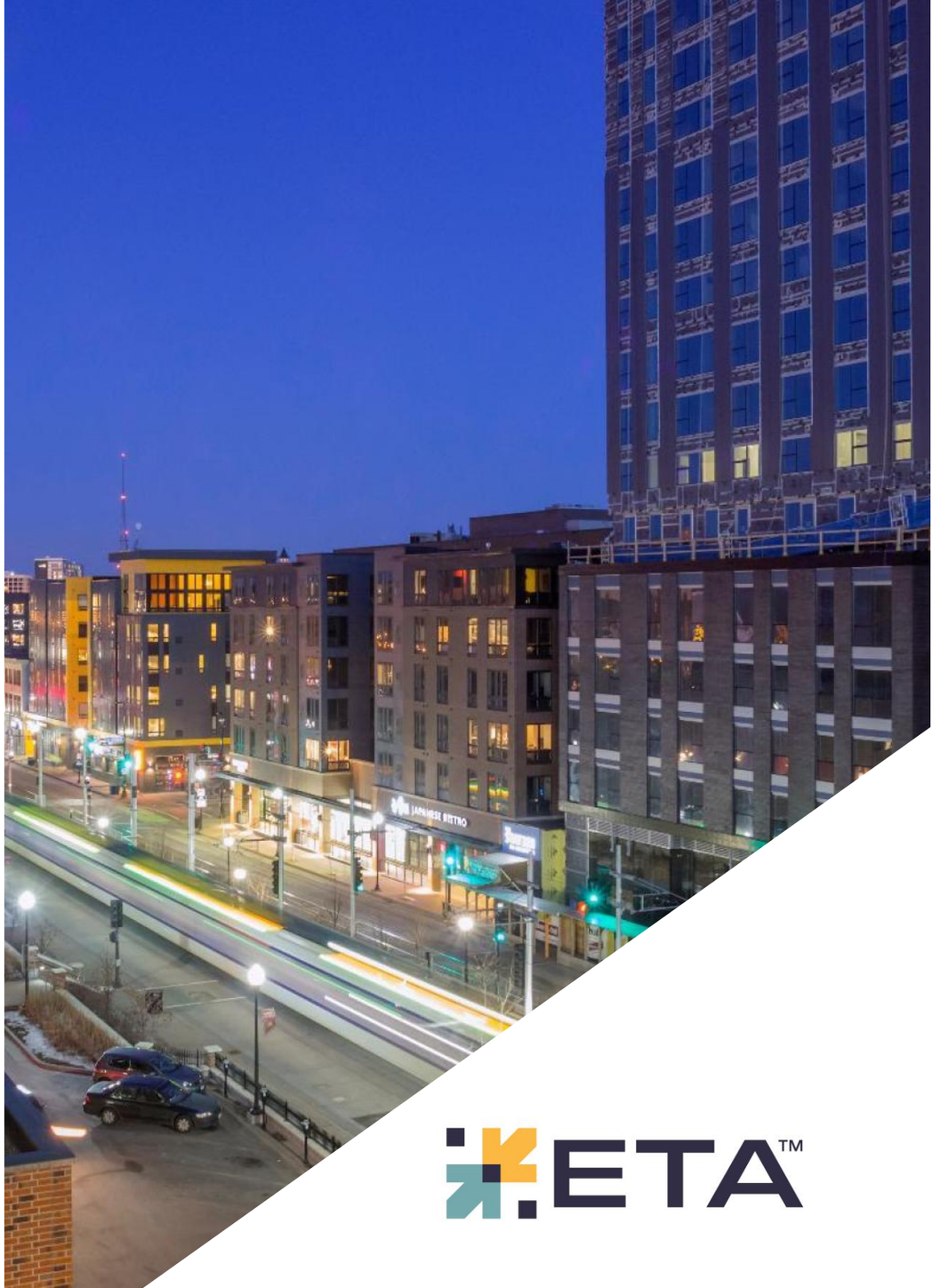
ETA™
EFFICIENT TECHNOLOGY ACCELERATOR

MN’s Efficient Technology Accelerator (ETA)

Accelerating adoption of key EE technologies and approaches, bringing benefits to all Minnesotans

A partnership of:

- Investor-owned utilities (funders)
- Minnesota Department of Commerce, Division of Energy Resources (administrator)
- Center for Energy and Environment (implementer)



ETA Principles for Energy Code Development

Collaborative approach	Codes need to work for broad range of stakeholders – designers, builders, occupants, code officials – and we can best reach our goals when everyone has input
Data-driven decisions	Inform decisions with research and market data, such as: what are the costs? What are the savings? What has been the market experience with the technology?
Highest impact at least cost	Consider the costs and level of benefits; focus efforts are areas that will help achieve goals at the lowest cost and highest benefits
Market ready technologies	Durable products that supply chain can reliably deliver and install at reasonable costs

ETA™



Photo source: https://www.mprnews.org/story/2014/09/26/mpls-building-boom

ETA Forum 2025: Shaping the Future of New Construction

MEEA
MIDWEST ENERGY EFFICIENCY ALLIANCE

May 13, 2025

About Me

Why I am here today?

- Over 20 years of buildings and energy code experience
- Director of Building Codes & Policy at MEEA
- Served on 2024 IECC Residential Consensus Committee
- Served on Minnesota Commercial Energy Code TAG for 2015 code
- Serves on Minnesota Residential Energy Code TAG
- Serves on Illinois Energy Code Advisory Council
- Lived in Minneapolis/St. Paul for 19 years
- Architecture degree from University of Minnesota, Twin Cities

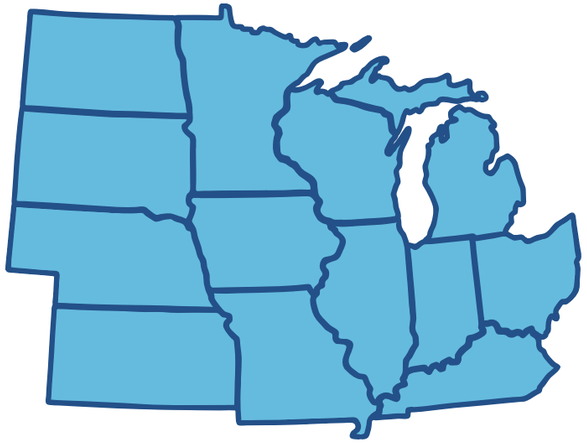


Alison Lindburg
Director, Building Codes & Policy

MEEA
MIDWEST ENERGY EFFICIENCY ALLIANCE

Who We Are

The **Midwest Energy Efficiency Alliance (MEEA)** is a collaborative network, promoting energy efficiency to optimize energy generation, reduce consumption, create jobs and decrease carbon emissions in all Midwest communities.



MEEA is a non-profit membership organization with 170+ members, including:



Energy Service Companies & Contractors



State & Local Governments



Academic & Research Institutions



Electric & Gas Utilities



Community-based Organizations

MEEA
MIDWEST ENERGY EFFICIENCY ALLIANCE

About MEEA

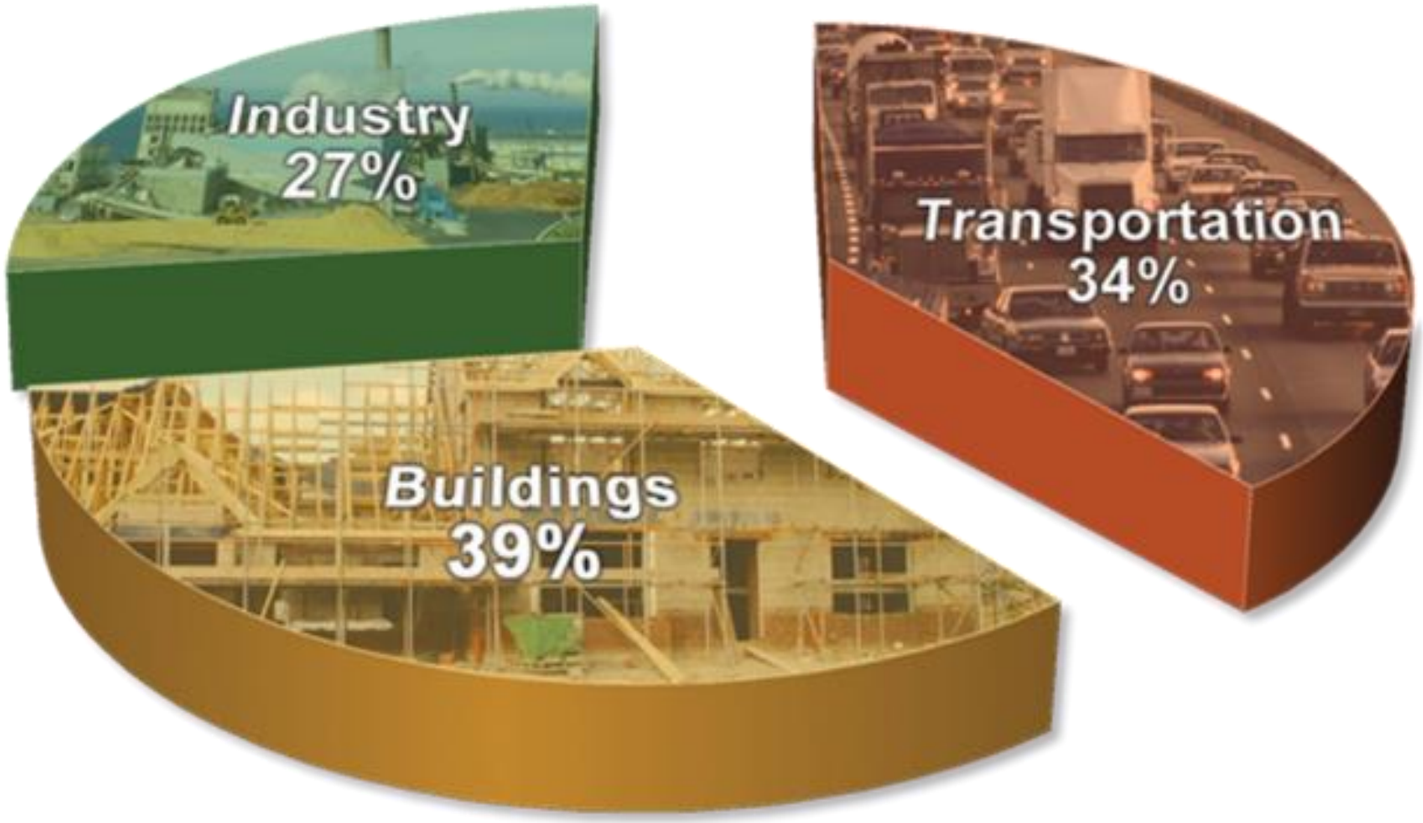
Building Codes & Policy

The Building Codes & Policy team is involved in all aspects of the energy code, including:

- **Stakeholder Engagement** – Led or participated in code related stakeholder engagement efforts in 12 states and dozens of municipalities
- **Compliance** – Led or participated in compliance field studies in 7 Midwestern states; leads or participates in all Midwest code collaboratives
- **Training** – Led or participated in training programs in 6 states
- **Adoption** – Supported adoption efforts in 11 states and dozens of municipalities
- **Research** – Published dozens of code related, peer reviewed papers
- **Development** – Participated in state and national energy code development

Why Energy Efficient Buildings are Important

Why are energy codes important?

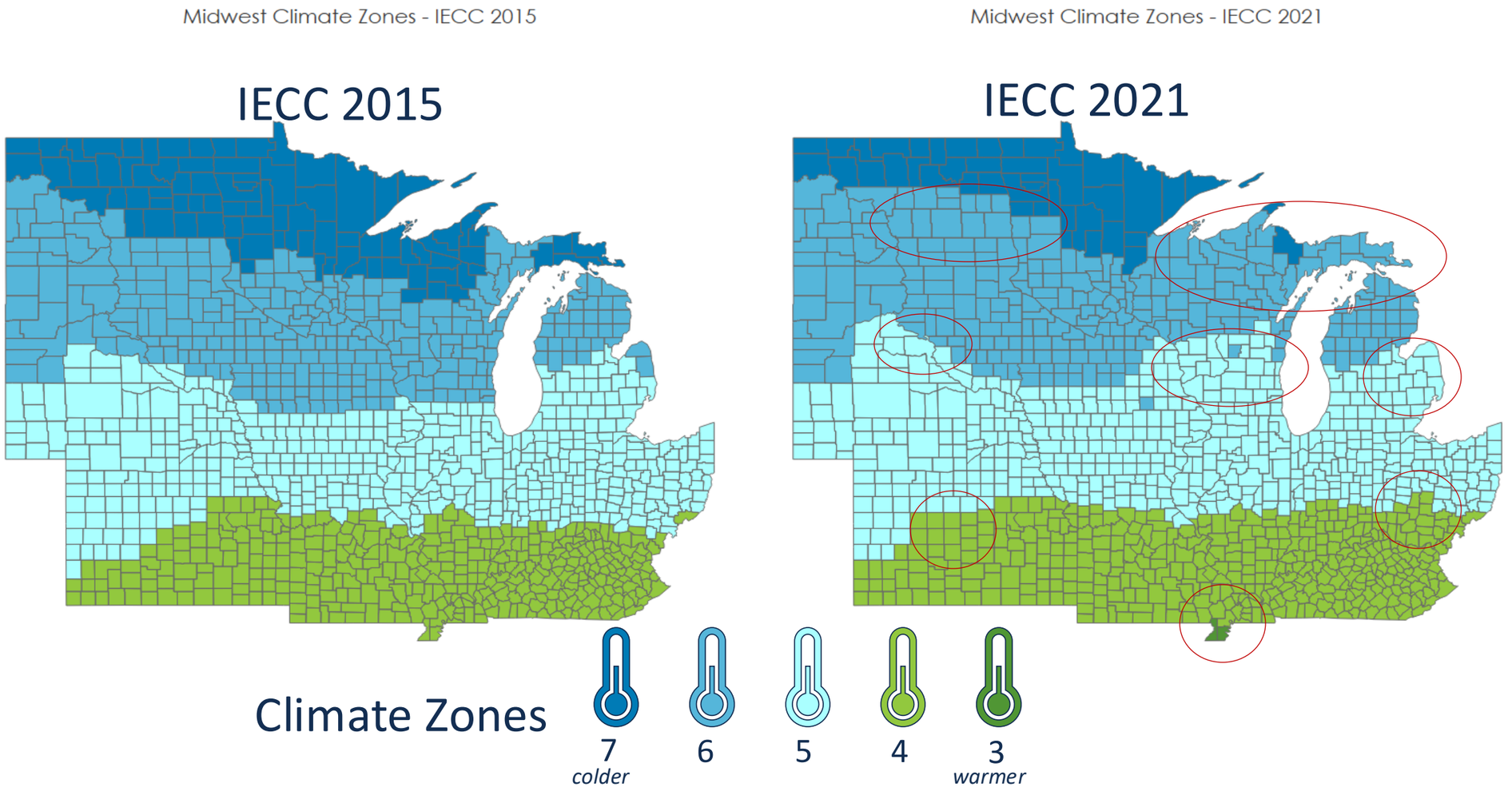


Buildings account for ~70% of electricity use

MEEA
MIDWEST ENERGY EFFICIENCY ALLIANCE

The Need for Decarbonization

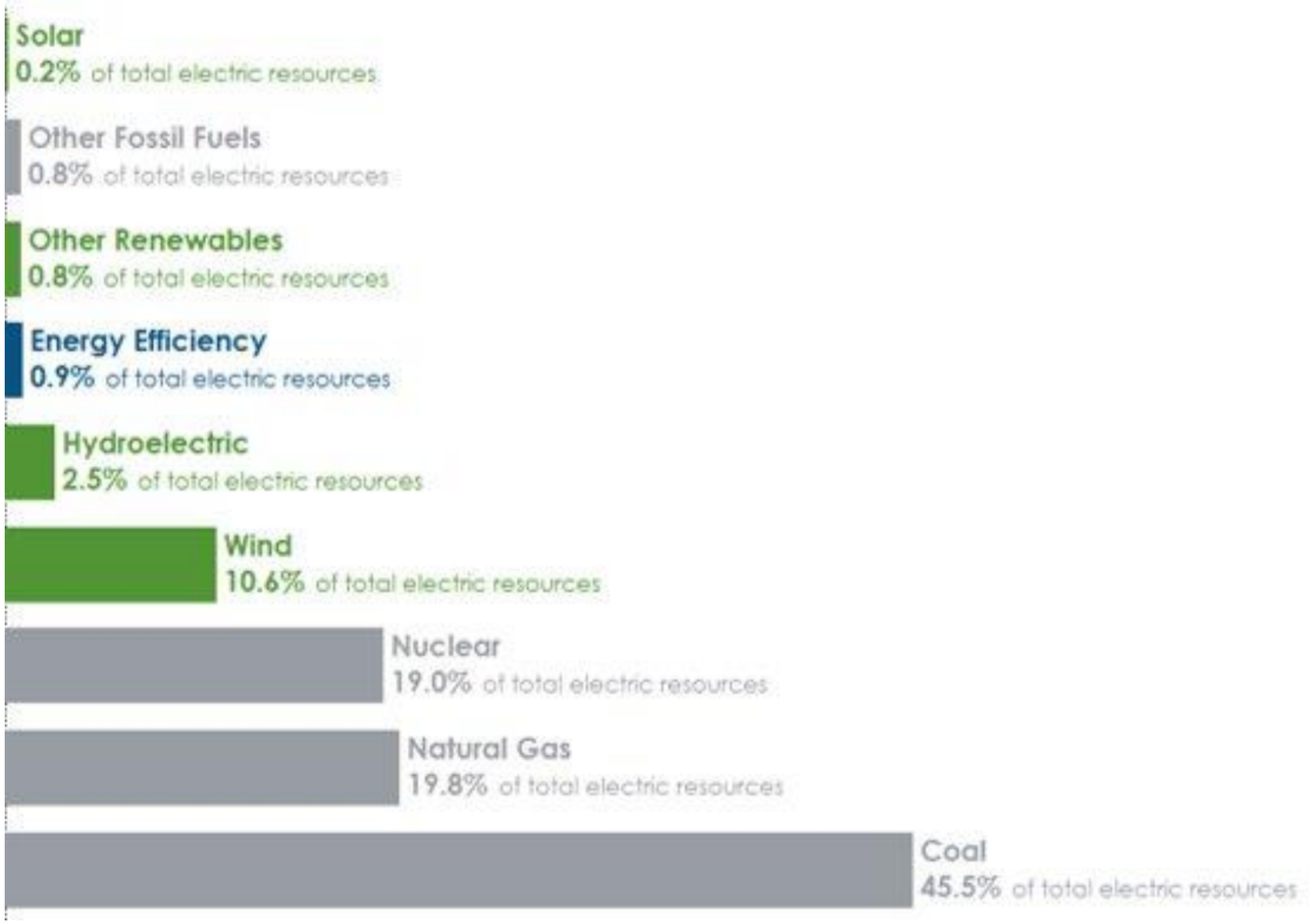
The Midwest is getting warmer



176 Midwest counties shifted to warmer climate zones

Source: International Code Council 2021

Why Buildings?



Over 66% of electric generation in the Midwest is from **fossil fuels sources**

Both **building energy efficiency and greening the grid** have to happen to decarbonize the built environment

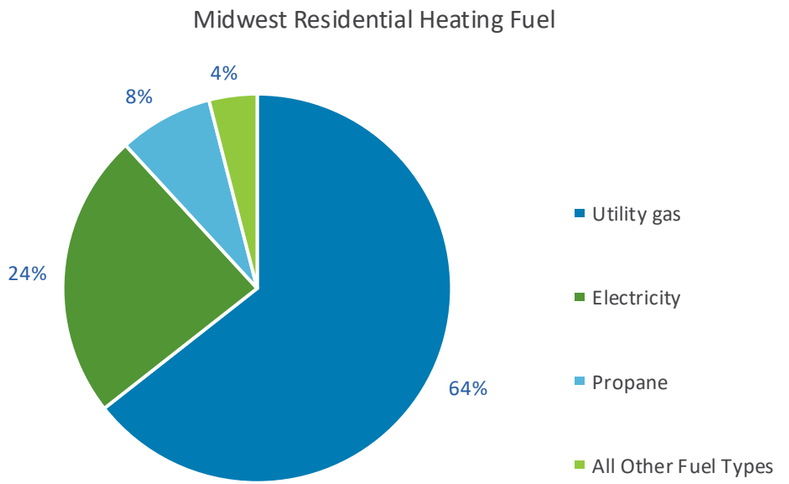
Source: EIA-861; EIA-923 (2019)

MEEA
MIDWEST ENERGY EFFICIENCY ALLIANCE

Residential Buildings

Primary Heating Source

Region	Total Residential Units	Electricity	Utility gas	Bottled, tank, or LP gas	Fuel oil, kerosene, etc.	Coal or coke	Other Fuel	No fuel used
United States	122,802,852	**48,468,860**	**58,702,794**	**5,930,166**	**5,416,452**	**111,484**	**2,832,386**	**1,340,710**
Midwest	28,854,563	**6,854,759**	**18,584,722**	**2,261,552**	**274,882**	**13,968**	**727,954**	**136,726**
Midwest % of National	23%	**14%**	**32%**	**38%**	**5%**	**13%**	**26%**	**10%**



Fossil fuels are the dominant heating source (76% Midwest; 61% U.S.)

