



The First Step to Increasing ASHP Adoption in the Midwest

Midwest Air Source Heat Pump Collaborative
April 27, 2023

Housekeeping

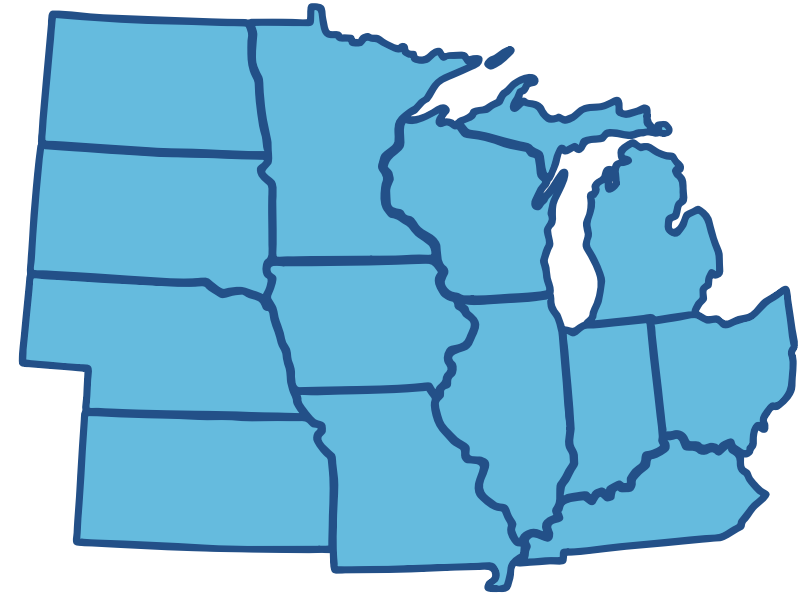
- This webinar is being recorded, and MEEA will be sending a link to view it
- If you have any questions for the presenters, please put them in the Question box, not the chat, to make sure we see them
- Feel free to provide input using the chat functionality



Midwest Energy Efficiency Alliance

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 150+ members, including:



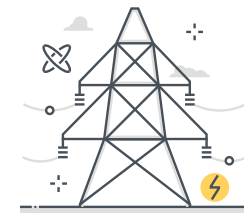
Energy service
companies &
contractors



State & local
governments



Academic &
Research institutions



Electric &
gas utilities

Speakers



Joe Ricchiuto
Midwest Energy
Efficiency Alliance



Molly Garcia
Center for Energy
and Environment



Emily
McPherson
Center for Energy
and Environment



Justin Margolies
Slipstream

Agenda

Introduction

Data Analysis | Key Findings

Insights by Audience

Regional Opportunities

Connection to National Field Validation Study

What's Next

Discussion



Goals for today

01

Absorb key findings

02

Understand regional opportunities and provide input

03

Be aware on what's next for the Collaborative



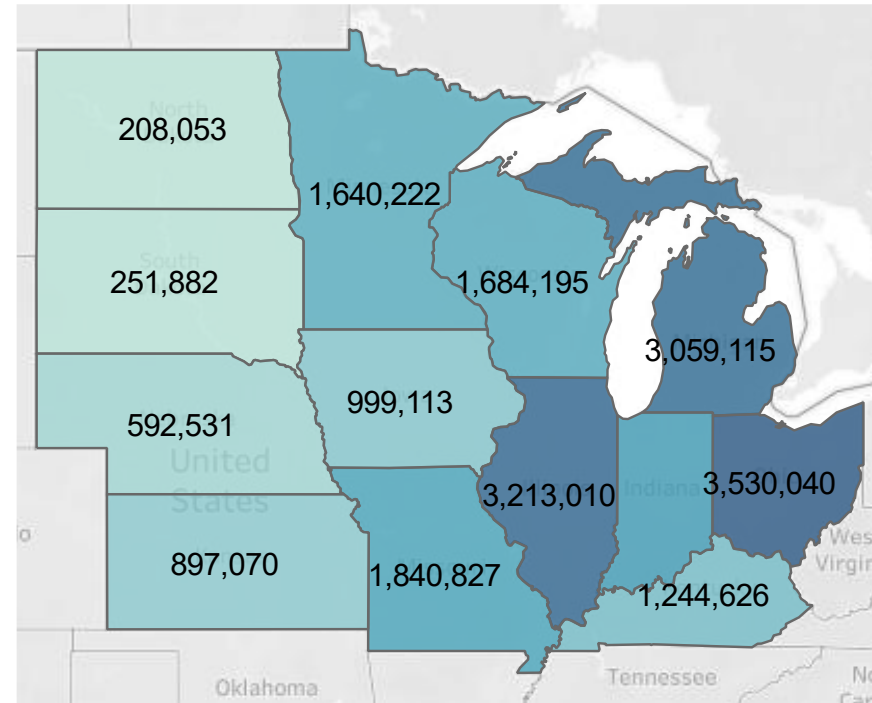


Introduction

Midwest ASHP Collaborative

Accelerating ASHP adoption faster and better, together

- Delivered by **CEE** and **Slipstream**
 - In partnership with Midwest Energy Efficiency Alliance (**MEEA**) and **Elevate**
- 2022-2023 Objectives:
 - Cross pollinating program best practices
 - Rate design for heat pumps
 - Equitable workforce development
 - Regional market transformation strategy



Number of SFH per state



Why do we need to act now?