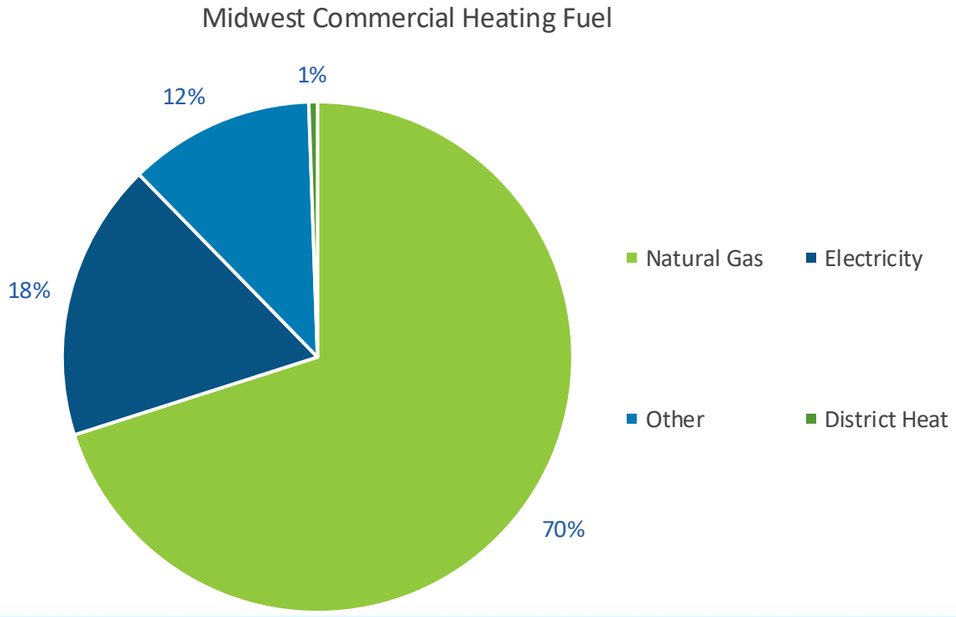
Source: American Community Survey 2019

MEEA
MIDWEST ENERGY EFFICIENCY ALLIANCE

Commercial Buildings

Primary Heating Source

	All Buildings	Buildings with Space Heat	Heating Fuel: Electricity	Natural Gas	Fuel Oil	District Heat	Other
National	5,557,000	4,722,200	1,819,000	2,322,000	205,000	47,000	329,200
Midwest	1,237,000	1,096,000	193,000	768,000	n/a	6,000	129,000



The Midwest has a **much higher % of commercial buildings with gas heating** (70% Midwest; 49% US)

Source: CBECS 2012

MEEA
MIDWEST ENERGY EFFICIENCY ALLIANCE

Commercial Buildings

New Construction vs. Existing Buildings

Type	Region	Number of buildings	Total floorspace	Average floorspace
Existing buildings	Midwest (excl. Kentucky)	1,719,000	26,128,000,00	15,000
New construction	Midwest	3,468	182,897,239	52,739
Addition %		*0.20%*	*0.66%*	

New commercial buildings are **added at about 0.2% annually** in the Midwest and new buildings tend to have a much higher square footage on average

Source: CBECS 2018, REED 2017

MEEA
MIDWEST ENERGY EFFICIENCY ALLIANCE

Residential Buildings

New Construction vs. Existing Buildings

Type	Number of buildings
Existing buildings	32,540,657
New construction permits	196,583
Addition %	***0.6%***

Over the past decade, Midwestern states have nearly **doubled** their new housing permits.

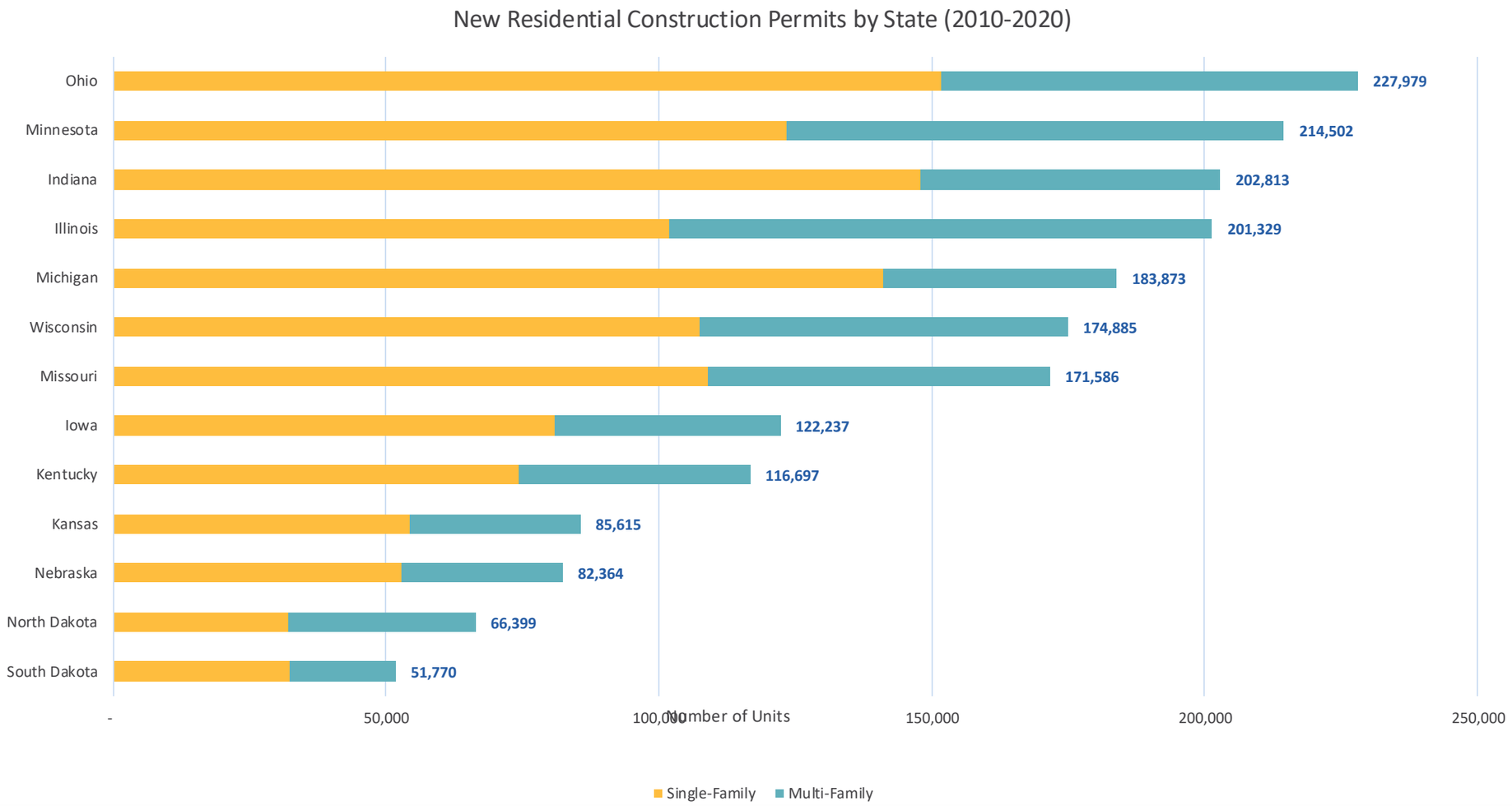
New residential buildings accounted for **0.6% of the Midwest building stock in 2019** and new buildings tend to have a much higher square footage on average

Source: American Community Survey, 2019; Census Bureau

MEEA
MIDWEST ENERGY EFFICIENCY ALLIANCE

Residential Buildings

New Construction Building Permits: MEEA States

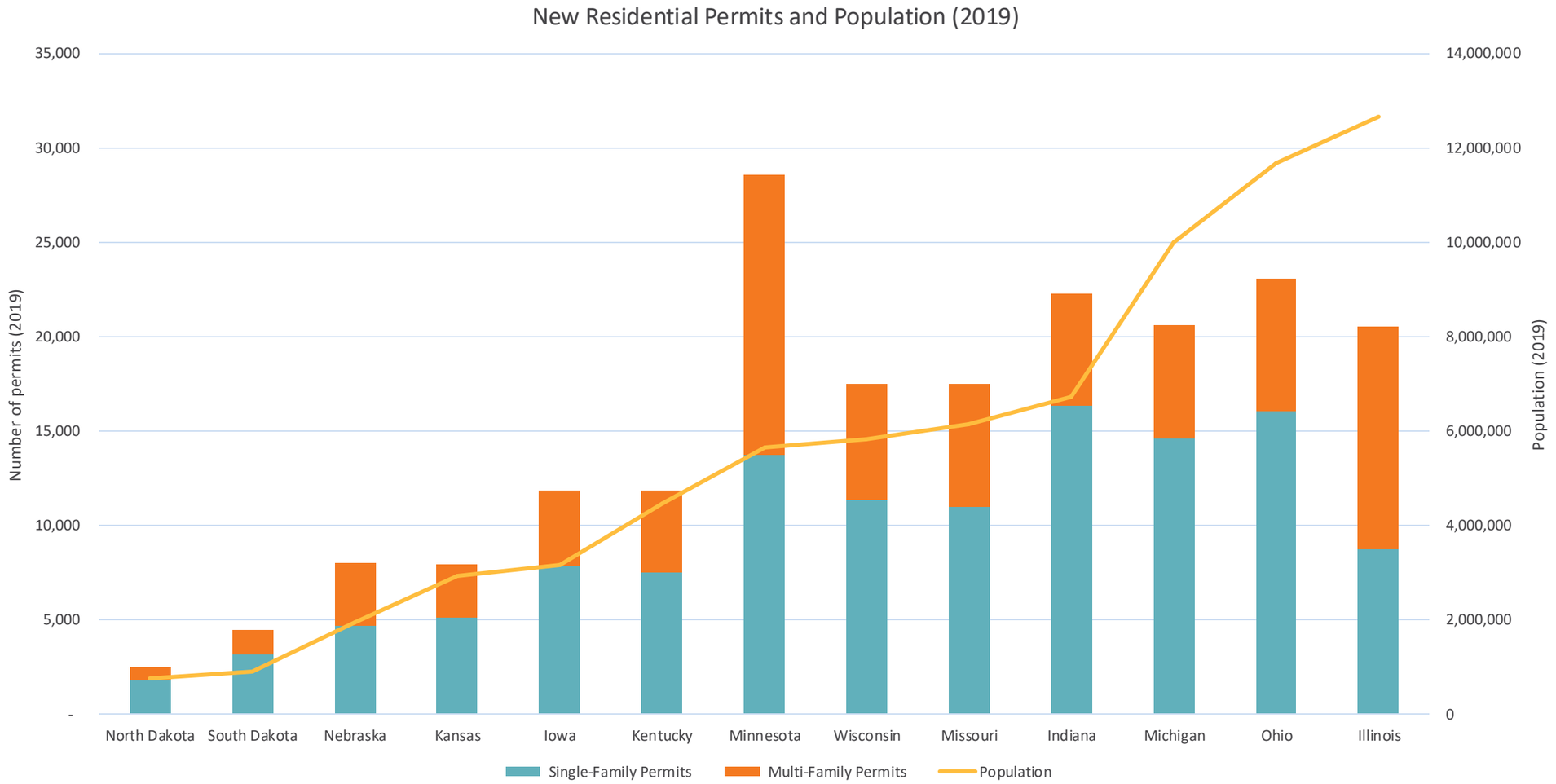


Single-Family construction dominates the housing market in the Midwest, except in IL and MN, where multi-family has more permits.

Source: Census Bureau

Residential Buildings

New Construction Building Permits: MEEA States



Source: Census Bureau

Minnesota Climate Action Plan

Clean Energy and Efficient Buildings

Some of the Minnesota Climate Action Plan goals and actions include:

- Reducing emissions related to heating and cooling homes and businesses;
- Designing and building climate-smart new buildings; and
- Improving building codes and standards so that all new commercial and large multi-family buildings produce net-zero greenhouse gas emissions by 2036.

https://climate.state.mn.us/next-step-our-clean-energy-transition

Minnesota Climate Action Plan

Clean Energy and Efficient Buildings

Some of the Minnesota Climate Action Plan goals and actions include:

- Reducing emissions related to heating and cooling homes and businesses;
- Designing and building climate-smart new buildings; and
- Improving building codes and standards so that all new commercial and large multi-family buildings produce net-zero greenhouse gas emissions by 2036.

https://climate.state.mn.us/next-step-our-clean-energy-transition

MEEA
MIDWEST ENERGY EFFICIENCY ALLIANCE

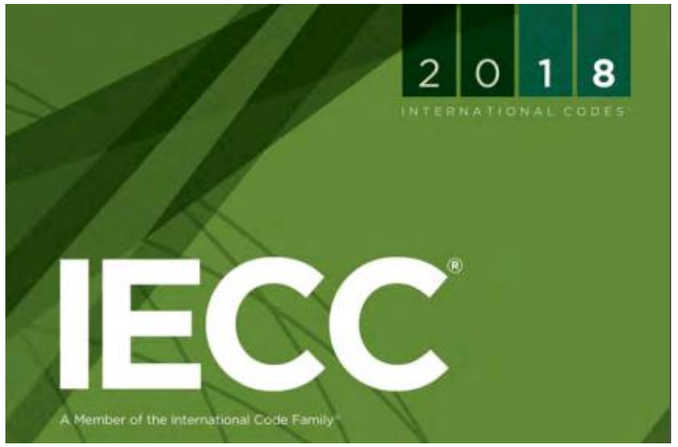
Benefits of Energy-Efficient Buildings

- Energy efficiency is the most cost-effective method for reducing energy consumption and emissions
- Efficient homes and commercial buildings have a lasting payback; new construction has a lifespan of more than 50 years
- Lower energy expenditures mean residents have more money to invest in the local economy
- Efficient buildings result in higher quality, safer and more comfortable homes and buildings
- Energy savings = affordability, ensuring more people can afford their monthly mortgage payments

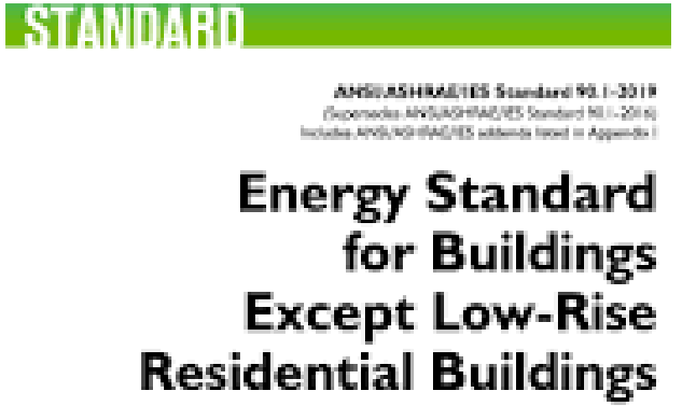
Current Energy Codes Landscape

Current Energy Codes and Processes

- Energy Codes are **rules that set the minimum** requirements for the energy efficiency components of a new building
- Most cost-effective policy for buildings
- National Model Codes developed by International Code Council and ASHRAE
- Updated on a 3-year cycle
- States/municipalities adopt and enforce the code
- Mainly new construction, also some major renovations and additions
- Developed using a robust and iterative public/stakeholder input process