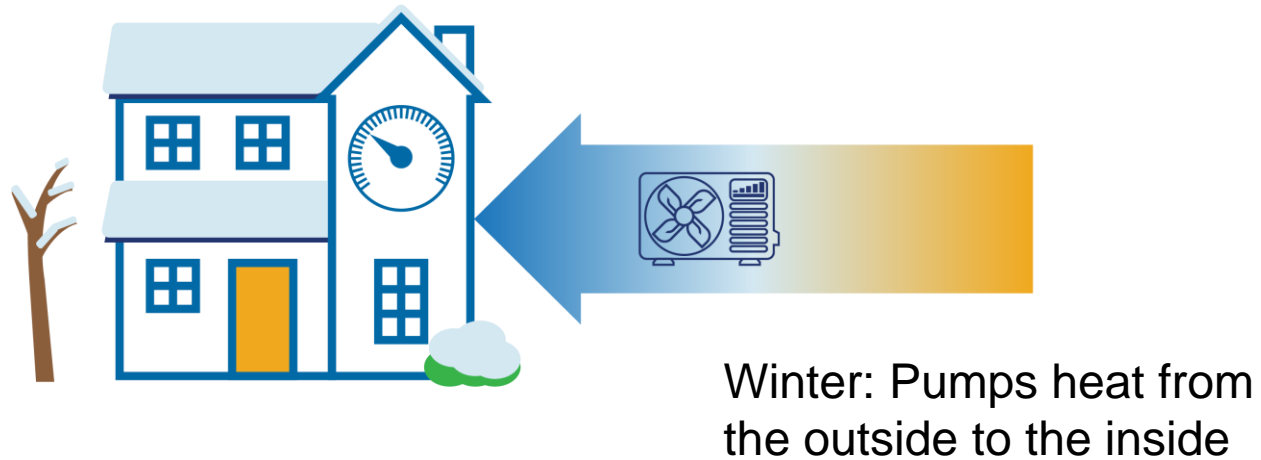
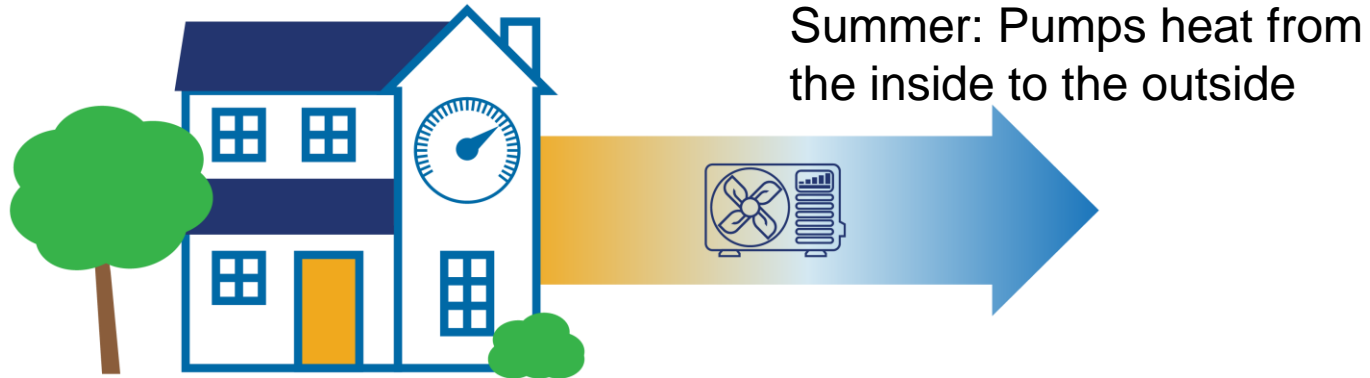
“The mission of DOE’s Office of Energy Efficiency and Renewable Energy is to accelerate the research, development, demonstration, and deployment of technologies and solutions to equitably **transition America to net zero greenhouse gas emissions economy-wide by no later than 2050**”

Vision: The Future of Home Heating is Heat Pumps

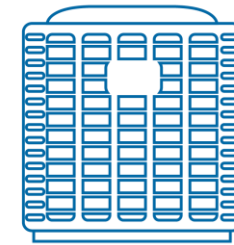
By 2030 air source heat pumps (ASHPs) are the first choice for contractors and homeowners replacing heating systems or air conditioners, optimized to provide heating as well as cooling.



What is a Heat Pump?



Same technology
as:



Air Conditioner

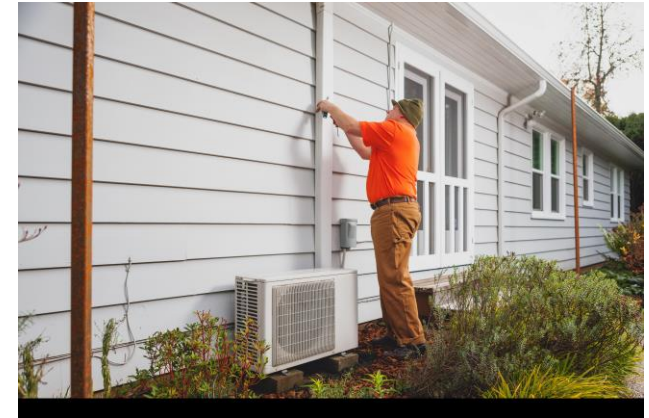


Refrigerator



In focus for the Midwest ASHP Collaborative

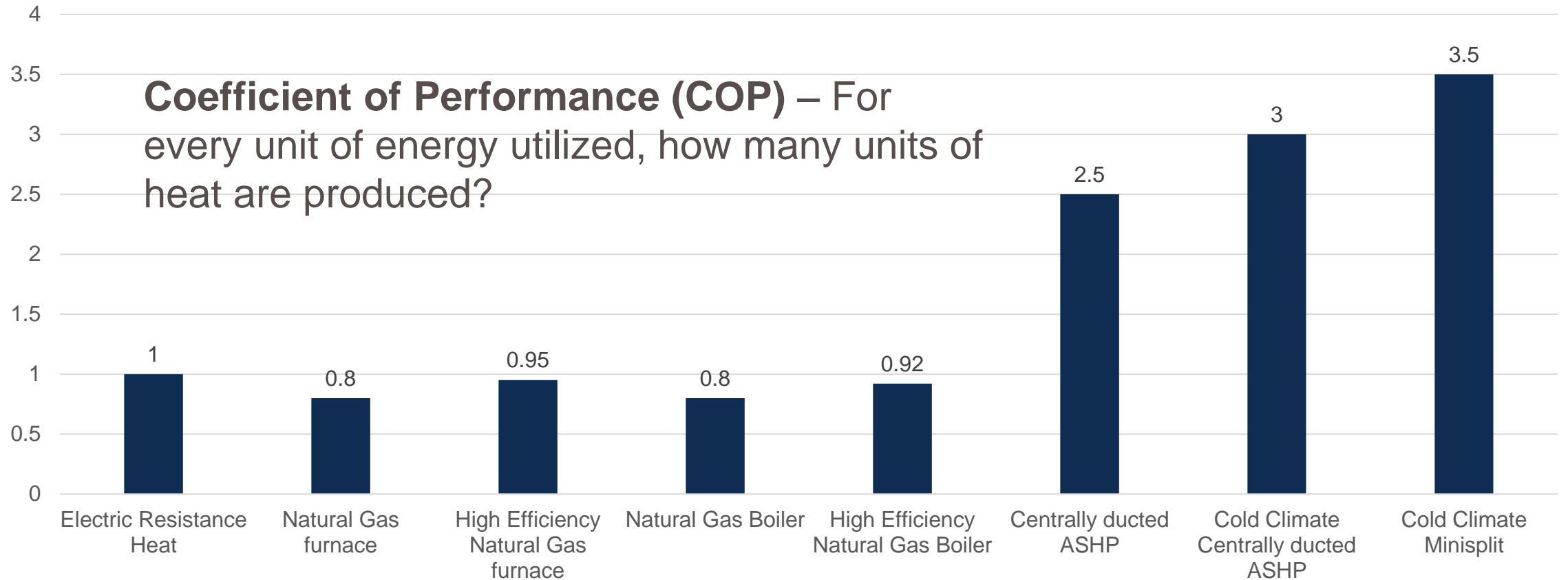
- **Residential Heat Pumps**
 - Minisplit heat pumps
 - Centrally ducted heat pumps
 - Dual-fuel heat pumps
 - Air-to-water heat pumps
 - Ground source heat pumps
 - Gas fired heat pumps
- **Commercial Heat Pumps**
 - VRF heat pumps
 - RTU heat pumps
- **Industrial heat pumps**



Why ASHPs?

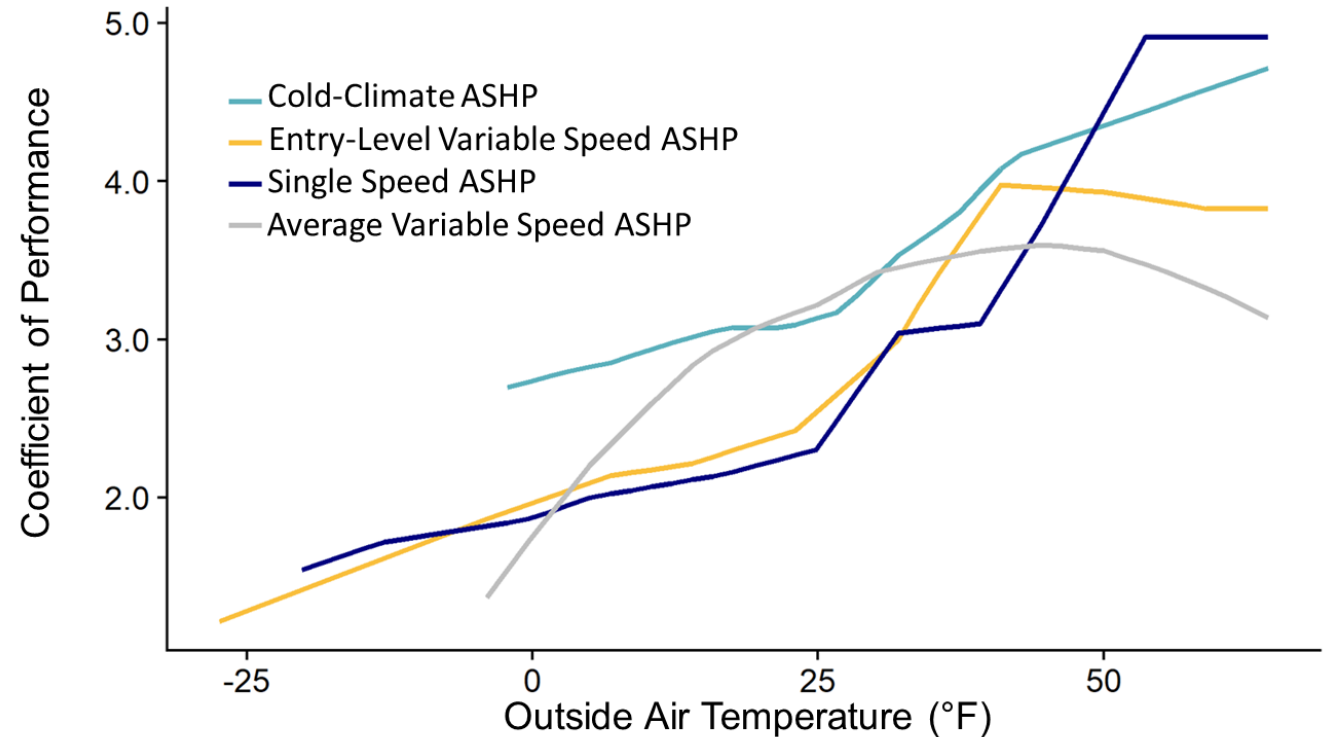
Immense fuel efficiency and carbon reduction

Approximate COP



ASHPs in cold and very cold climates

- ccASHPs offer promise for large site energy savings and emissions reductions
- Many models do work at these very cold design temperatures
- But they still have significant capacity limitations compared to space heating needs



Low hanging fruit opportunities

Electric resistance heated homes

- 2X - 3X customer bill reduction and emissions reductions
- Addresses customer comfort issues

Propane heated homes

- ~40% customer bill reduction and ~35% - 70% emissions reductions
- Addresses customer comfort issues
- Hedges against fuel price volatility



Today's ASHP Market Context

Technology

- Ongoing product development and technology advancements
- Innovations in software, tools, and controls

Regulations and policy

- Changing efficiency metrics and minimum efficiencies
- Refrigerant global warming potential draw downs
- Electrification attention and dollars (federal, state, local)