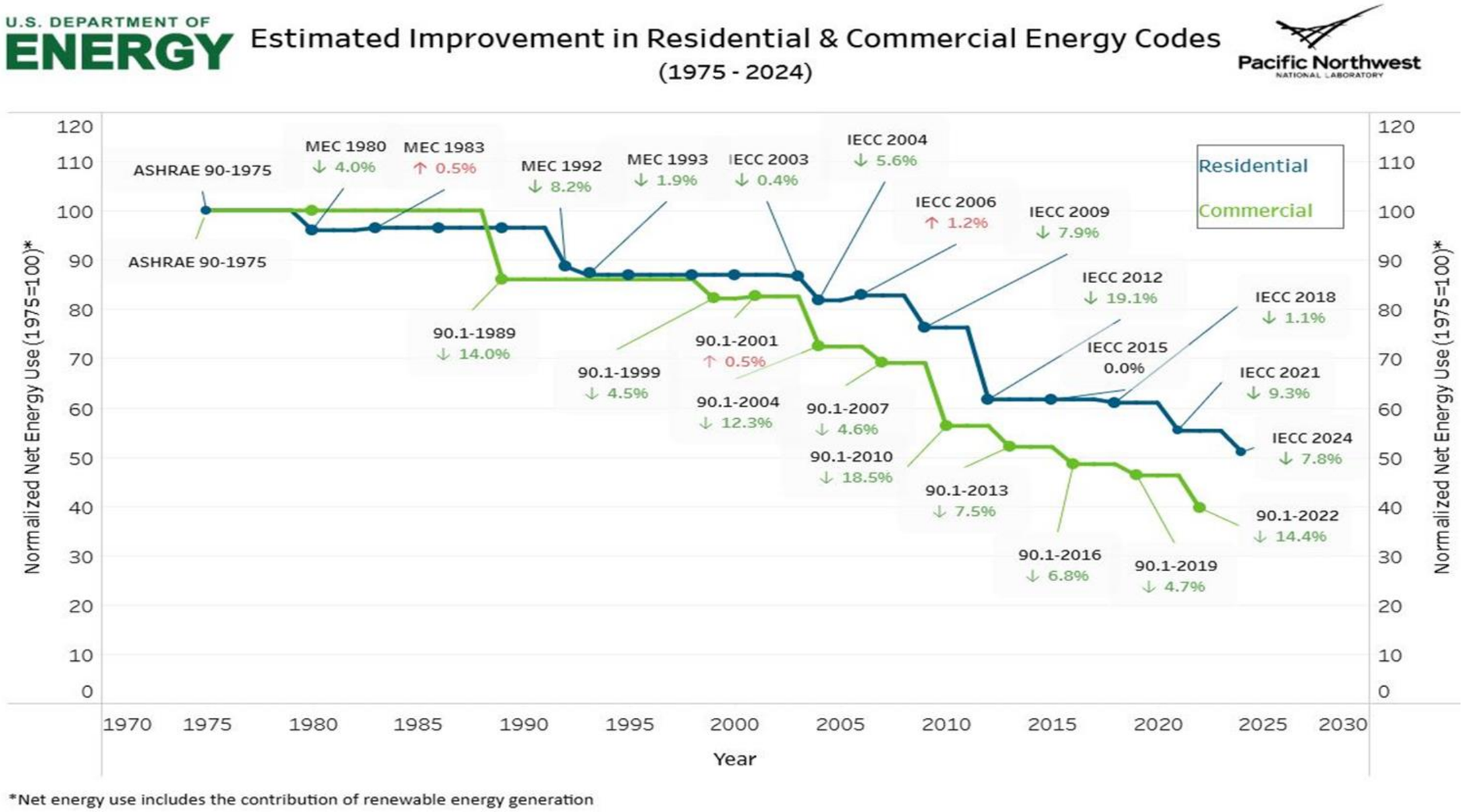
International Energy Conservation Code



ASHRAE Standard 90.1

MEEA
MIDWEST ENERGY EFFICIENCY ALLIANCE

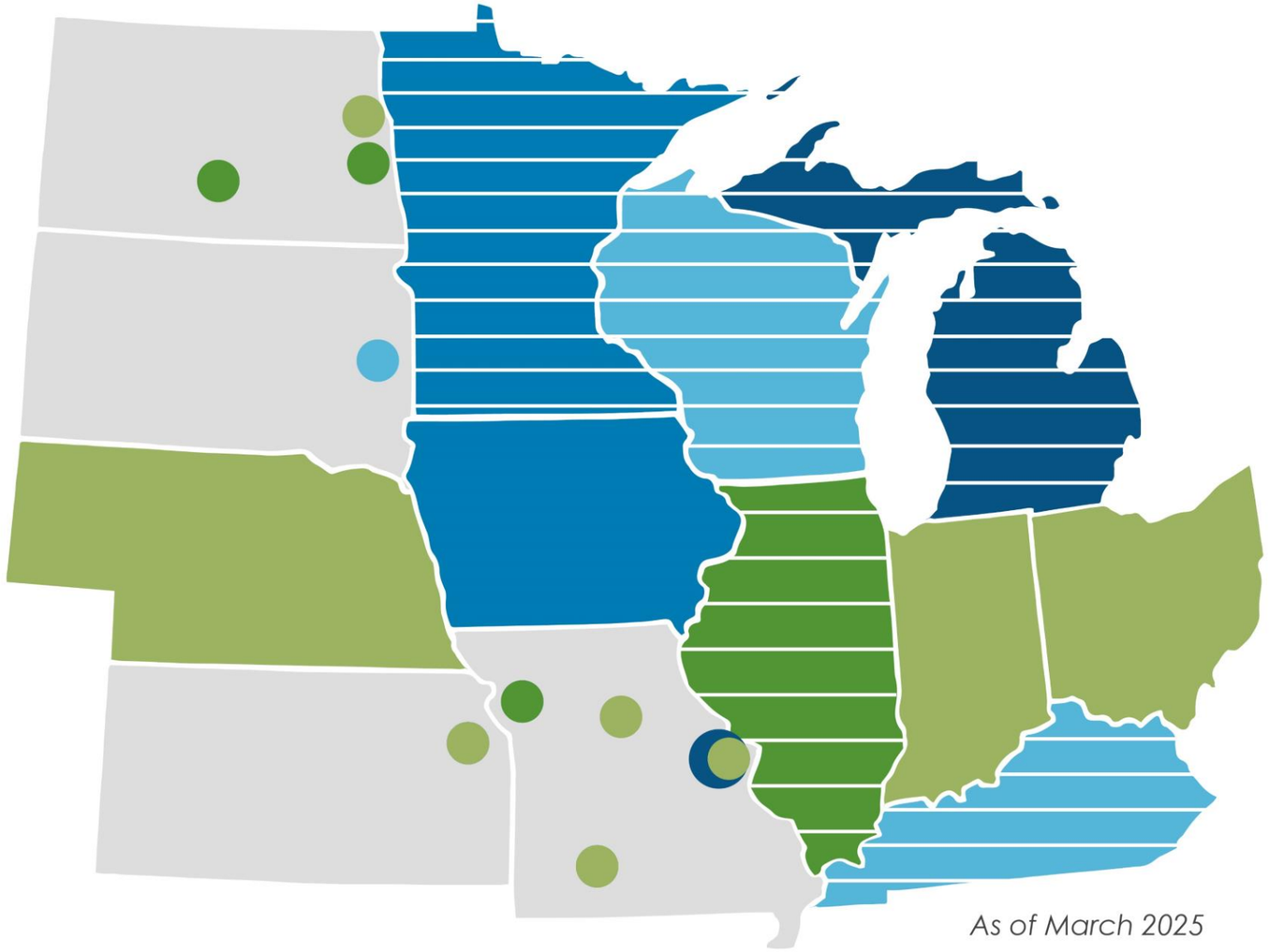
Building Energy Codes



*Net energy use includes the contribution of renewable energy generation

MEEA
MIDWEST ENERGY EFFICIENCY ALLIANCE

Midwest Residential Energy Codes



Adopted Energy Code
or IECC-equivalent Standard

- No mandatory code
- 2009 IECC
- 2012 IECC
- 2015 IECC
- 2018 IECC
- 2021 IECC

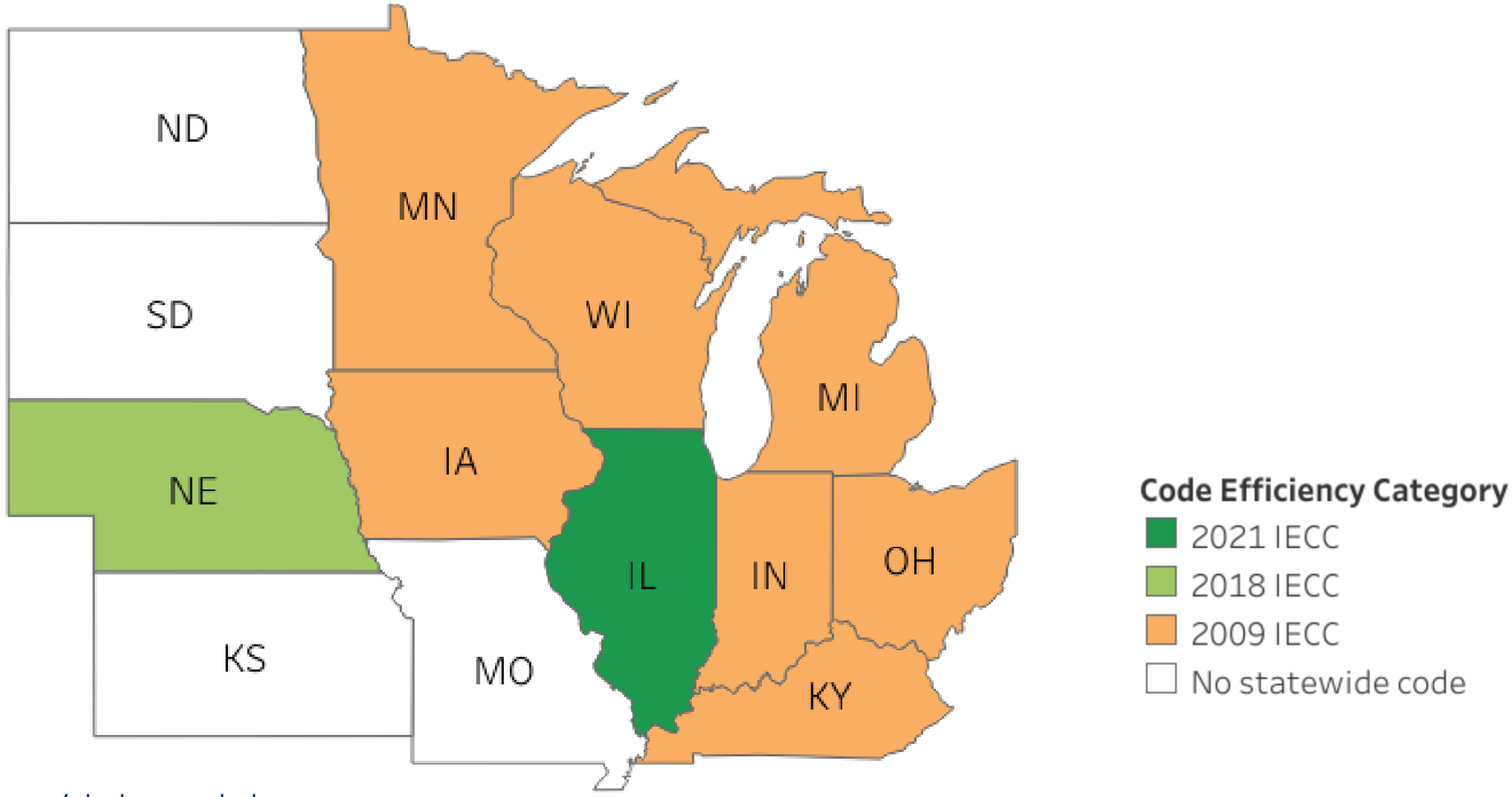
* Stripes indicate code update in progress

As of March 2025

MEEA
MIDWEST ENERGY EFFICIENCY ALLIANCE

Efficiency of Codes in the Midwest

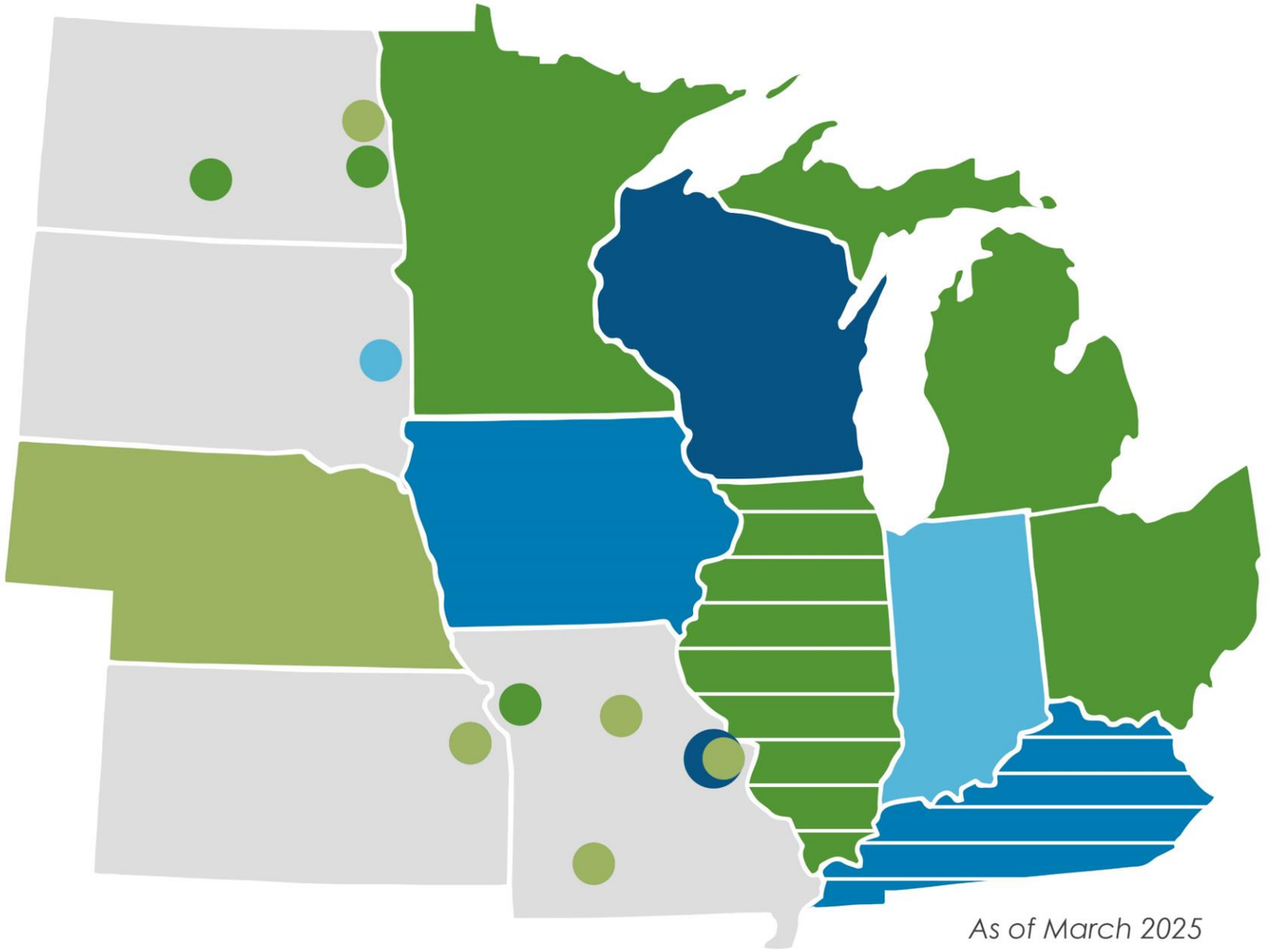
Residential Energy Code



Source: US Dept of Energy
https://www.energycodes.gov/state-portal

MEEA
MIDWEST ENERGY EFFICIENCY ALLIANCE

Midwest Commercial Energy Codes



Adopted Energy Code
or IECC-equivalent Standard

- No mandatory code
- 2009 IECC
- 2012 IECC
- 2015 IECC
- 2018 IECC
- 2021 IECC

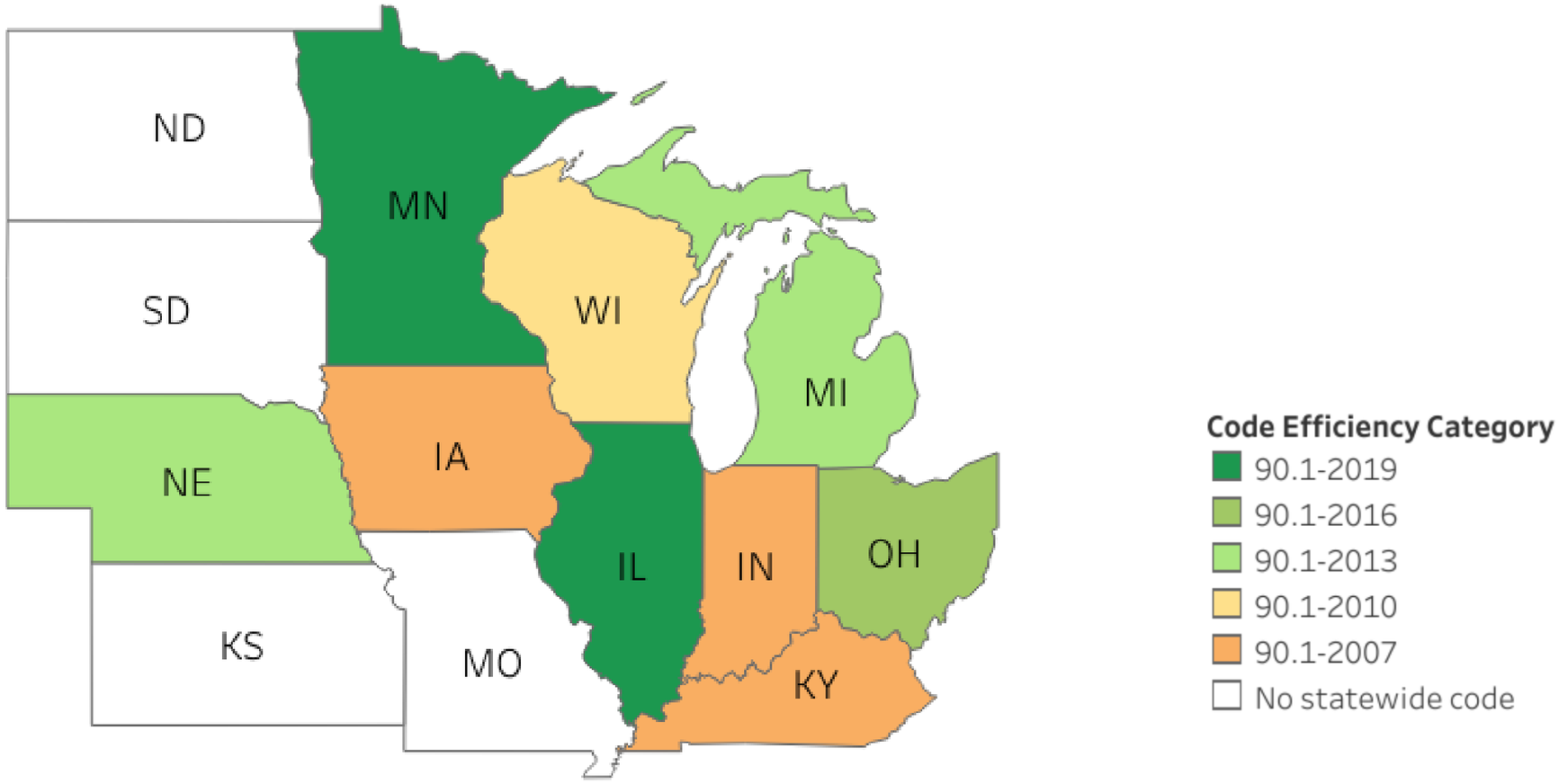
* Stripes indicate code update in progress

As of March 2025

MEEA
MIDWEST ENERGY EFFICIENCY ALLIANCE

Efficiency of Codes in the Midwest

Commercial Energy Code

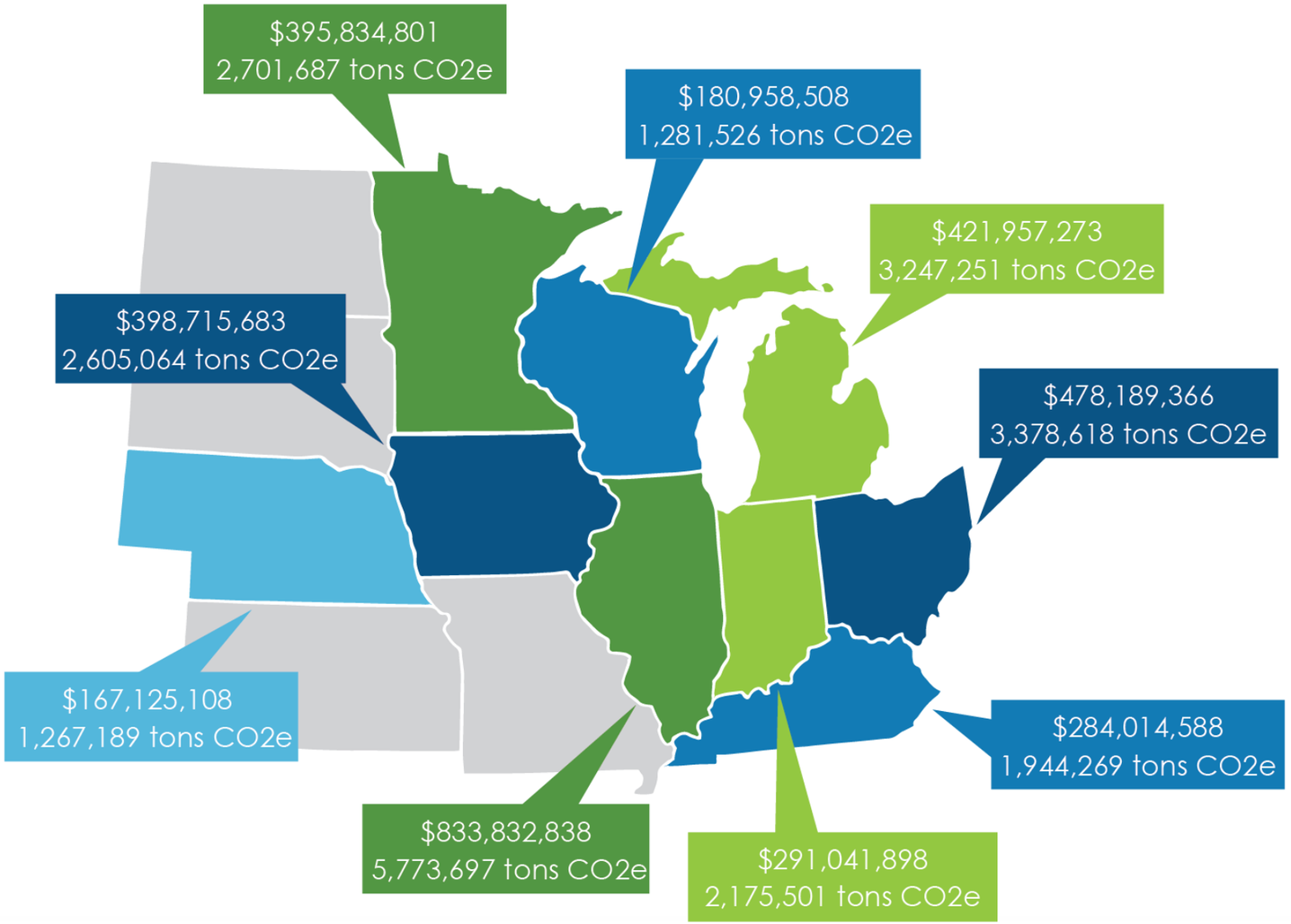


Source: US Dept of Energy
https://www.energycodes.gov/state-portal

MEEA
MIDWEST ENERGY EFFICIENCY ALLIANCE

Building Energy Code Impacts in the Midwest

Cumulative Savings 2009-2019



Source: MEEA analysis using PNNL methodology as described in US DOE Impacts of Model Building Energy Codes

MEEA
MIDWEST ENERGY EFFICIENCY ALLIANCE

Minnesota Energy Codes

- Base code will be required to advance in efficiency every three years to get to net-zero ready by the dates below
- Residential 70% improvement over 2006 by 2038
- Commercial 80% improvement over 2004 by 2036
- Had not updated since 2015 (with 2012 efficiency)
- Utilities are providing statewide energy code compliance support
- Minnesota Advanced Energy Codes Partnership

Success with Advanced Energy Codes

Essential Components

- Data & Market Considerations
- Stakeholder Input
- Compliance Support
- Training & Education
- Simplicity
- Flexibility

MEEA
MIDWEST ENERGY EFFICIENCY ALLIANCE

Other Code Support Examples

Illinois

- Energy code increases in stringency every three years
- State and utility are providing advancement and compliance support

Colorado

- EV-ready, Solar-ready and/or Electrification/Electric-ready requirements over 2021 IECC (stretch code)
- State and utility are providing training and other support

Massachusetts

- Has 3 options – Base, Stretch (increased efficiency), Specialized (toward Net-Zero)
- Has been in place since 2009
- Has utility-supported statewide compliance support program

Energy Codes Benefits



MEEA
MIDWEST ENERGY EFFICIENCY ALLIANCE

Thank you!

Alison Lindburg

alindburg@mwalliance.org

MEEA
MIDWEST ENERGY EFFICIENCY ALLIANCE



Energy Codes for a Vital Tomorrow

Deputy Commissioner Kate Perushek

Greg Metz | Minnesota State Building Official

DEPARTMENT OF LABOR AND INDUSTRY



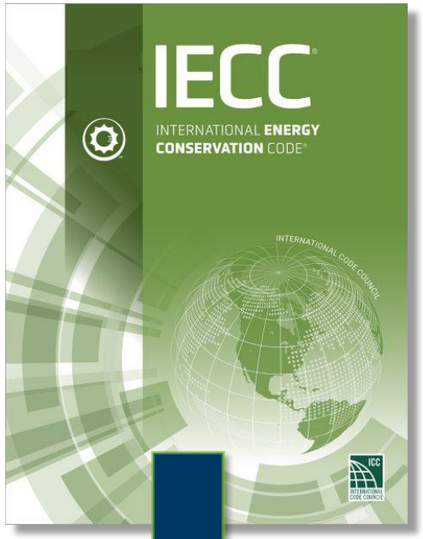
Open Meeting Laws

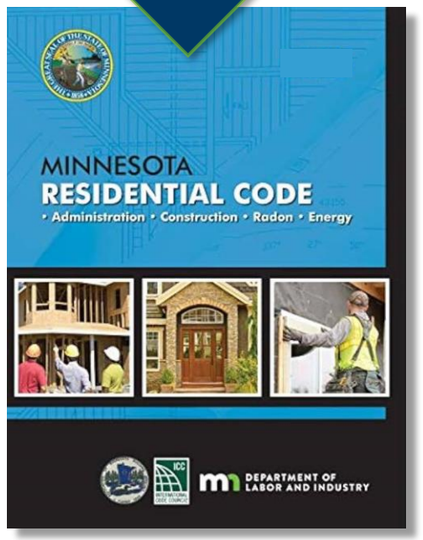
Energy Code Technical Advisory Groups Quorum Present:

- No discussion of code change proposals
- No collaboration on TAG topics
- Remember that TAG discussions are for TAG meetings

DEPARTMENT OF LABOR AND INDUSTRY

Statutory Scoping for Energy Codes

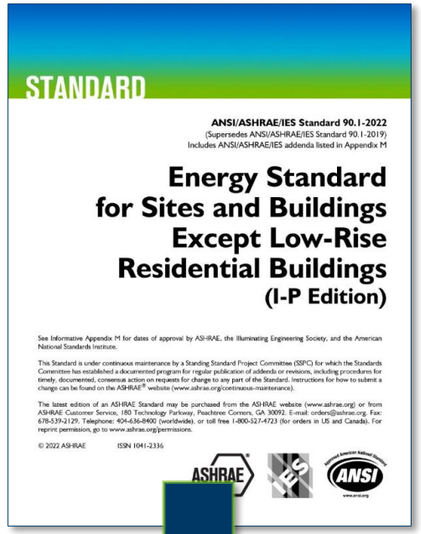


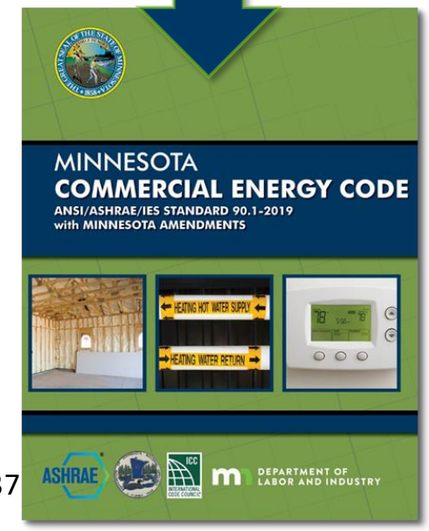


Minnesota Statute 326B.106 (d)

> *The commissioner may adopt new energy codes to advance construction methods, technology, or materials, or, where necessary, protect the health, safety, and welfare of the public, or to improve the efficiency or use of a building.*

- Emphasis on efficiency
- No scoping for power generation





State Legislation – Statutory Goal Setting for Energy Codes

Commercial (2023)

- Adopt each new published model energy edition. (3-year cycle)
- Amend the model code as necessary to incrementally advance toward the goal.
- **Goal: 2036 code** - 80% reduction from 2004 as backstop.



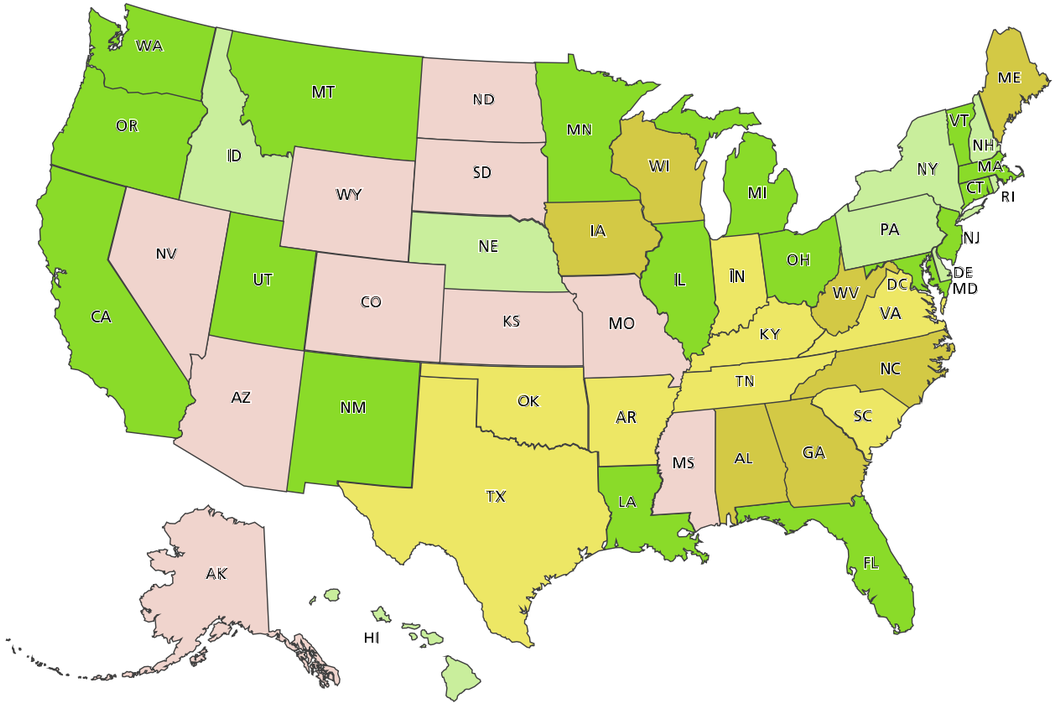
Residential (2024)

- Adopt each new published model energy edition. (3-year cycle)
- Amend the model code as necessary to incrementally advance toward the goal.
- **Goal: 2038 code** - 70% reduction from 2006 as backstop.



How Does Minnesota Compare?

COMMERCIAL ENERGY CODE ADOPTION



2024 IECC or 2022 ASHRAE 90.1

2021 IECC or 2019 ASHRAE 90.1

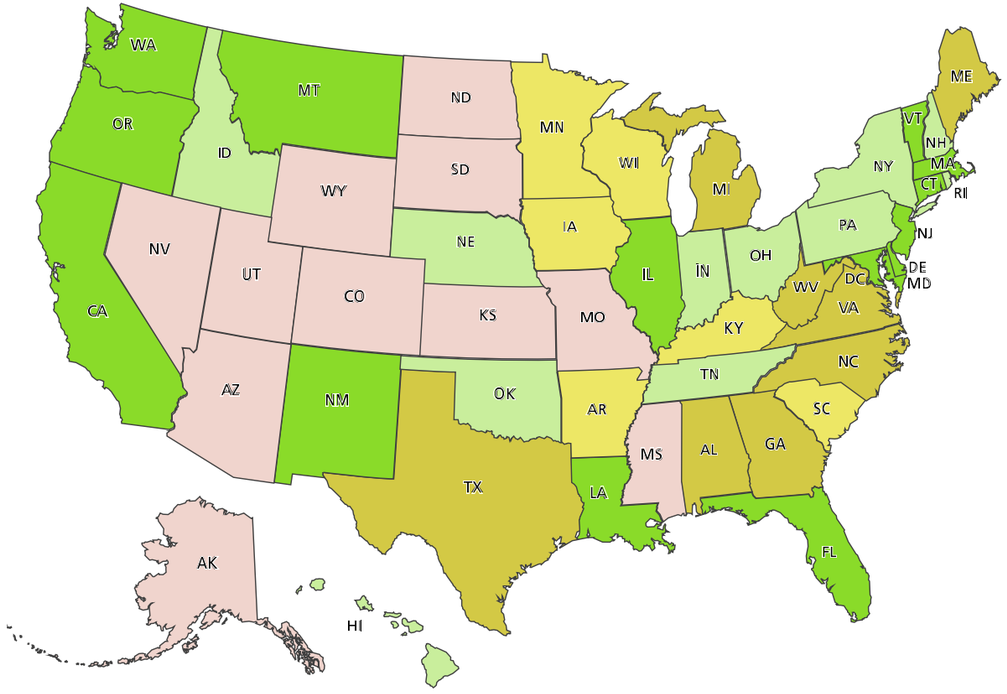
2019 IECC or 2016 ASHRAE 90.1

2015 IECC or 2013 ASHRAE 90.1

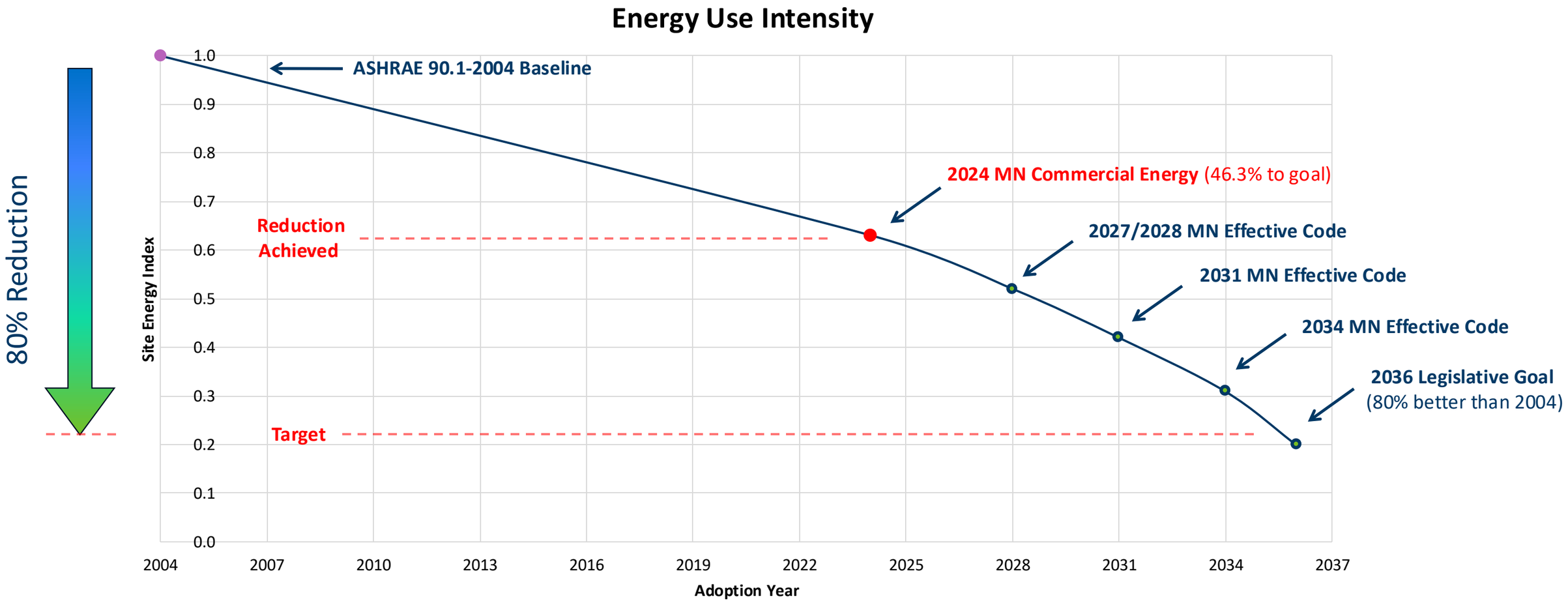
2012 IECC or 2010 ASHRAE 90.1 Or earlier

No Statewide Code

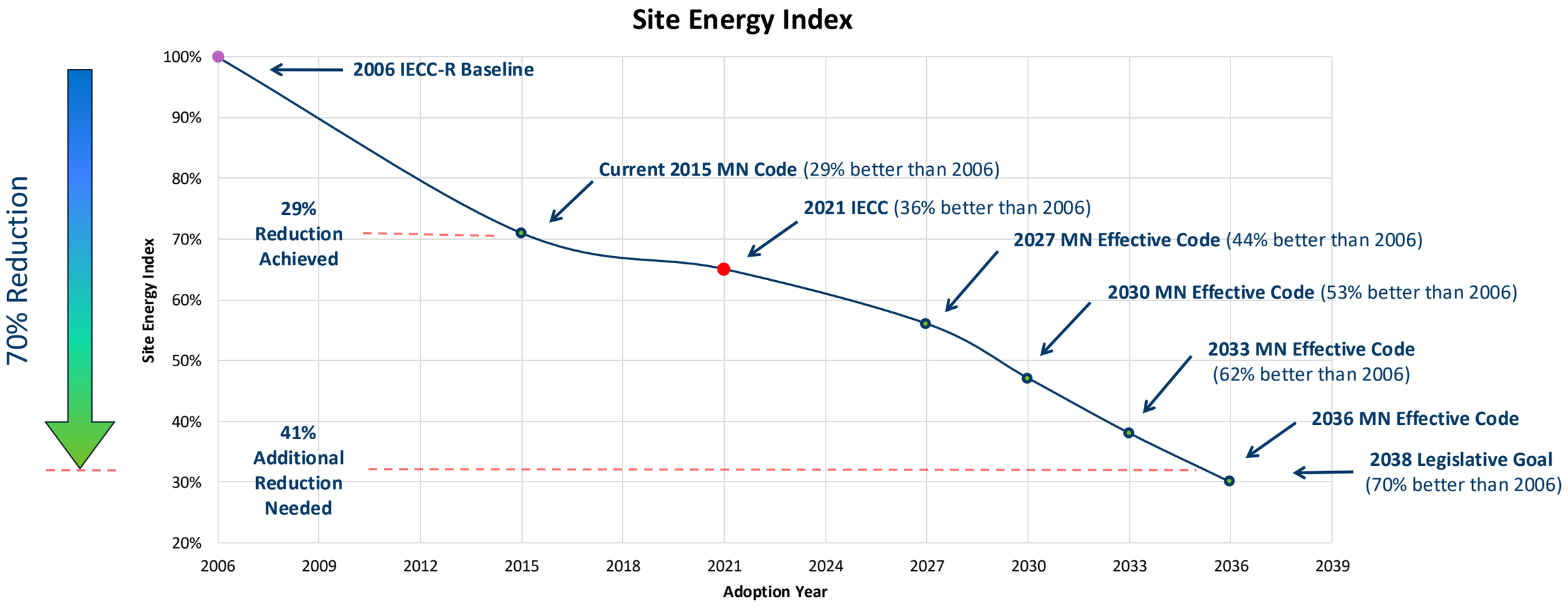
RESIDENTIAL ENERGY CODE ADOPTION



Commercial Energy Code- Where are we going?



Residential Energy Code- Where are we going?

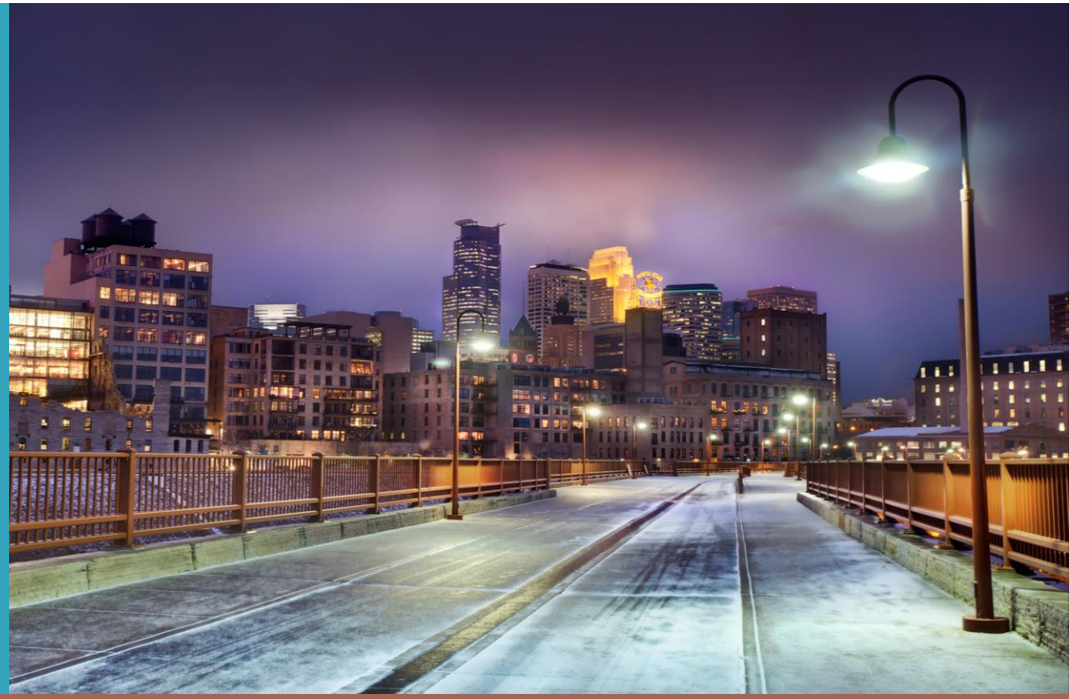


Source: DOE BECP - https://public.tableau.com/app/profile/doebecp/viz/BECPStatusofStateEnergyCodeAdoption/ResidentialDashboard

Where are we at in Code Adoption?

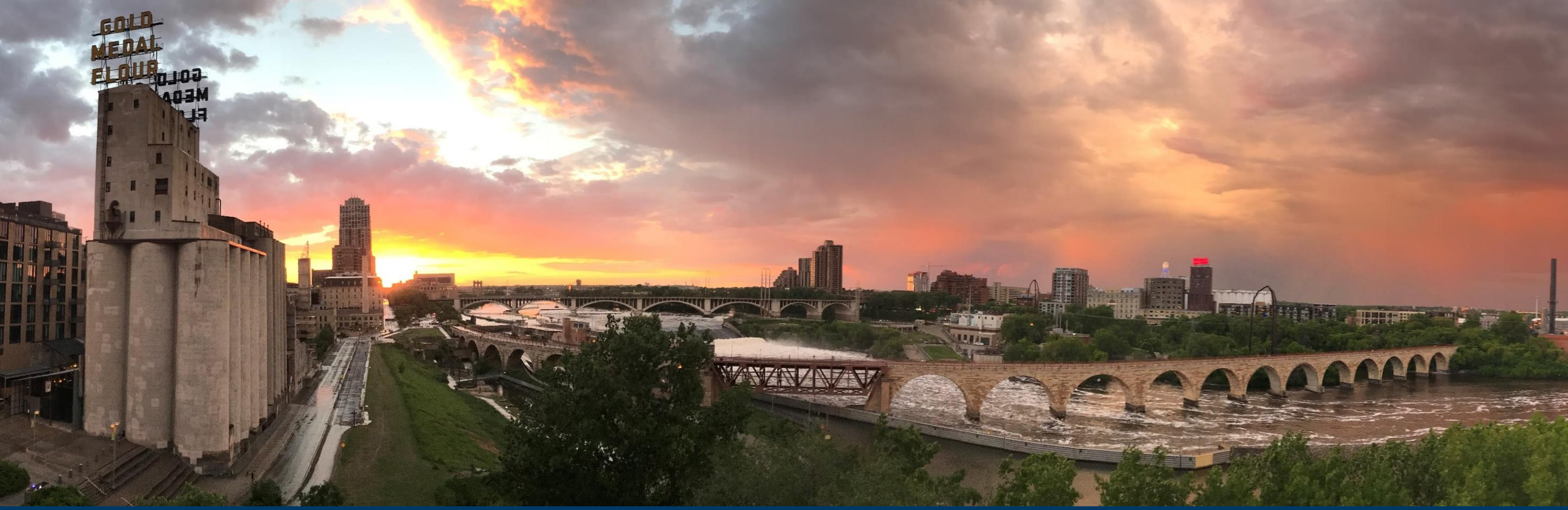
Commercial:

- January 2024, MN adopted an amended 2019 ASHRAE 90.1 with amendments.
- TAG currently meeting to adopt an amended 2022 ASHRAE 90.1 with addenda through March 2025. Target +16% : Publish 2027



Residential:

- February 2015, MN adopted an amended 2012 IECC Residential Energy Code
- TAG currently meeting to adopt an amended 2024 IRC Chapter 11. Target + 16%: 2027



ECO Program - Code Support/Advancement

ETA New Construction Forum

May 13, 2025

Anthony Fryer

Director, Energy Conservation & Optimization

Mission and Strategic Priorities

Protect and assist consumers

Oversight: 40+ industry areas

Engagement with all communities

Protect the Public Interest

Trusted Resource

Reduce Economic Barriers

Climate Change Resilience

Strong, Competitive, Fair Marketplace

Division of Energy Resources

Deputy Commissioner: Dr. Pete Wyckoff

Federal and State Initiatives
Assist Comm Lissa Pawlisch

Energy Affordability

- Focus on residential
- Energy assistance
- Weatherization
- Federal Home Energy Rebates

Energy Development

- Non-residential programs
- Technical Assistance & Education
- Environmental Review

Regulatory Affairs
Assist Comm Dr. Sydnie Lieb

Regulatory Affairs

- Public Interest Advocacy at the PUC
- Utility energy conservation programs
- Telecommunications