People

- Changing labor force; need for more tradespeople
- Homeowner and contractor education needed
- Energy efficiency actors ramping up demands on heat pump technologies

Supply Chain

- Constraints and inflation increase wait time and cost
- Distributor stocking liability
- Supply chain recovering from Covid-19 restrictions



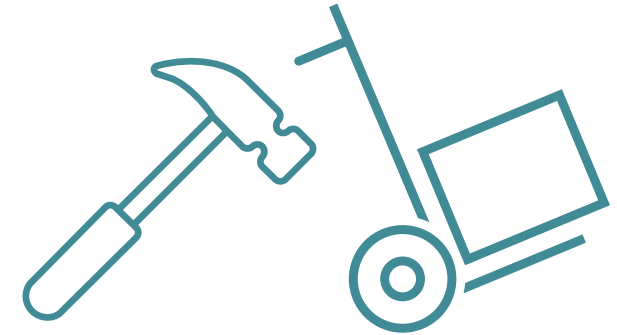
Initial key audiences of the Collaborative



Utilities



State energy offices
and regulators



ASHP
Manufacturers
and Distributors



Project Overview – Phase 1



Needs Assessment

Data Analysis
Stakeholder interviews



Regional Strategy

Equitable Workforce Development
Electric Rates Optimization



Program Best Practices

Interactive Website

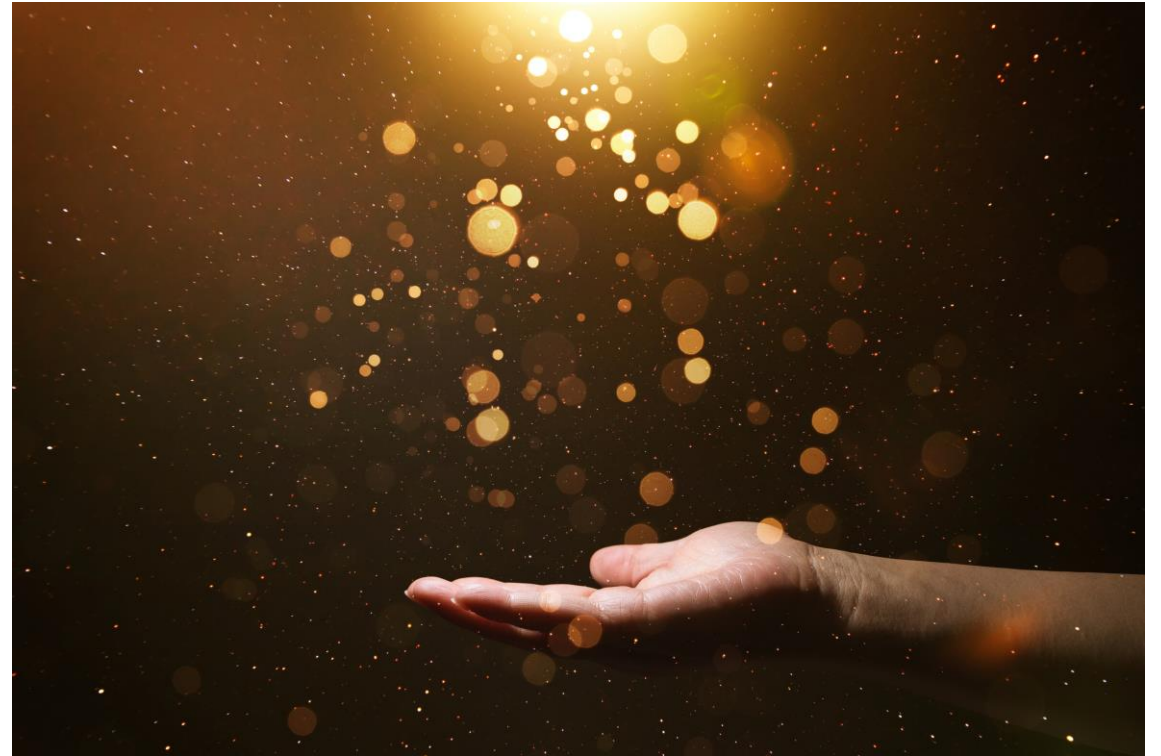


Needs Assessment Purpose

Shed light on the state of the Midwest

Identify key opportunities for market transformation

Inform Collaborative activities

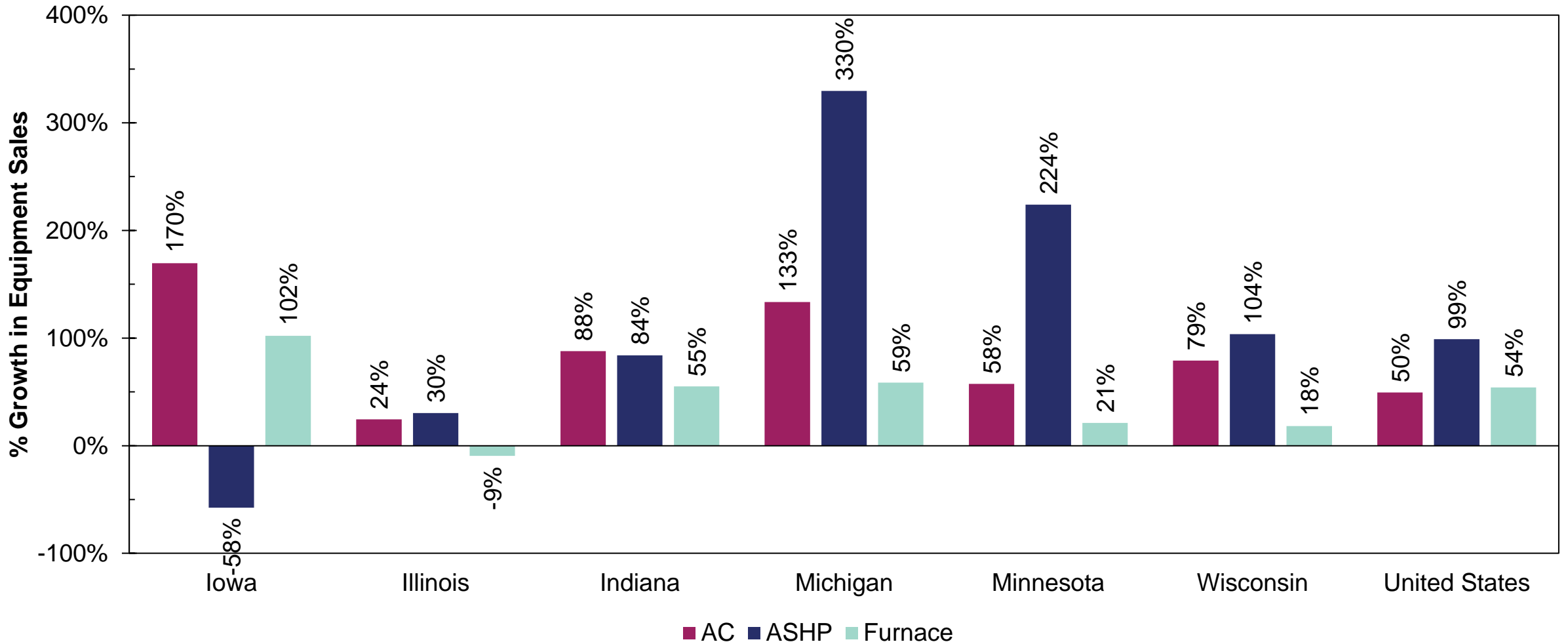




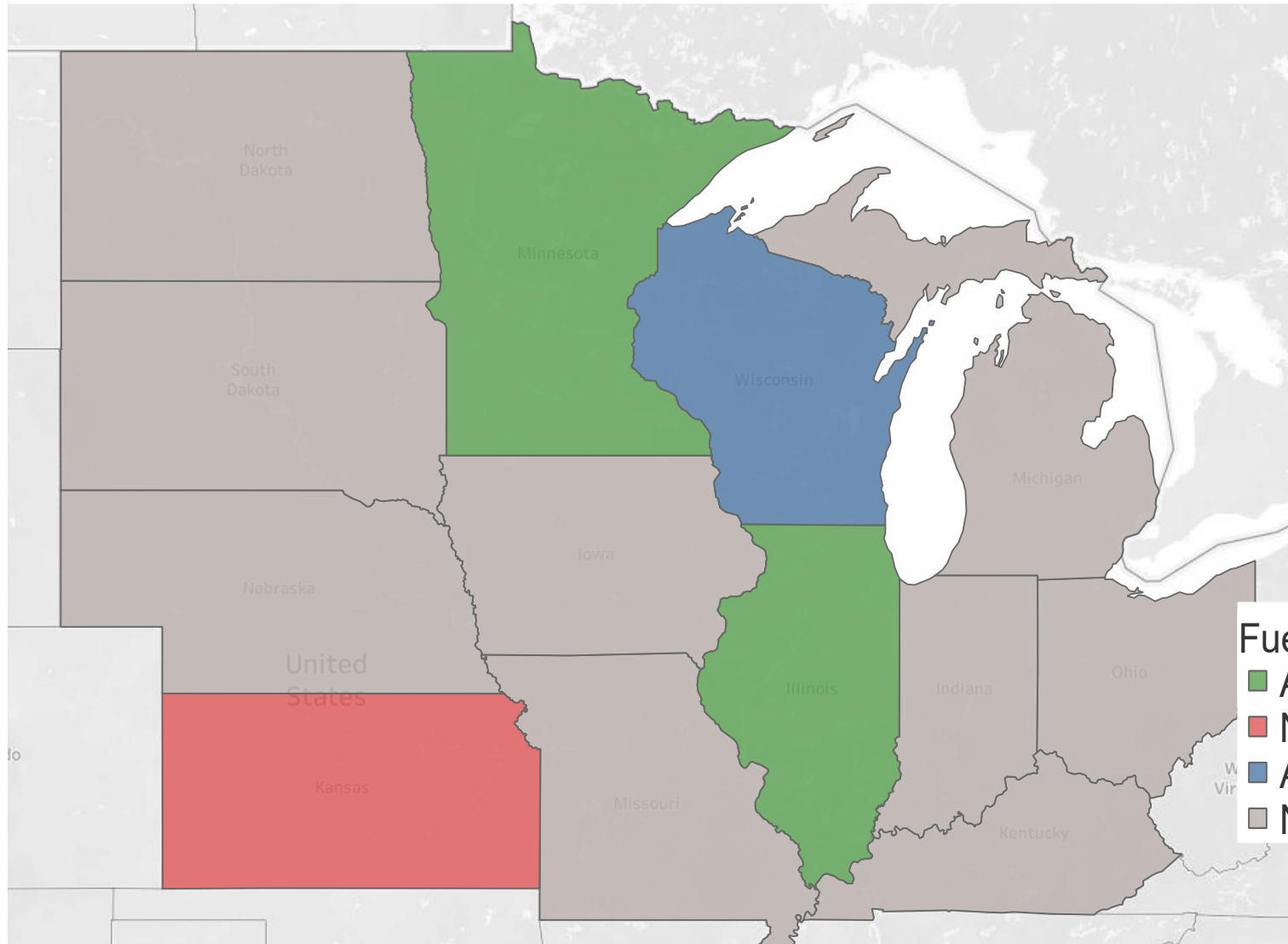
Data Analysis

Key Takeaways

Residential HVAC Sales Growth 2013-2021

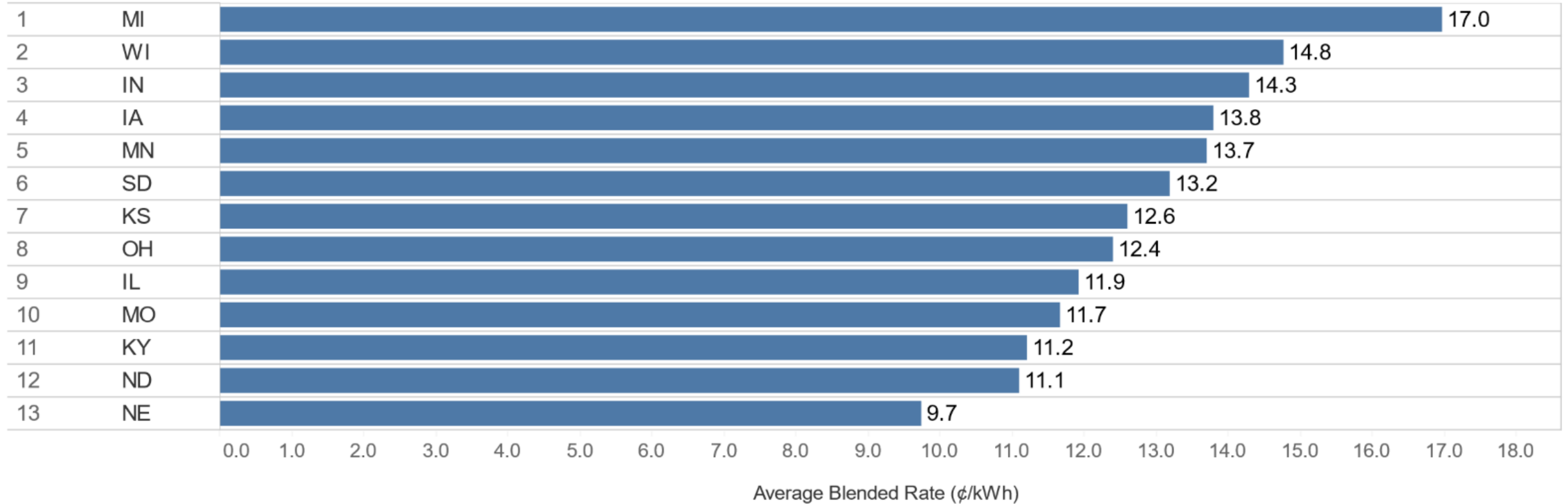


Fuel Switching Policy for Energy Efficiency Programs



- Fuel Switching Policy
- Allowed for regulated and unregulated fuels
 - No fuel switching allowed
 - Allowed for regulated but not unregulated fuels
 - None established