Energy Reliability & Security

- System Reliability Planning
- Risk Monitoring and Response

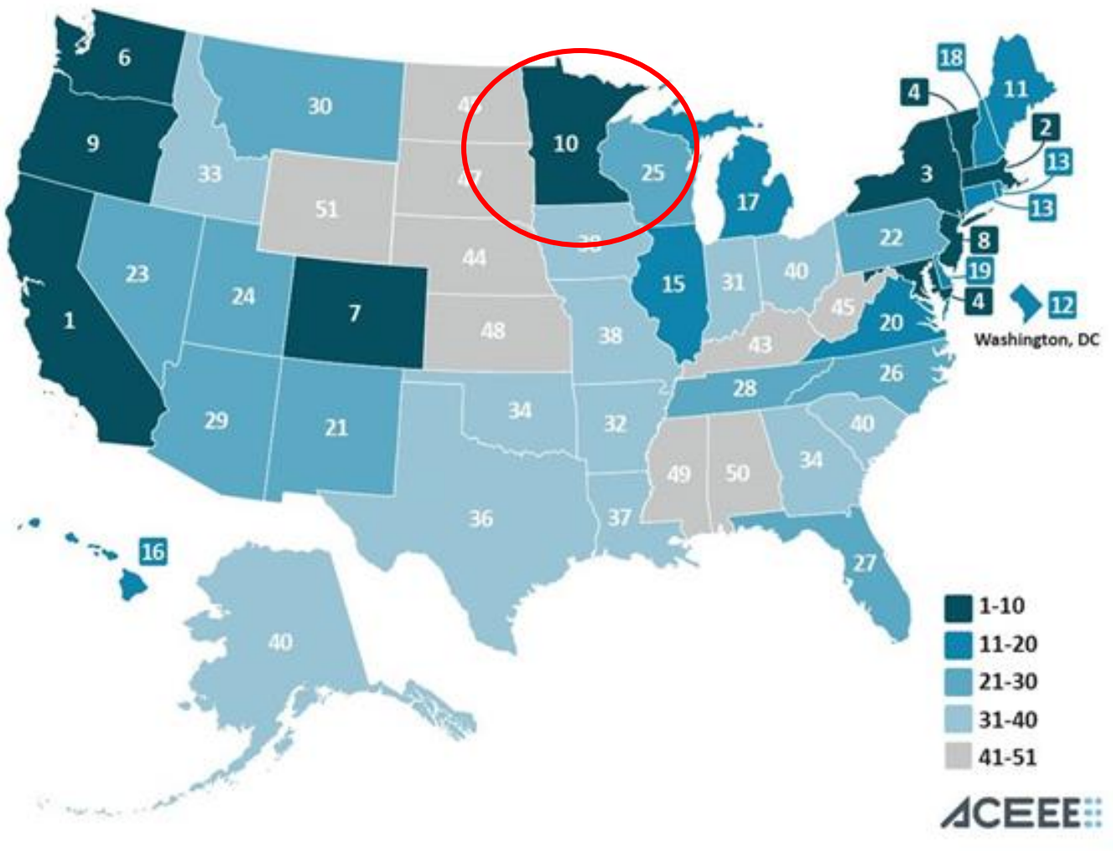
Minnesota Climate Efforts

Leading the transition to a clean, equitable, reliable, and affordable energy system

- 2040: 100% carbon free electricity
- 2050: net zero greenhouse gas emissions economy wide

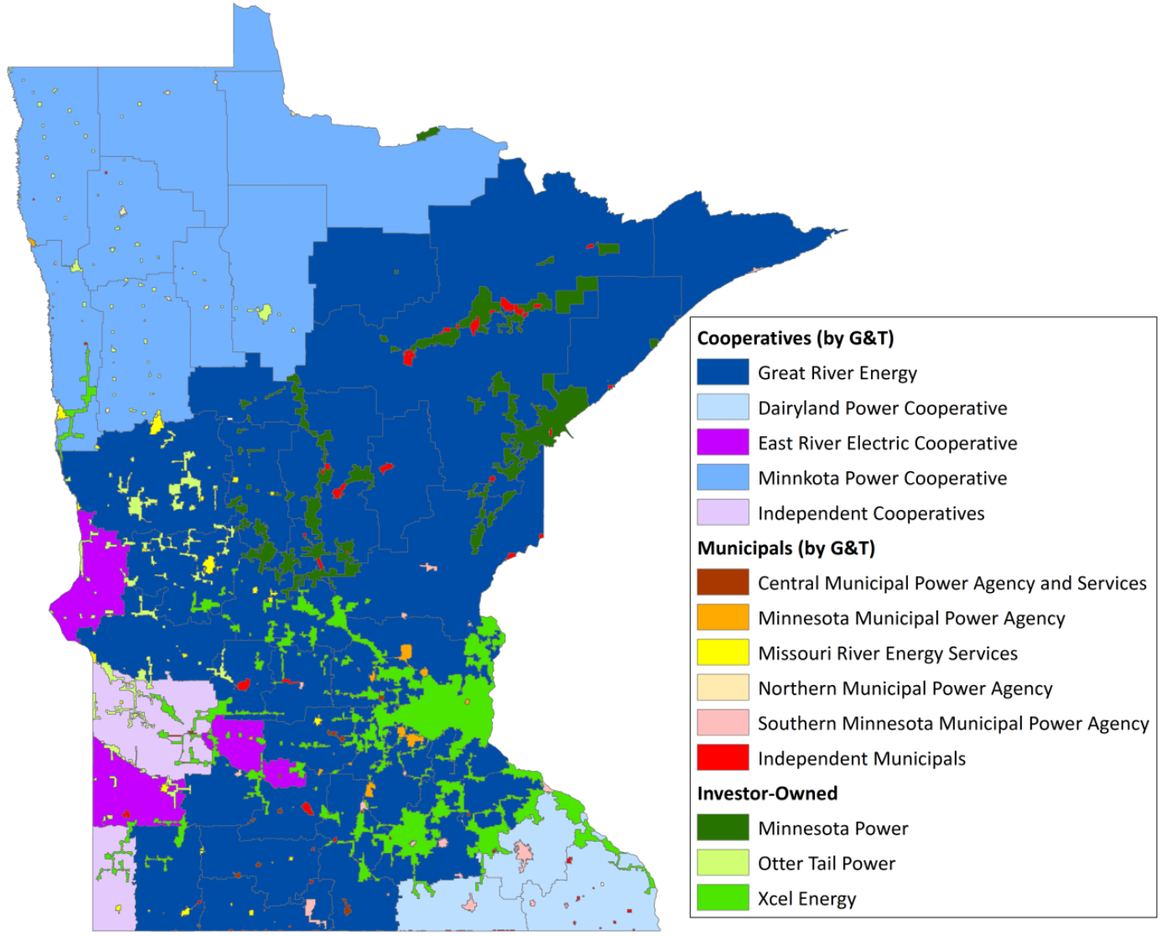
Minnesota's Energy Conservation & Optimization Program (ECO)

- Minnesota's Energy Efficiency Resource Standard
- ~120 electric and natural gas utilities required to participate
- Helped Minnesota achieve top 10 ranking in ACEEE state efficiency scorecard for over a decade

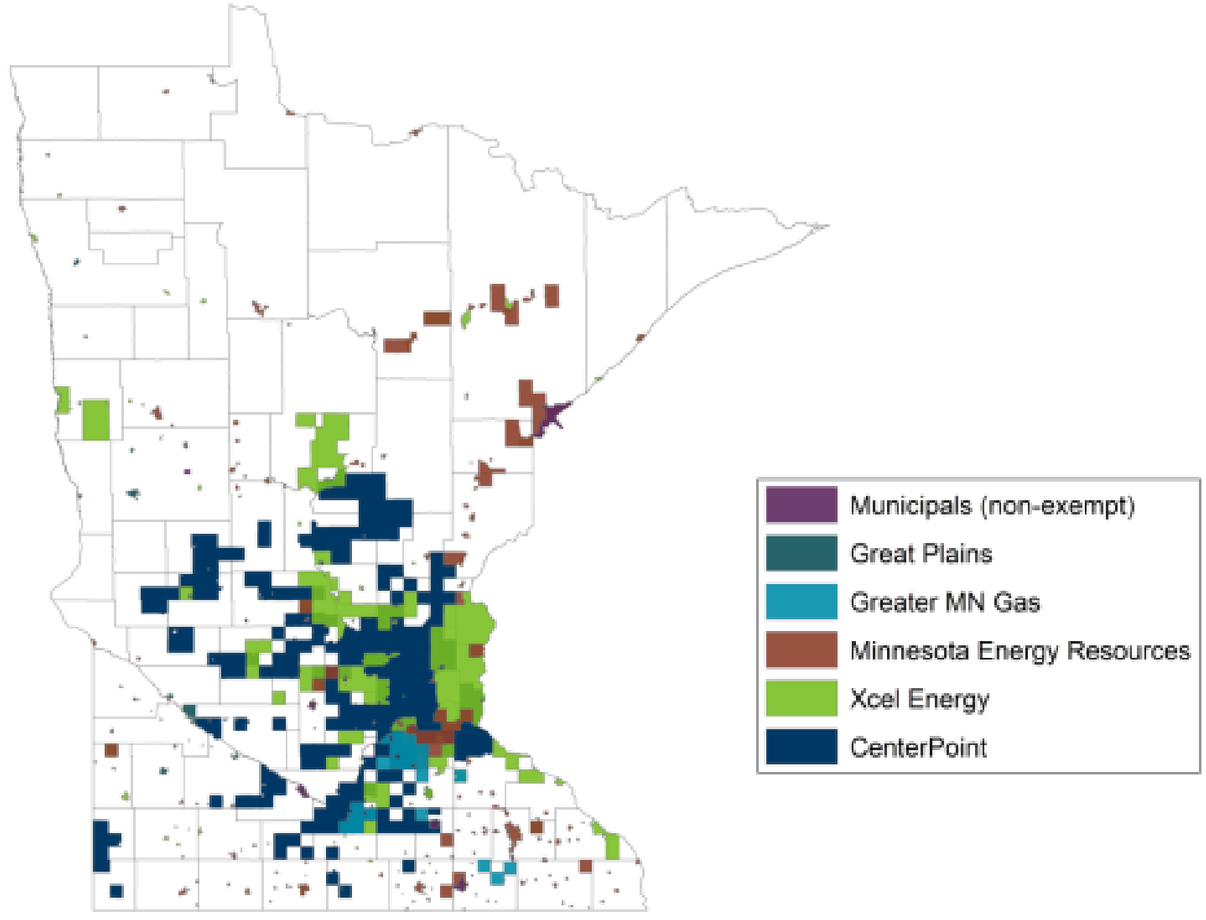


Minnesota Utilities

Electricity



Natural Gas



Energy Code Related Programming/Research in ECO

Research

- Commercial and residential energy code compliance studies (Slipstream)
- Minnesota codes and standards program roadmap (2050 Partners, et al.)

Programs

- Energy code support (Xcel, CenterPoint, Minnesota Power, MERC, Otter Tail)
- Code advancement through ETA (Xcel, CenterPoint, Minnesota Power, MERC, Otter Tail)
- Sustainable Buildings 2030 (funded through ECO statute)

Thank You!

Anthony Fryer

Director, Energy Conservation & Optimization

anthony.fryer@state.mn.us – 651.539.1858

PASSIVE BUILDING

cold climate case studies

passive building principles



Photo by Darrell Cassell on Unsplash

PASSIVE STRATEGIES
REDUCE ENERGY DEMAND

- Airtight Envelope
- Super Insulated / Thermal Bridge Free
- High Performance Windows & Doors



- Energy Recovery
- Efficient Systems

ACTIVE STRATEGIES
MEET ENERGY DEMAND

design process

PREDESIGN

SCHEMATIC DESIGN

DESIGN DEVELOPMENT

CONSTRUCTION DOCUMENTATION

CONSTRUCTION ADMINISTRATION

OCCUPANCY

PASSIVE SYSTEMS

conceptual design strategies

- Site selection
- Programming
- Spatial relationships & adjacencies
- Massing & orientation
- Window to wall ratio (WWR)
- Facade articulation & shading

technical design strategies

- Super Insulated / Thermal Bridge Free
- Airtight Envelope
- High Performance Windows & Doors
- Verification

ACTIVE SYSTEMS

- Energy Recovery Ventilation
- Low-load high-efficiency equipment
- Automated controls
- Commissioning

growing local examples

VERDANT
Saint Paul, MN (2019) - Kaas Wilson & Sherman Associates



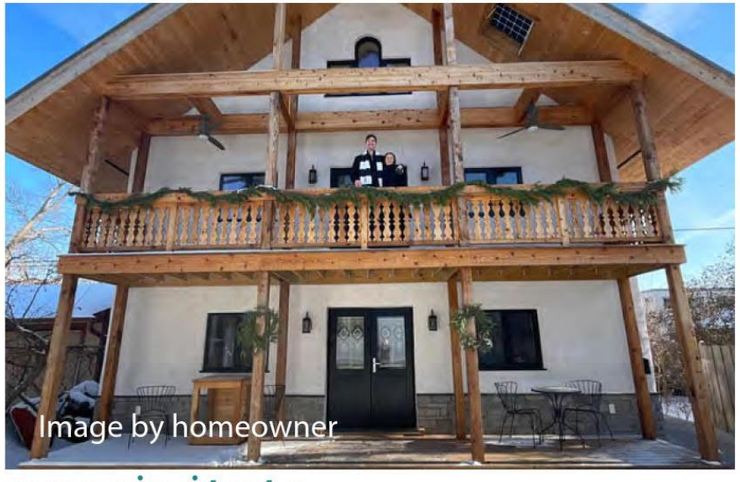
HOOK & LADDER
Minneapolis, MN (2017) - LHB & Newport Midwest



SOLSTICE APARTMENTS
Minneapolis, MN (2024) - Precipitate & Footprint Development



UPTOWN STRAWHOUSE
Minneapolis (2022) - Precipitate & Jones / Schmitt



NORTHSIDE PASSIVE
Minn eapolis, MN (2024) - Precipitate & Urban Homeworks / PPL



HILLCREST VILLAGE
Northfield, MN (2021) - Sweetgrass Design Studio & Northfield CDC

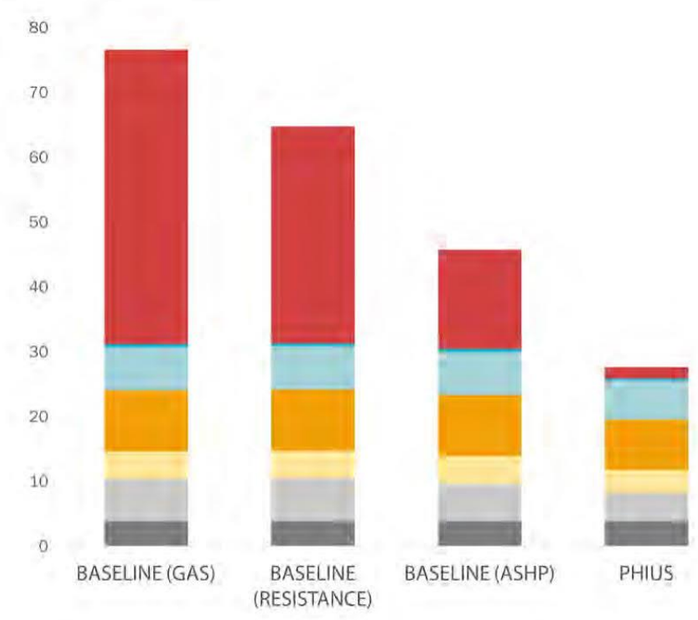


precipitate
ARCHITECTURE | PLANNING RESEARCH

annual site energy use comparison| large multifamily

BEMIDJI (7A)

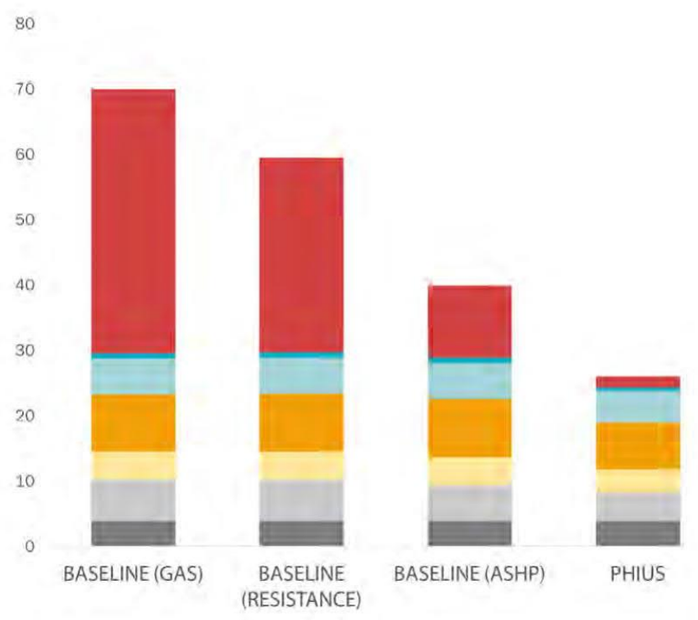
64% - 40% reduction



Wall	R21	R44
Roof	R35	R63
Slab	R7.9	R20
Wdws	U-0.36(operable)/0.29(fixed)	U0.19
Doors	U0.63(entry)/0.37(opaque)	U0.43
Solar		none

MINNEAPOLIS ST PAUL (6A)

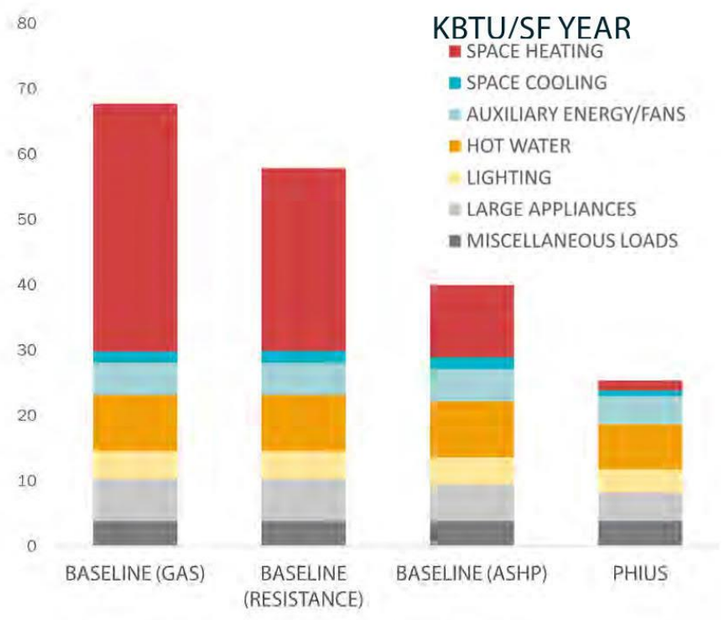
65% - 35% reduction



Wall	R21	R28
Roof	R30	R53
Slab	R7.9	R20
Wdws	U-0.42(operable)/0.34(fixed)	U0.19
Doors	U0.63(entry)/0.37(opaque)	U0.43
Solar		none

ALBERT LEA (6A)

63% - 37% reduction



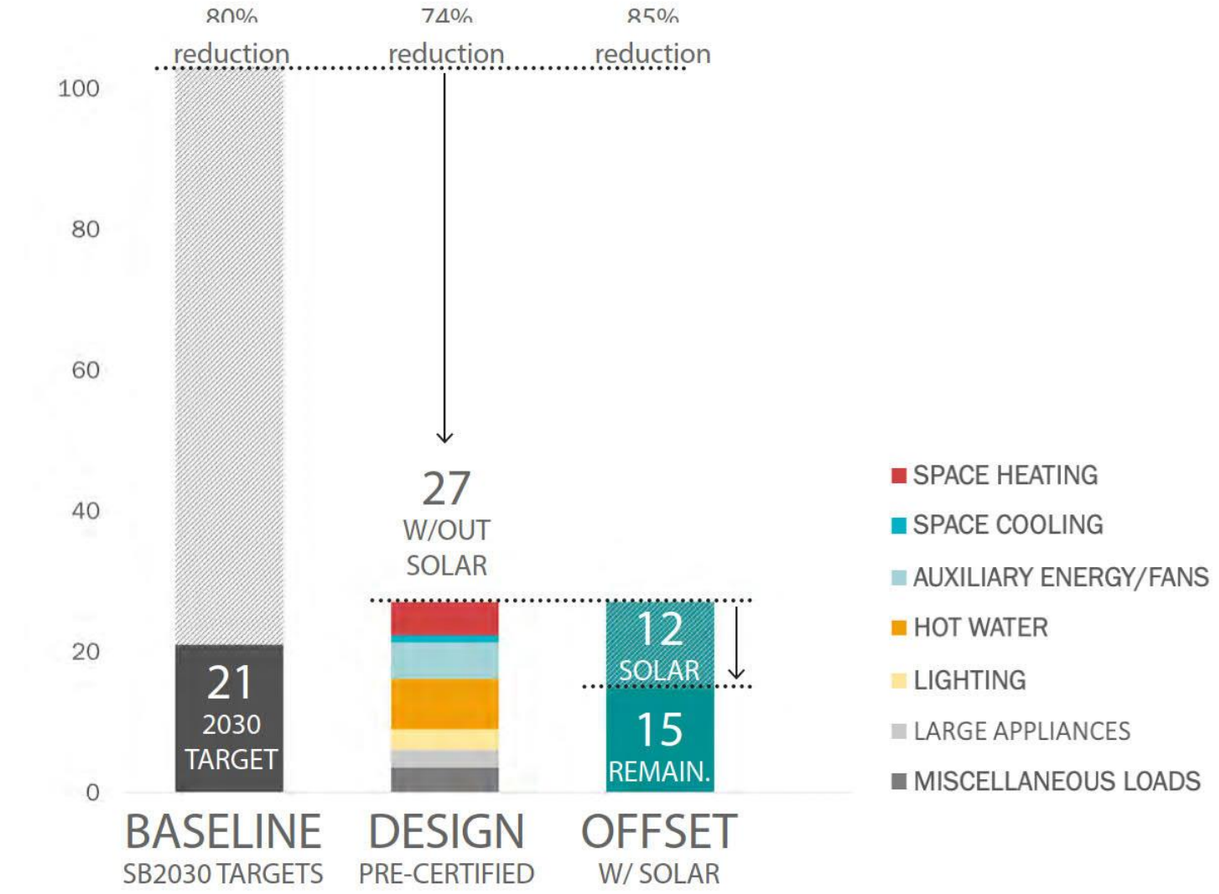
Wall	R21	R28
Roof	R30	R53
Slab	R7.9	R20
Wdws	U-0.42(operable)/0.34(fixed)	U0.19
Doors	U0.63(entry)/0.37(opaque)	U0.43
Solar		none

FUNDED BY CARD GRANT, DRAFT FINDINGS

verdant



Sherman Associates
Kaas Wilson Architects
Frana
Cain Thomas Associates
Precipitate



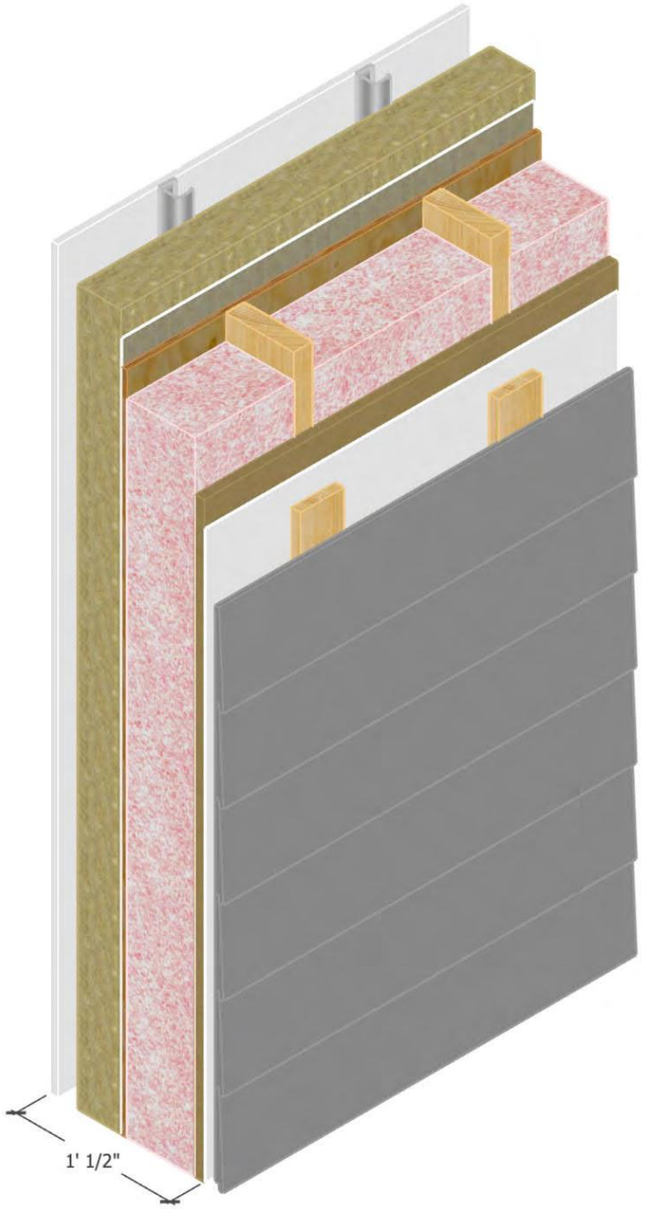
verdant

VAPOR
- resists or prevents water vapor from entering the assembly and condensing

THERMAL
- resists heat flow

AIR
- provides strong air-impermeable barrier to minimize airflow through the assembly

WATER
- waterproof material to stop rainwater from wetting the assembly



"BEST" WALL ASSEMBLY - B
PHIUS+ 2018 CONSTRUCTION

INTERIOR SHEATHING

FURRED SERVICE WALL
1 5/8" METAL STUD
CONTINUOUS R15 ROCKWOOL COMFORTBATT

AIR + VAPOR BARRIER
3M 3015 SELF-ADHERED MEMBRANE
1/2" PLYWOOD SUBSTRATE

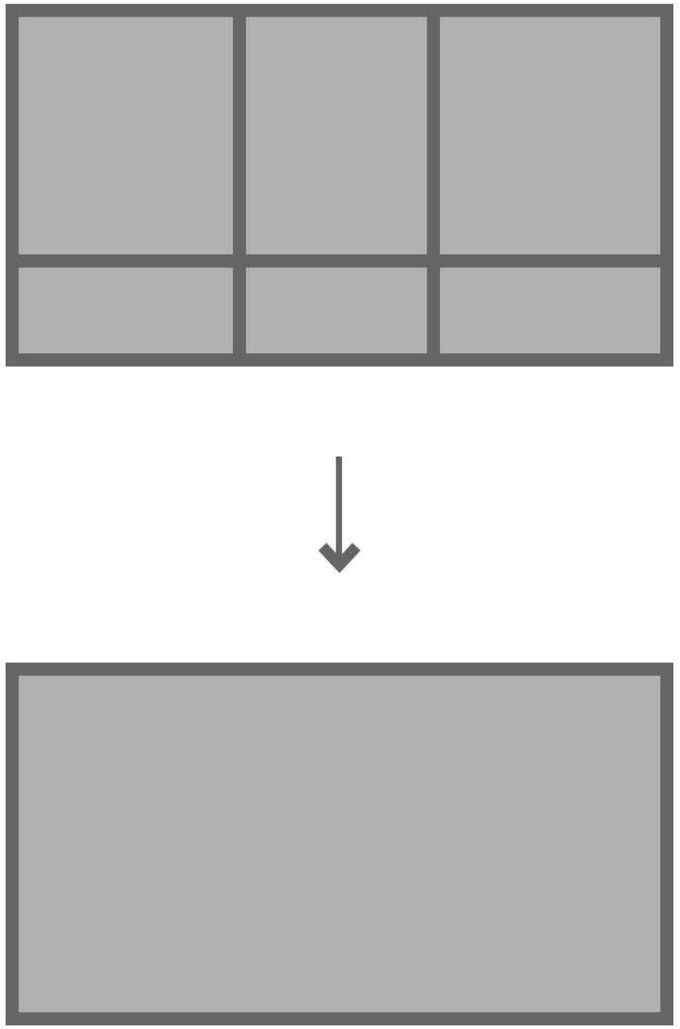
STRUCTURAL FRAMING
2X6 WOOD STUD
R24 BIBS (FIBERGLASS BLOW-IN-BLANKET SYSTEM)
3/4" FIBERBOARD STRUCTURAL SHEATHING *VAPOR OPE

WATER BARRIER
WRB (WEATHER RESISTIVE BARRIER)

DRAINAGE PLANE + VENTED CAVITY
VERTICAL 1x4 WOOD STRAPPING

window mullions matter





northside passive





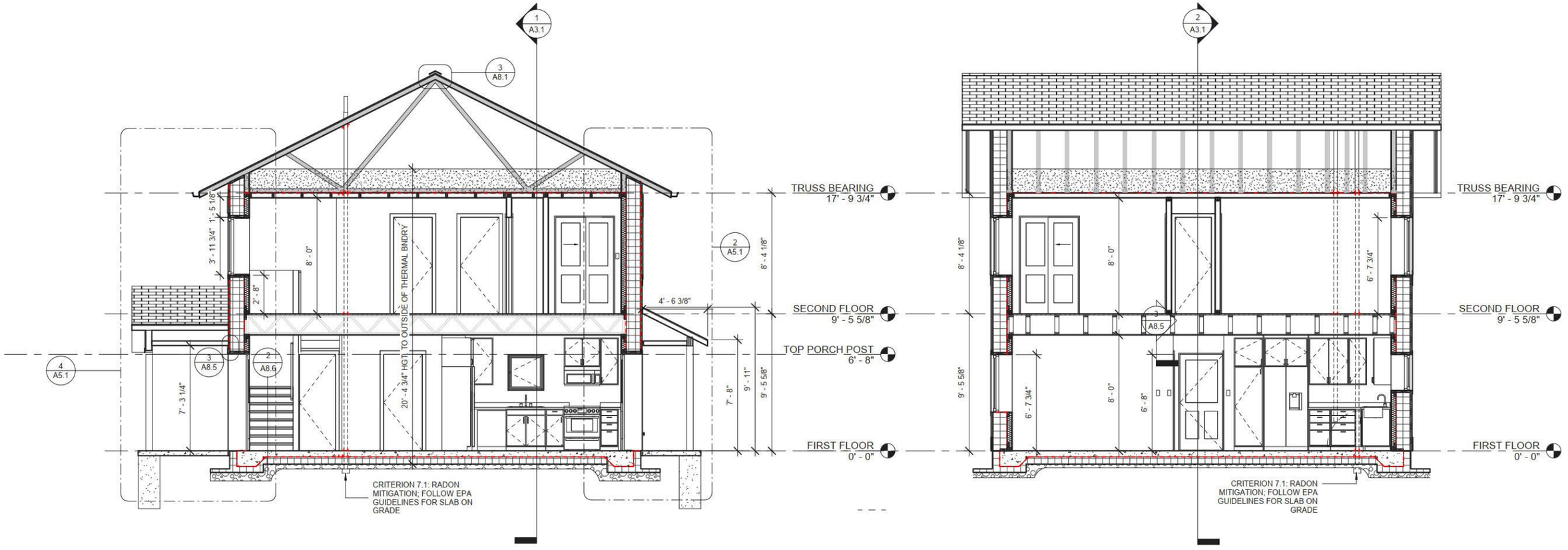


TOTAL: 1306 sq. ft
FLOOR 1: 653 sq. ft, FLOOR 2: 653 sq. ft

SIZES AND DIMENSIONS ARE APPROXIMATE, ACTUAL MAY VARY.

precipitate
ARCHITECTURE | PLANNING | RESEARCH

simplify the sections



Home Energy Rating Certificate

Projected Report
Based on Plans

Rating Date: 2023-01-27
Registry ID:
Ekotrope ID: Le6G73Pd

cee
Center for Energy and Environment

HERS® Index Score:

-8

Your home's HERS score is a relative performance score. The lower the number, the more energy efficient the home. To learn more, visit www.hersindex.com

Annual Savings

$3,546

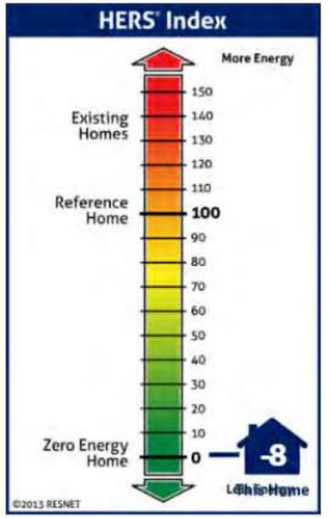
*Relative to an average U.S. home

Home:
811 31st Ave N
Minneapolis, MN 55411

Builder:
Urban Homeworks

Your Home's Estimated Energy Use:

	Use [MBtu]	Annual Cost
Heating	11.2	$289
Cooling	0.9	$26
Hot Water	2.7	$72
Lights/Appliances	16.9	$460
Service Charges		$96
Generation (e.g. Solar)	41.0	-$847
Total:	**31.6**	**$96**



Home Feature Summary:

Home Type:	Single family detached
Model:	Northside Passive
Community:	N/A
Conditioned Floor Area:	1,644 ft²
Number of Bedrooms:	4
Primary Heating System:	Air Source Heat Pump • Electric • 10.2 HSPF
Primary Cooling System:	Air Source Heat Pump • Electric • 19 SEER
Primary Water Heating:	Residential Water Heater • Electric • 3.42 UEF
House Tightness:	146.1 CFM50 (0.56 ACH50)
Ventilation:	180 CFM • 146 Watts • ERV
Duct Leakage to Outside:	65 CFM @ 25Pa (3.95 / 100 ft²)
Above Grade Walls:	R-60
Ceiling:	Attic, R-60
Window Type:	U-Value: 0.15, SHGC: 0.29
Foundation Walls:	N/A
Framed Floor:	N/A

This home meets or exceeds the criteria of the following:

ENERGY STAR v3.2
ENERGY STAR v3.1
ENERGY STAR v3
2018 International Energy Conservation Code
2015 International Energy Conservation Code
2012 International Energy Conservation Code
2009 International Energy Conservation Code

Rating Completed by:

Energy Rater: Tony Beres
RESNET ID: 5490671

Rating Company: Center for Energy and Environment
1754 University Ave W, St Paul, MN 55104

Rating Provider: Building Knowledge
PO Box 1376, Burnsville MN 55337

Tony Beres, Certified Energy Rater
Date: 4/5/24 at 4:49 PM

ekotrope

Ekotrope RATER - Version:4.1.0.3373
The Energy Rating Disclosure for this home is available from the Approved Rating Provider.
This report does not constitute any warranty or guarantee.

Home Energy Rating Certificate

Projected Report
Based on Plans

Rating Date: 2023-01-27
Registry ID:
Ekotrope ID: Le6G73Pd

cee
Center for Energy and Environment

HERS® Index Score:

28

Your home's HERS score is a relative performance score. The lower the number, the more energy efficient the home. To learn more, visit www.hersindex.com

Annual Savings

$2,700

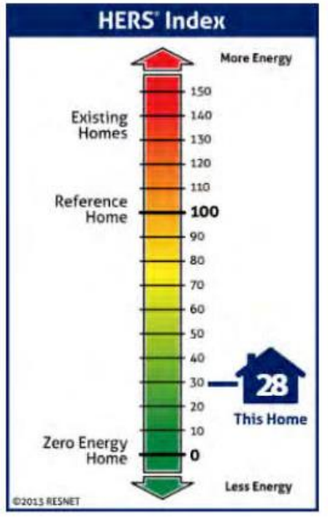
*Relative to an average U.S. home

Home:
811 31st Ave N
Minneapolis, MN 55411

Builder:
Urban Homeworks

Your Home's Estimated Energy Use:

	Use [MBtu]	Annual Cost
Heating	11.2	$289
Cooling	0.9	$26
Hot Water	2.7	$72
Lights/Appliances	16.9	$460
Service Charges		$96
Generation (e.g. Solar)	0.0	$0
Total:	**31.6**	**$943**



Home Feature Summary:

Home Type:	Single family detached
Model:	Northside Passive
Community:	N/A
Conditioned Floor Area:	1,644 ft²
Number of Bedrooms:	4
Primary Heating System:	Air Source Heat Pump • Electric • 10.2 HSPF
Primary Cooling System:	Air Source Heat Pump • Electric • 19 SEER
Primary Water Heating:	Residential Water Heater • Electric • 3.42 UEF
House Tightness:	146.1 CFM50 (0.56 ACH50)
Ventilation:	180 CFM • 146 Watts • ERV
Duct Leakage to Outside:	65 CFM @ 25Pa (3.95 / 100 ft²)
Above Grade Walls:	R-60
Ceiling:	Attic, R-60
Window Type:	U-Value: 0.15, SHGC: 0.29
Foundation Walls:	N/A
Framed Floor:	N/A

This home meets or exceeds the criteria of the following:

ENERGY STAR v3.2
ENERGY STAR v3.1
ENERGY STAR v3
2018 International Energy Conservation Code
2015 International Energy Conservation Code
2012 International Energy Conservation Code
2009 International Energy Conservation Code

Rating Completed by:

Energy Rater: Tony Beres
RESNET ID: 5490671

Rating Company: Center for Energy and Environment
1754 University Ave W, St Paul, MN 55104

Rating Provider: Building Knowledge
PO Box 1376, Burnsville MN 55337

Tony Beres, Certified Energy Rater
Date: 4/5/24 at 5:09 PM

ekotrope

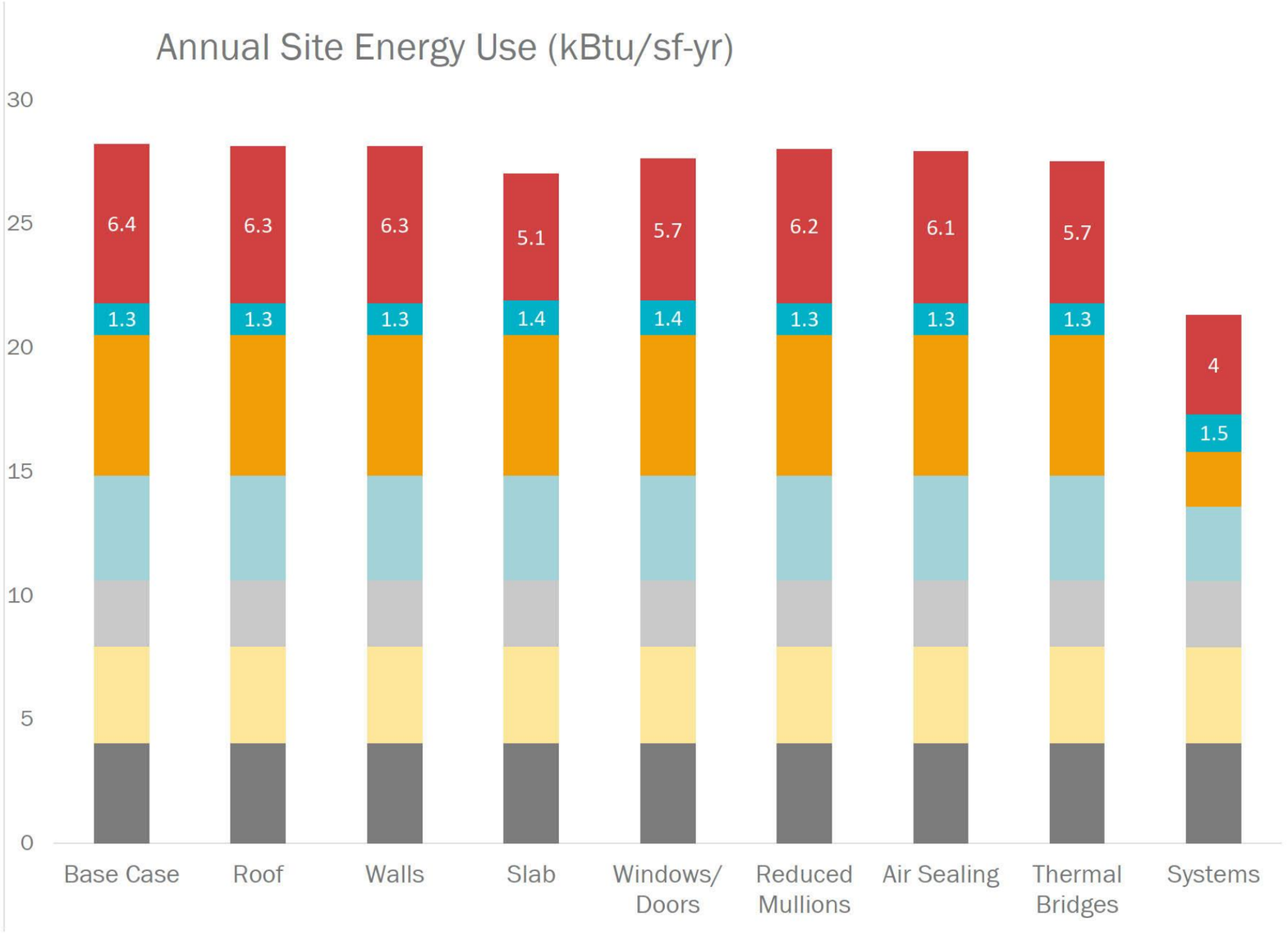
Ekotrope RATER - Version:4.1.0.3373
The Energy Rating Disclosure for this home is available from the Approved Rating Provider.
This report does not constitute any warranty or guarantee.

northside passive 2.0 prescriptive path



precipitate
ARCHITECTURE | PLANNING | RESEARCH

caution: envelope upgrades aren't isolated



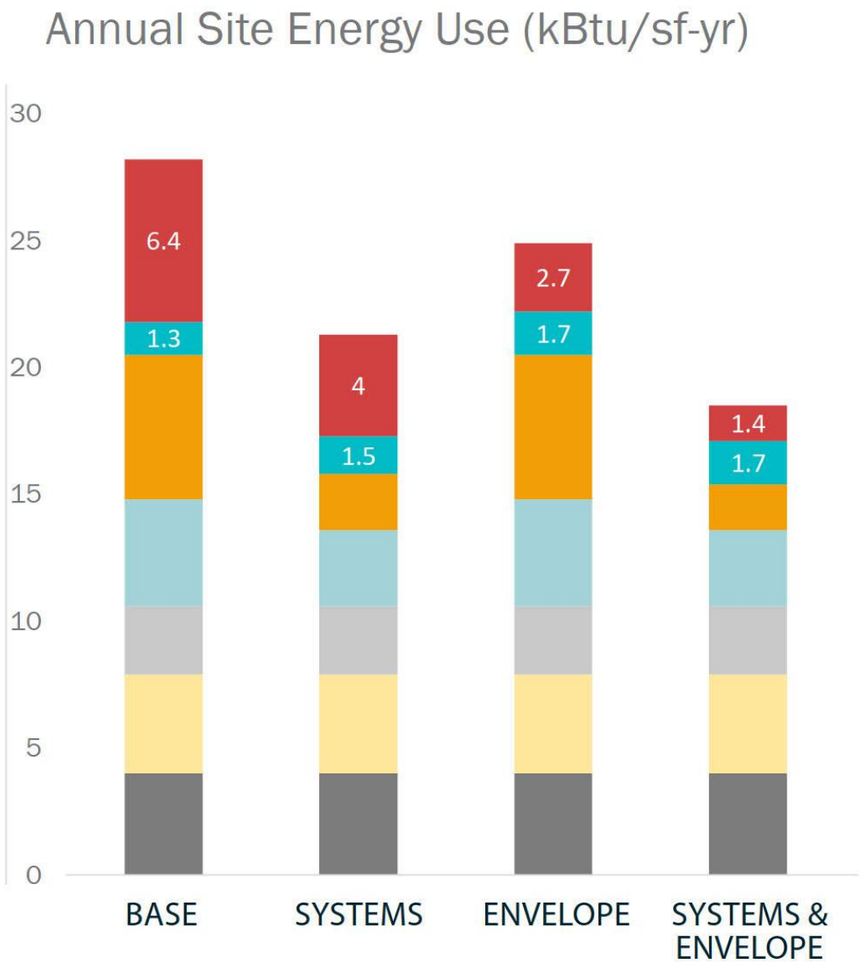


ANTHONY SOUFFLE, STAR TRIBUNE

A University of Minnesota student crossed University Avenue in shorts today. He wouldn't give his name because he said his mom would be mad at him.