Average Blended Electric Rates by State

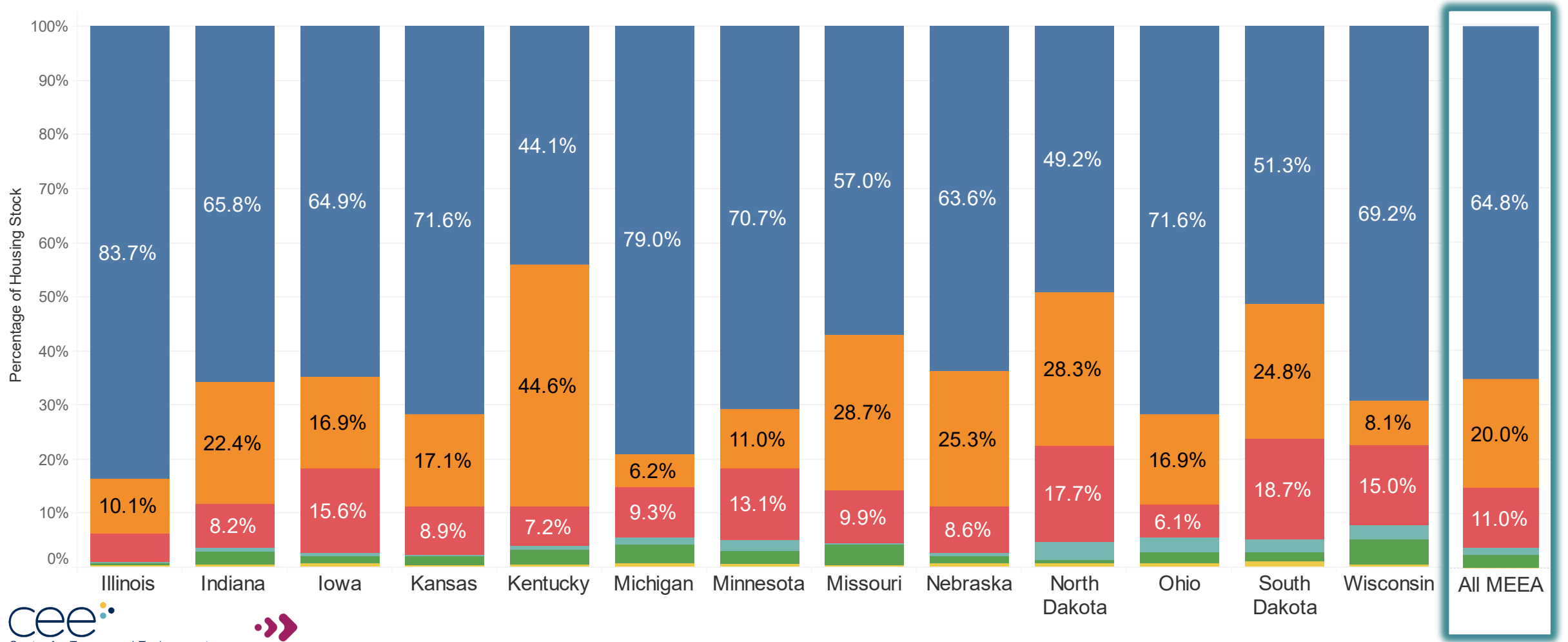


2021 EIA blended electric rates - \$ revenue/kWh sales (minimum 49,000 customers and 500 MWh of annual sales)



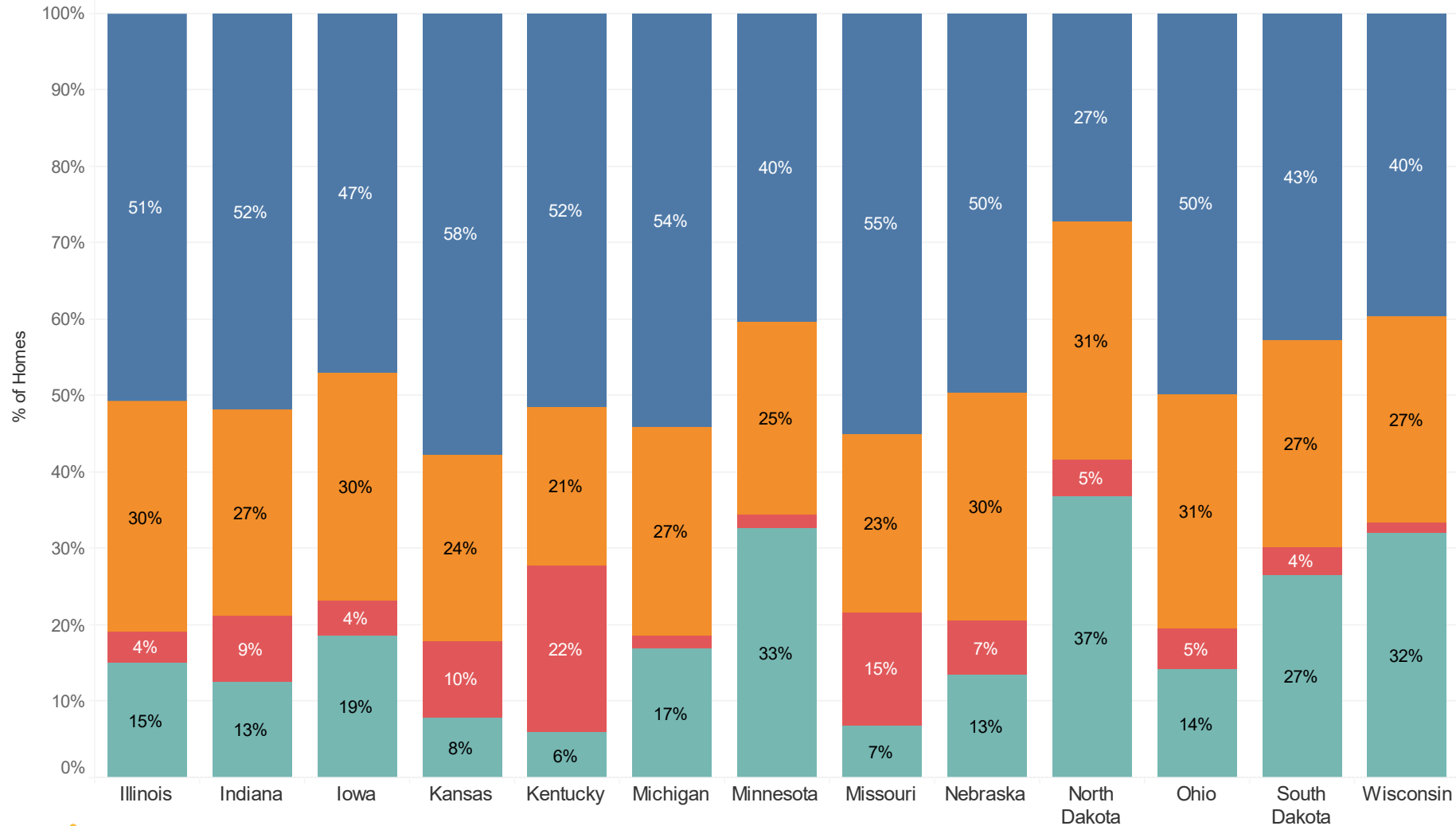
Single Family Home Heating Fuel Allocations, per State

- Heating Fuel
- Natural Gas
 - Electricity
 - Bottled, tank, LP gas
 - Fuel oil, kerosene, liquid fuels
 - Wood
 - Other fuels