precipitate
ARCHITECTURE | PLANNING | RESEARCH

holistic, iterative modeling leads to deeper savings & accuracy





HGA

LOW-ENERGY COMMERCIAL BUILDINGS

SELECT LOW-ENERGY MN PROJECTS

	YEAR	pEUI
Minnesota Military & Veteran Museum and Archives Little Falls, MN	2025	30
Playwrights' Center New Facility St. Paul, MN	2023	54
Carver County Lake Waconia Waterfront Pavilion Waconia, MN	2023	33
Plymouth Creek Community Center Plymouth, MN	2022	45
U of M Masonic Institute for the Developing Brain Minneapolis, MN*	2021	53.3
Water Works Park & Pavilion Minneapolis, MN*	2021	48
Normandale CC Classroom & College Svcs Bloomington, MN	2020	59
Ramsey County Shoreview Library Shoreview, MN*	2017	45.6
Minnesota State Capitol Restoration St. Paul, MN	2017	66
Hennepin County Brooklyn Park Library Brooklyn Park, MN*	2016	29
Ordway Center for the Performing Arts Expansion St. Paul, MN*	2015	85
Arlington Hills Community Center St. Paul, MN*	2014	48.3
U of M Northrop Auditorium Renovation Minneapolis, MN*	2014	78.2
St. Paul Union Depot Renovation St. Paul, MN*	2012	87.6
U of M Bruininks Hall Minneapolis, MN	2011	61

**Full case study available in the Minnesota B3 Case Study Database (https://casestudies.b3mn.org)*





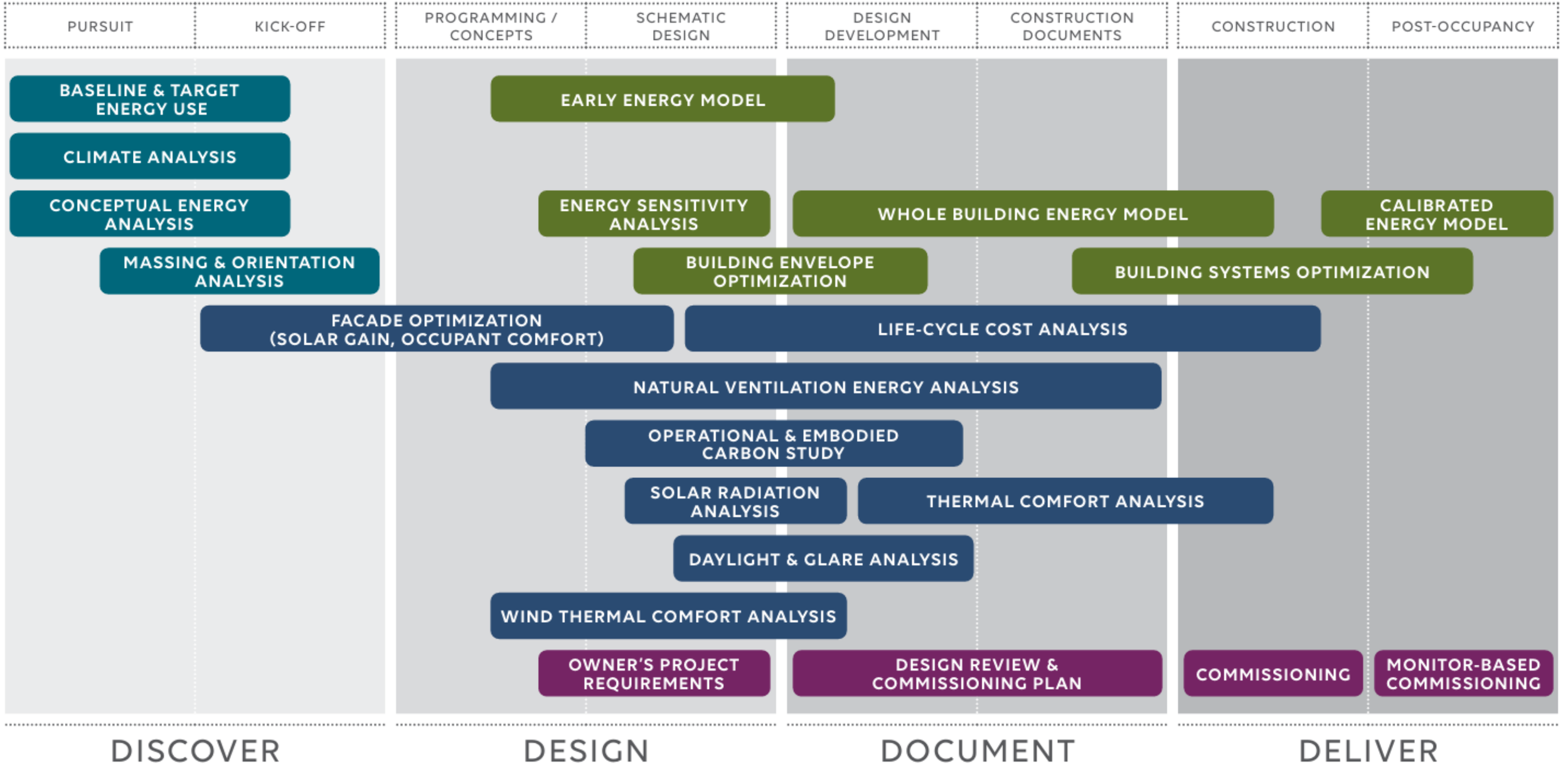






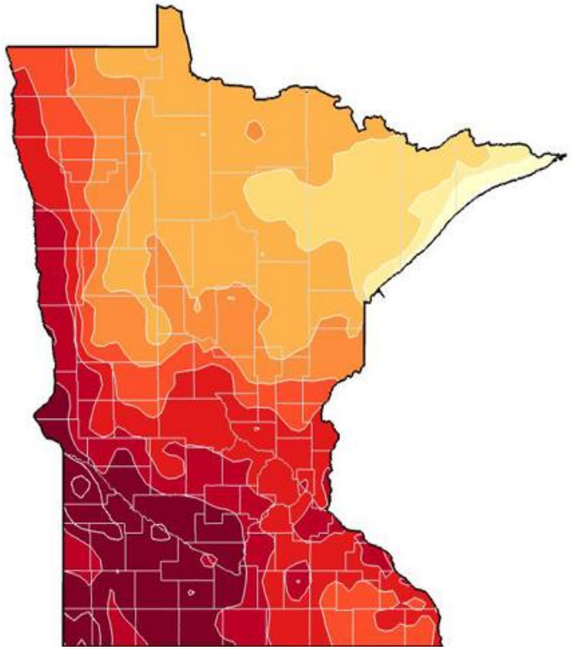
50% – 80% SAVINGS FROM BASELINE

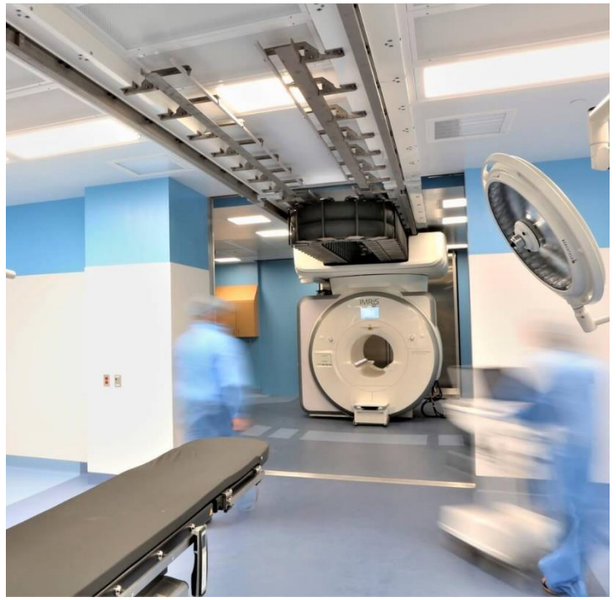
LOW-ENERGY OPTIMIZATION PROCESS

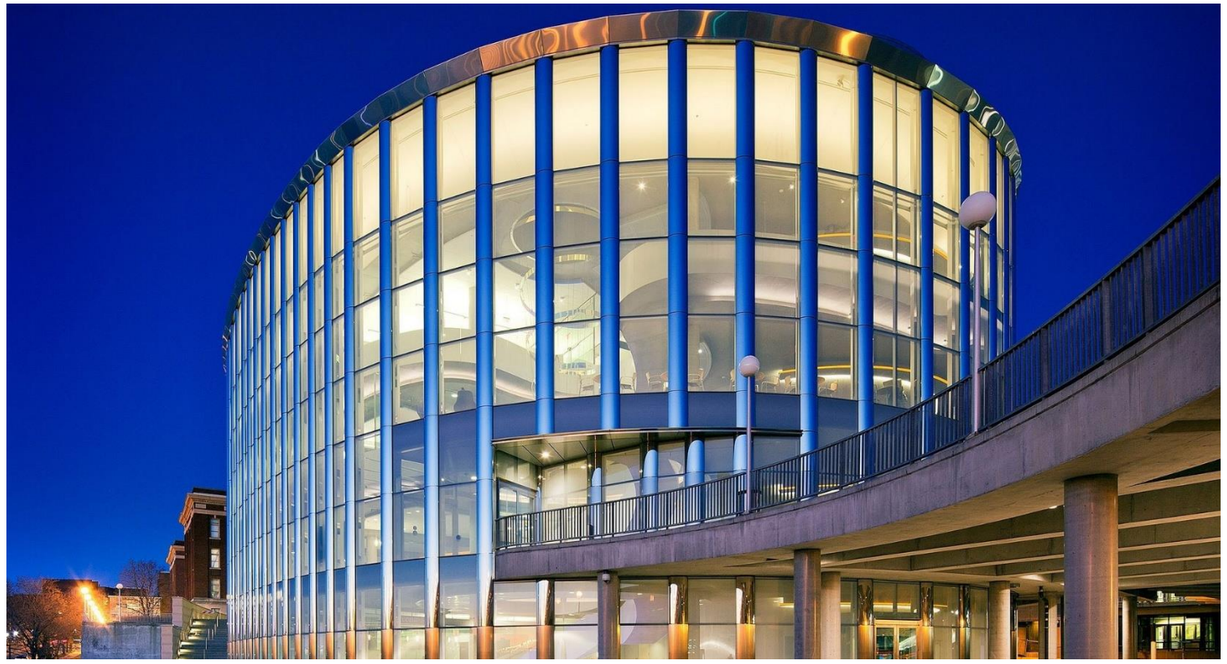


ENERGY VARIABLES

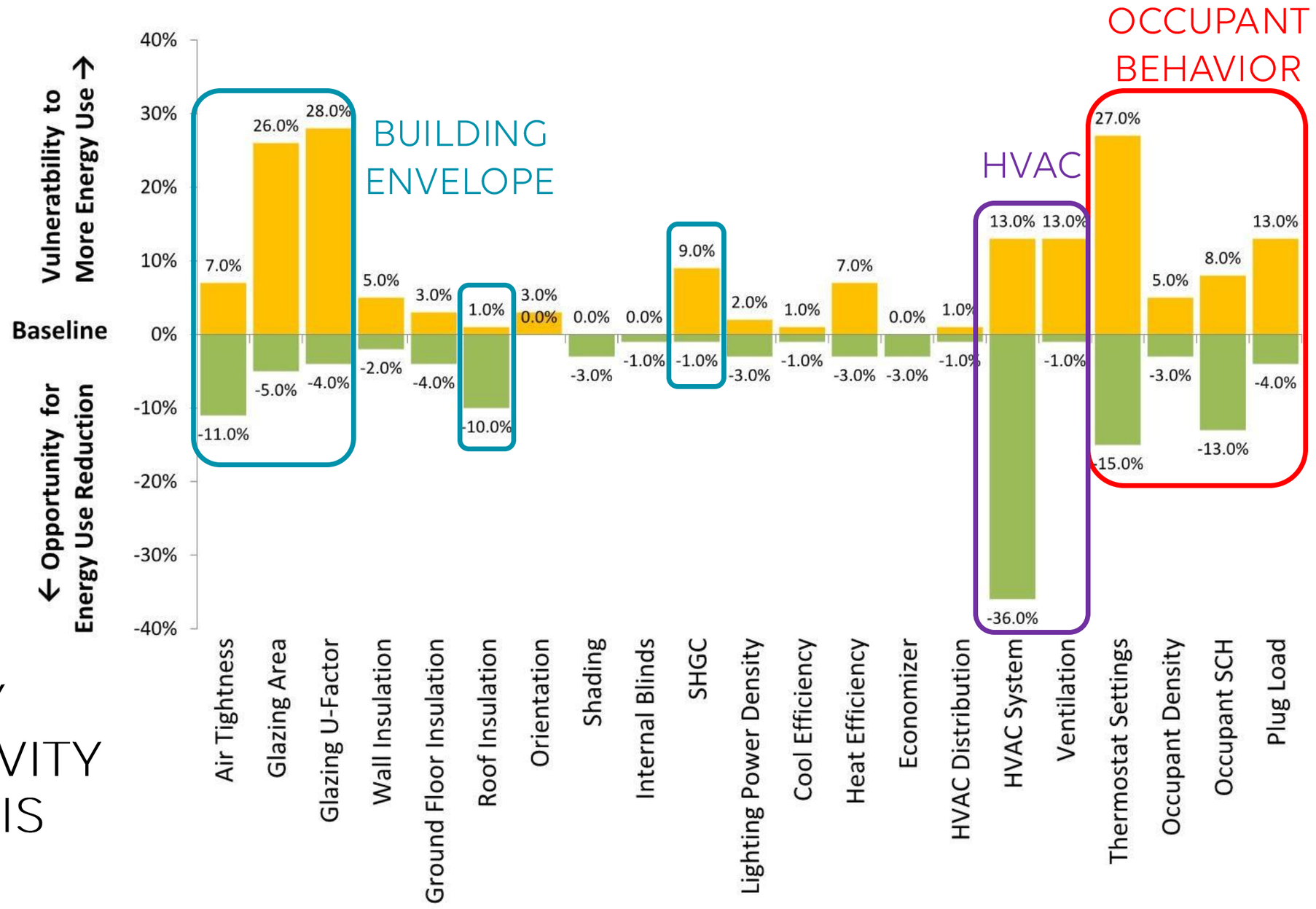
- Climate
- Building type / function
- Building form / size
- Window to wall area ratio
- Hours of operation







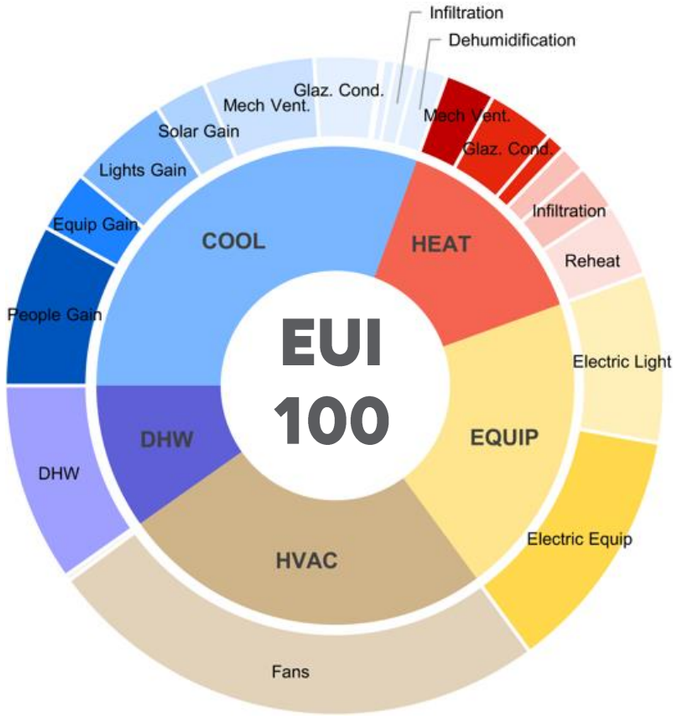
FINDING THE MOST EFFECTIVE SAVINGS



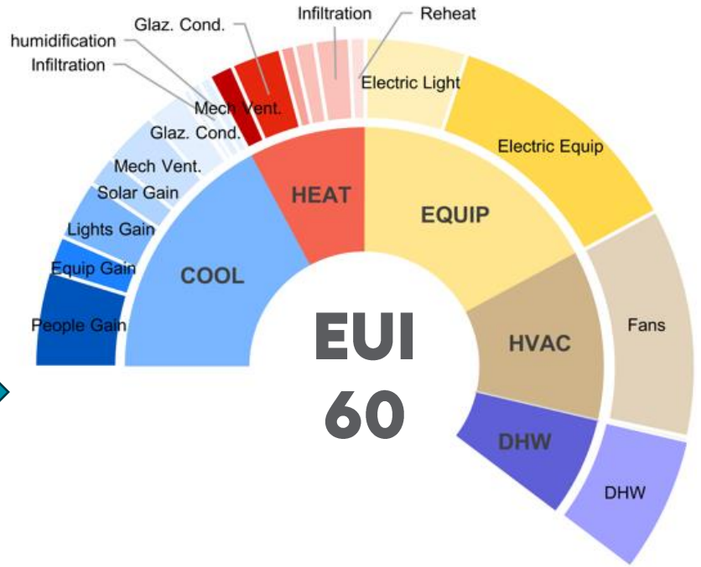
ENERGY SENSITIVITY ANALYSIS

MODELING PATH TO LOW-ENERGY BUILDINGS

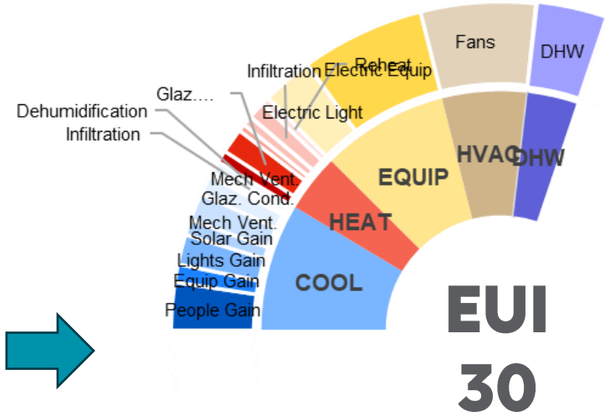
BASELINE



ENHANCED CODE BUILDING

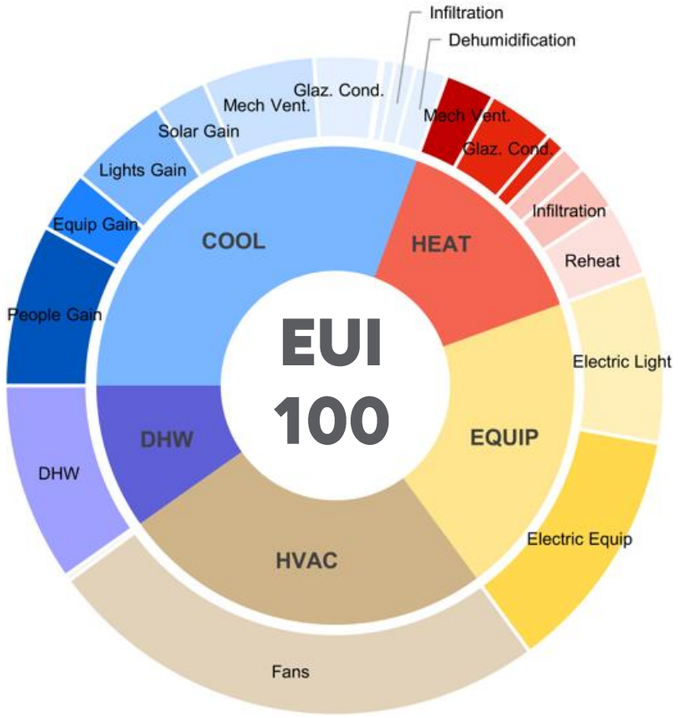


BUNDLED HIGH-PERFORMANCE SYSTEMS

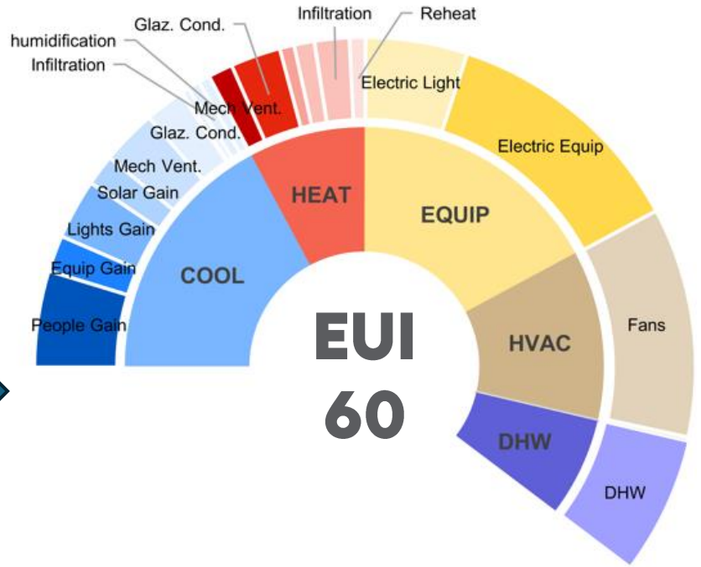


MODELING PATH TO LOW-ENERGY BUILDINGS

BASELINE

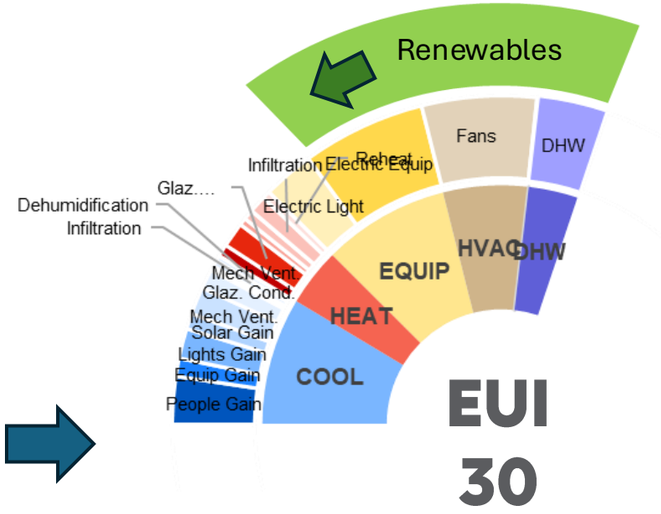


ENHANCED CODE BUILDING



- Improved envelope
- Efficient lighting
- Readily-available MEP equipment

BUNDLED HIGH-PERFORMANCE SYSTEMS



- Enhanced envelope
- Advanced lighting
- High-performance HVAC systems

HIGH-PERFORMANCE SYSTEM TRENDS

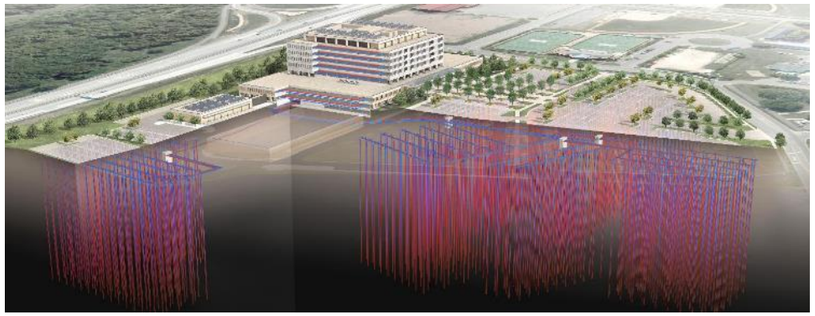
HEAT PUMPS



ENERGY-RECOVERY CHILLERS



GEOTHERMAL



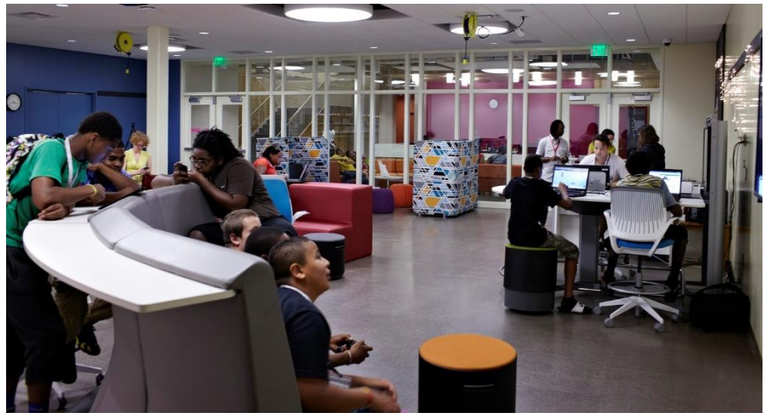


Low-Energy Building Example

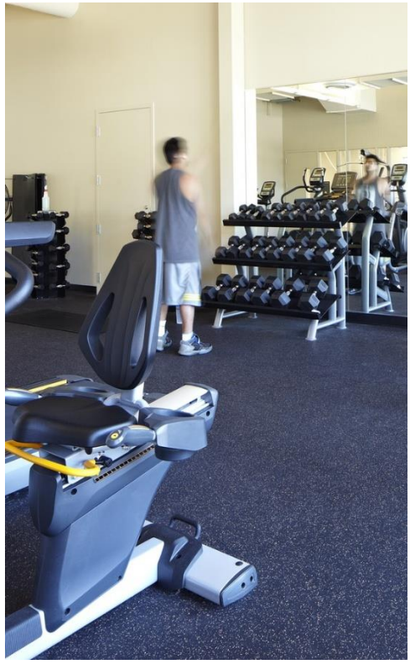
ARLINGTON HILLS COMMUNITY CENTER

Opened 2014
St. Paul, MN





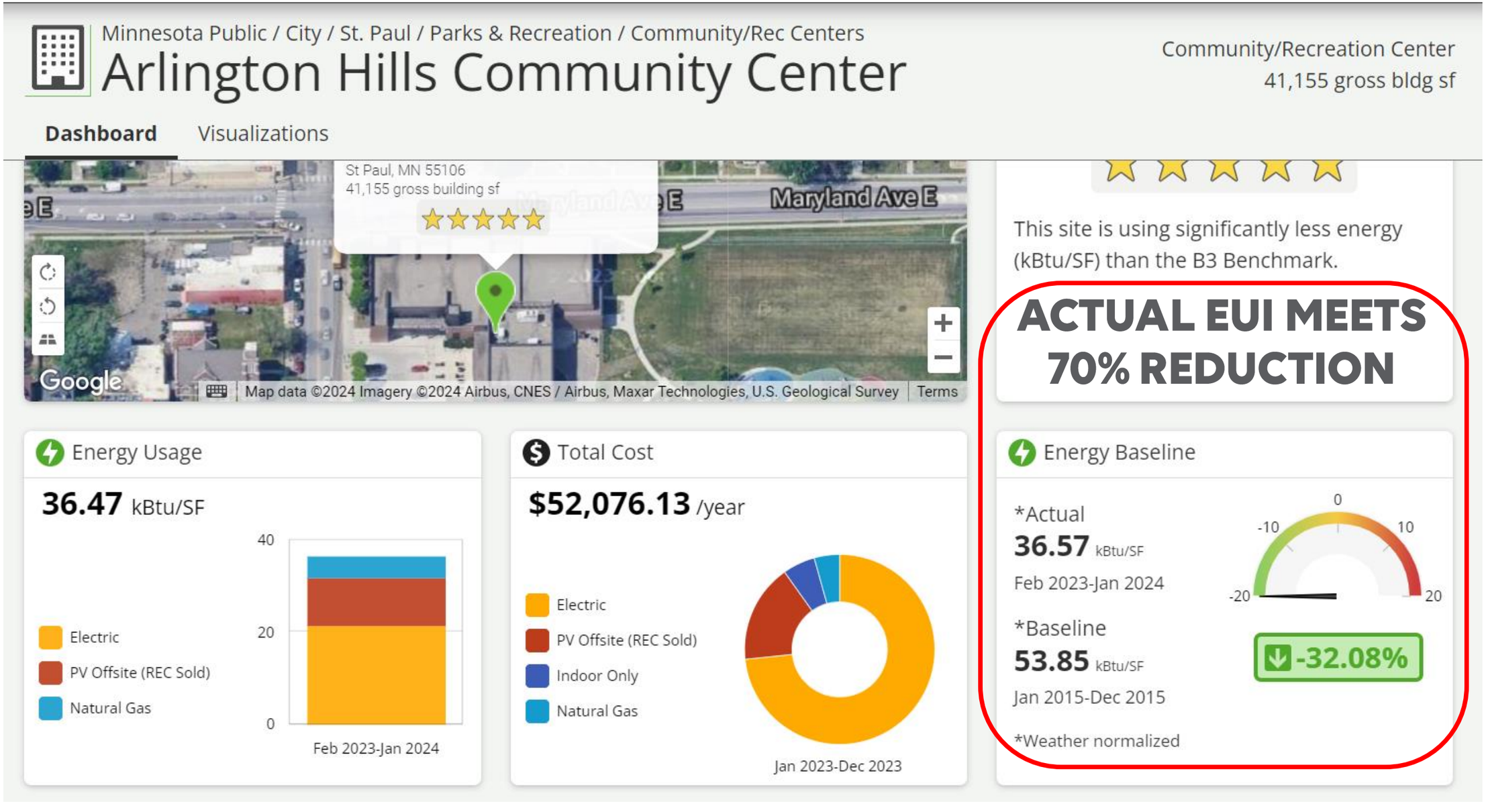




Low-Energy Building Example

ARLINGTON HILLS COMMUNITY CENTER

Opened 2014
St. Paul, MN



Low-Energy Building Example

WESTWOOD HILLS NATURE CENTER

Opened 2020
St. Louis Park, MN







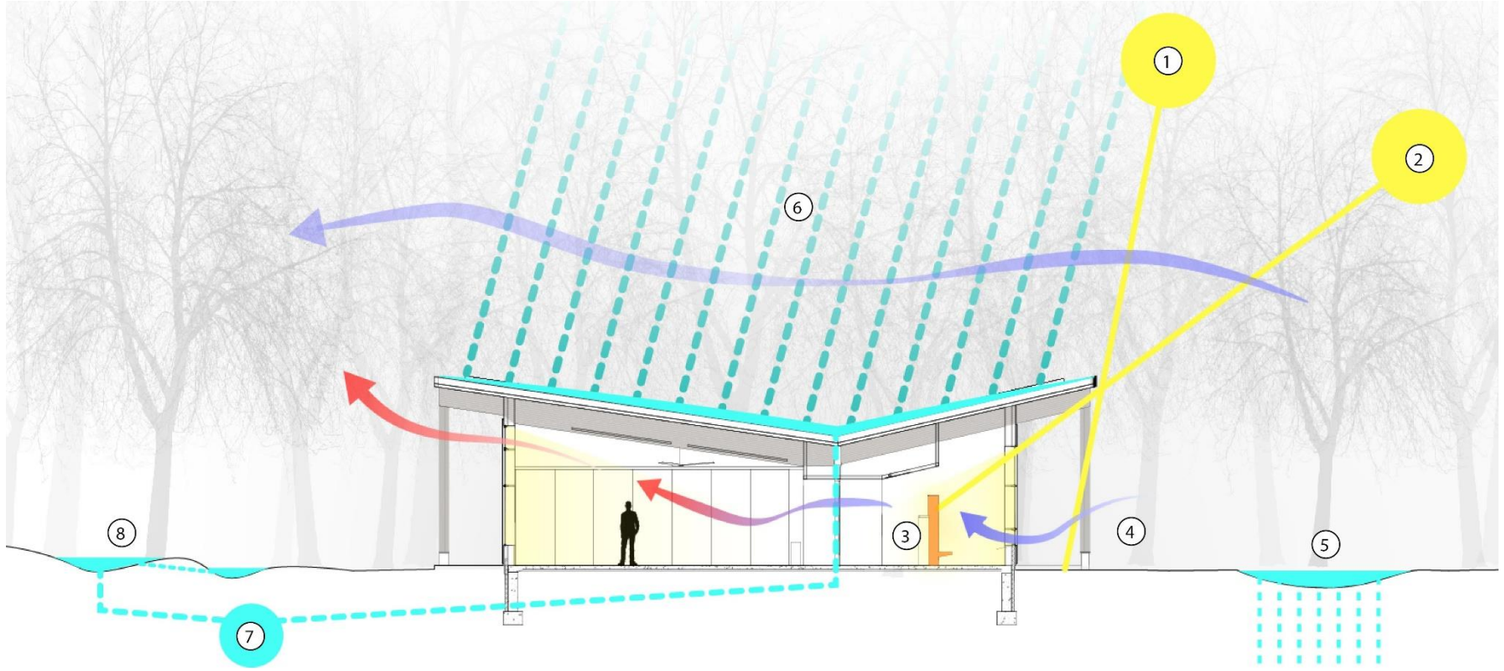
Low-Energy Building Example

WESTWOOD HILLS NATURE CENTER

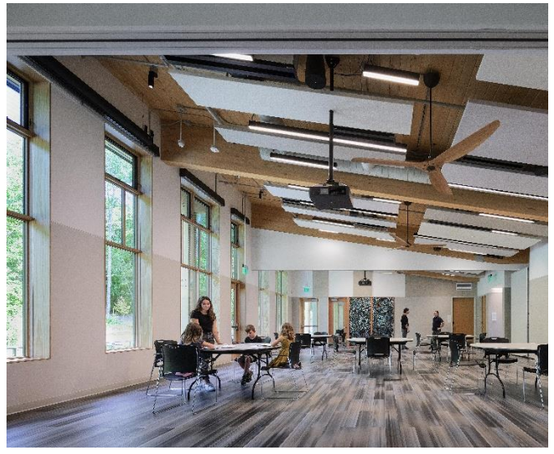
Opened 2020
St. Louis Park, MN

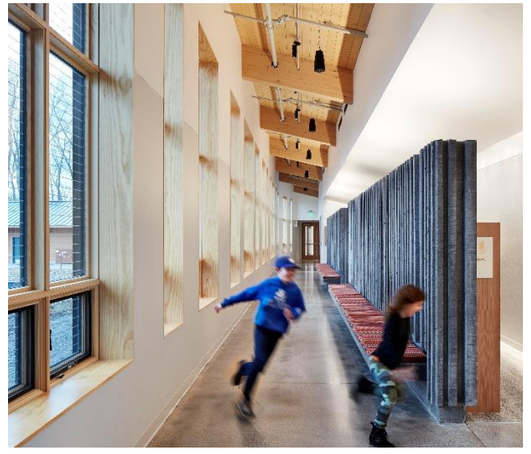
PASSIVE SYSTEMS

- Butterfly roof optimized for summer shading and winter passive heating
- East-west long-axis building orientation
- High-performance glazing
- Operable windows and ceiling fans
- Trombe wall heating
- Future climate analysis









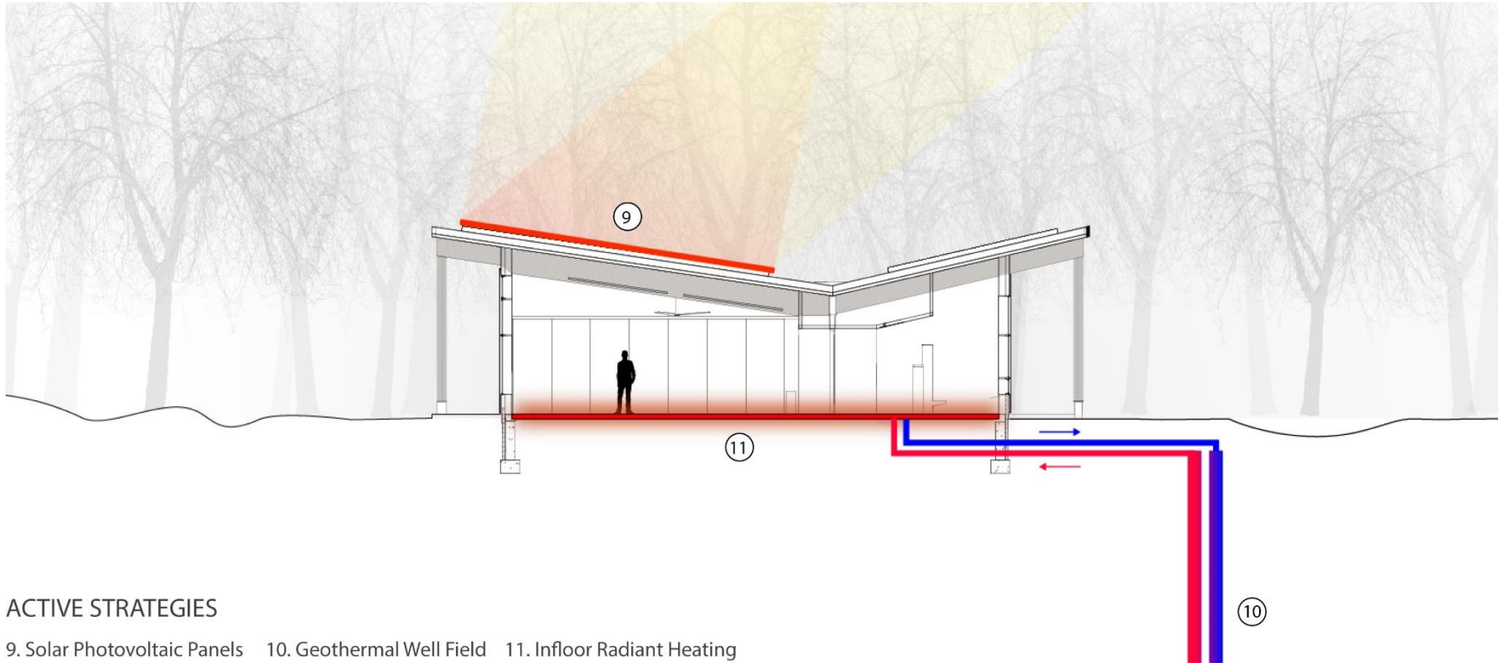
Low-Energy Building Example

WESTWOOD HILLS NATURE CENTER

Opened 2020
St. Louis Park, MN

ACTIVE SYSTEMS

- Geothermal heating & cooling
- Solar photovoltaic
- Energy recovery ventilation
- Radiant floor heating
- High-performance lighting and controls



ACTIVE STRATEGIES

9. Solar Photovoltaic Panels 10. Geothermal Well Field 11. Infloor Radiant Heating







Low-Energy Building Example

WESTWOOD HILLS NATURE CENTER

Opened 2020
St. Louis Park, MN

26

Actual EUI

20′-21′

Net Zero Certified

ZERO ENERGY CERTIFICATION

LIVING FUTURE





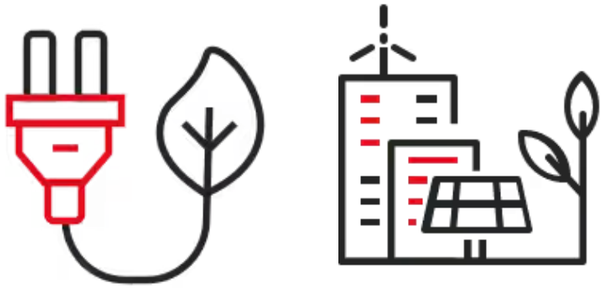


LOW-ENERGY PARTNERS

- Utility Partners
  - Design assistance
  - Equipment rebates
  - Custom programs
  - Energy studies
- Regional Energy Non-Profits
- Research Institutions

Xcel Energy®

OTTER TAIL POWER COMPANY





CenterPoint Energy

cee
Center for Energy and Environment

MINNESOTA ENERGY RESOURCES®

Center for Sustainable Building Research
CSBR

FEDERAL INCENTIVES

Inflation Reduction Act (IRA)

Addressing Climate Change & Cleaner Energy

How could this impact you?

With this new IRA, you may be able to implement design solutions to:

- Make your new or existing building more efficient
- Add green infrastructure
- Capture substantial savings

SECTION 48 INVESTMENT TAX CREDIT

Expands projects & credit threshold to include:

- **Combined Heat and Power**
  Construction must begin by Jan. 1, 2025
- **Geothermal Heating and Cooling as "Thermal Energy Storage Property"**
  Construction must begin by Jan. 1, 2035
- **New category of "Energy Storage Technology"**
  Construction must begin by Jan. 1, 2025
- Enables non-taxable entities to get a tax REFUND

Projects that do not meet those timelines could still be eligible for ITC credit, just not at Section 48 threshold.

Up to 50% credit for ITC projects with domestic product & energy community bonuses

- 30% maximum available (6% base rate applies to projects over 1MW. 24% bonus for PWA compliance)
- 10% additional "Domestic Product" bonus
- 10% additional "Energy Community" bonus

SECTION 179D UPDATES

Up to $5 per square foot tax deduction

- Tax deductions available on a sliding scale, from $.50 to $5.00 per square foot for new or existing buildings that achieve at least 25% better than their baseline.
  - Baseline for new buildings is ASHRAE-90.1-2007 for buildings placed in service until 2026. In 2027, 90.1-2019 will be the new standard.
- Maximum of $5.00 per square foot if prevailing wage and apprenticeship requirements are met.
- The deduction can now be taken on a specific commercial building every 3-4 years, depending on building type (Previously, the deduction was permitted once over the life of the building).

What's the difference between a tax CREDIT and tax DEDUCTION?

A tax credit is a direct reduction in tax payment, or in the case of a non-taxable entity, could be a tax **refund**. A tax **deduction** reduces an entities' taxable income, or in the case of a nontaxable entity, could be gifted to the designer/engineer.

NOTE: We are not providing tax or legal advice to our clients. We are raising awareness for programs our clients could be eligible for, and want to communicate our ability to provide design and/or energy consulting services that would help them qualify.





ETA Forum: Shaping the Future of New Construction

ETA™
EFFICIENT TECHNOLOGY ACCELERATOR