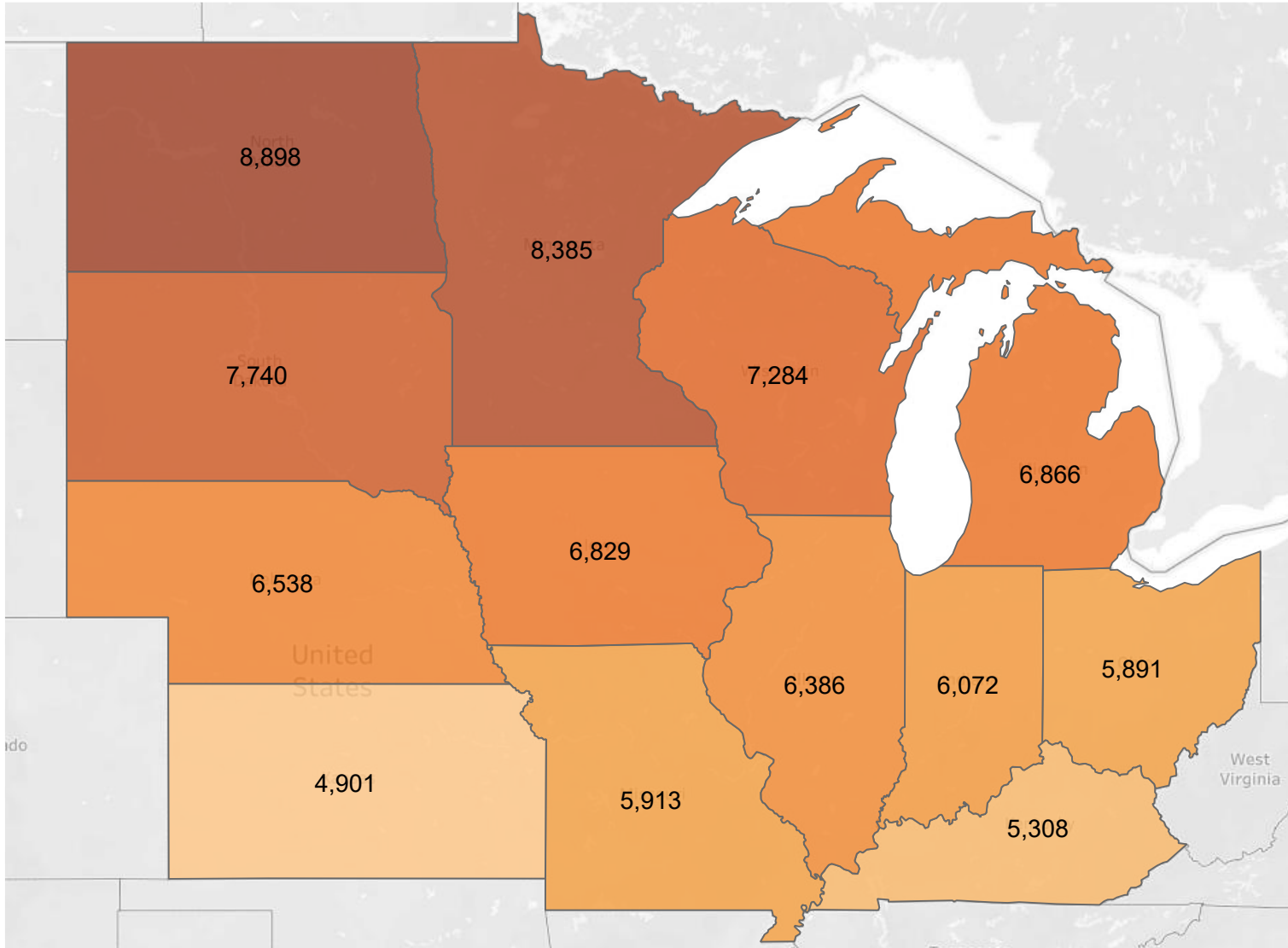


Air Conditioner Allocations by State

Single-family homes and multi-family homes



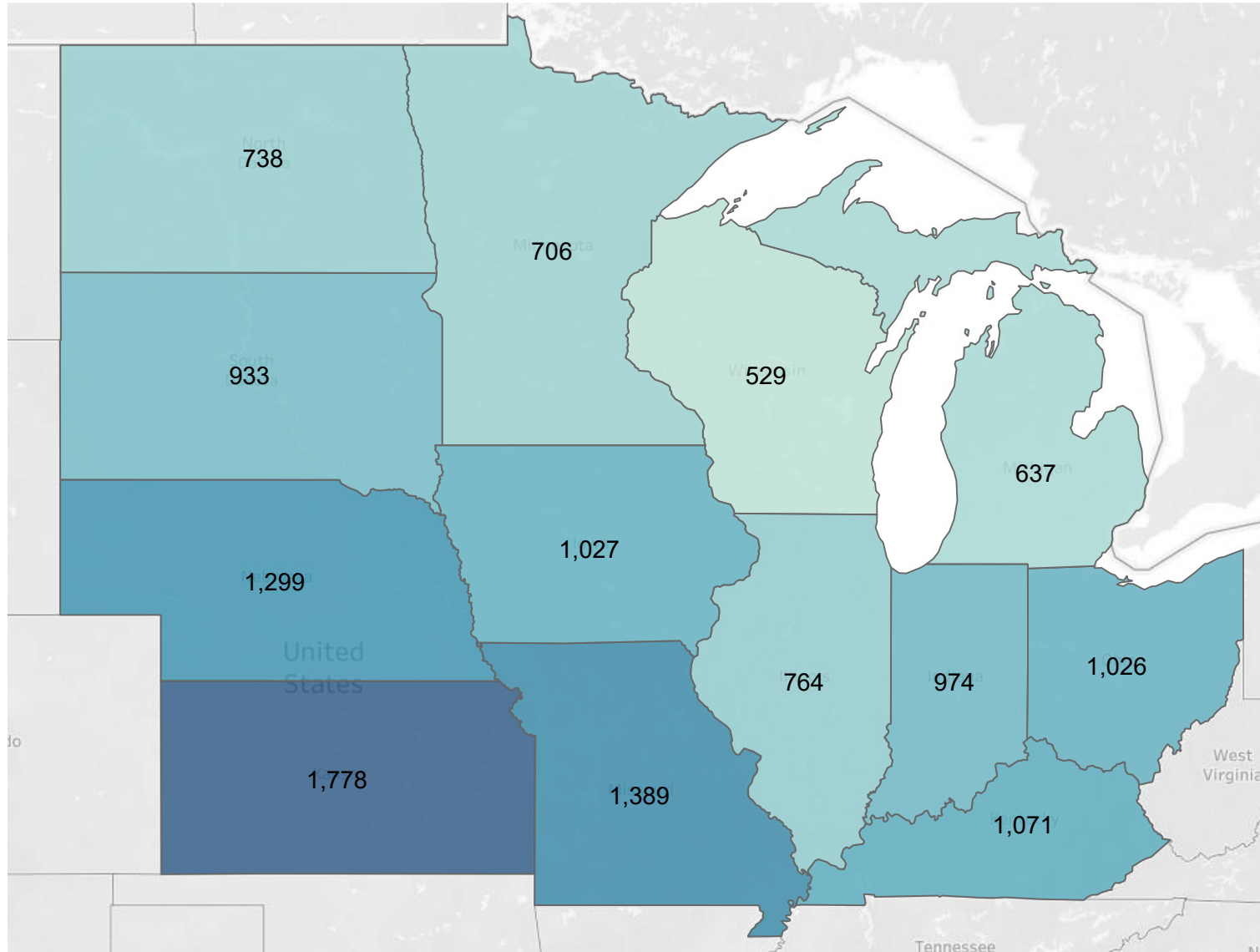
Annual Heating Degree Days, per MEEA State



Number of heating degree days is based on typical meteorological year data gathered via NREL's National Solar Radiation Database



Annual Cooling Degree Days, per MEEA State



Number of cooling degree days is based on typical meteorological year data gathered via NREL's National Solar Radiation Database



“Align” States and “Activate” States

 “Align” State

 “Activate” State
(bold=high interest/priority)

State	EE Program Fuel Switching	Statewide EE program or Collaborative	Mild climate (Zone 4-5)	Top 5 electric heating (%)	Top 5 propane heating (%)	Top 5 Lowest electric rates	Top 5 States with most homes w/ “no central AC” (%)
Illinois	x		x			x	
Michigan		x					
Minnesota	x	x			x		x
Wisconsin	x	x			x		x
Indiana			x				
Iowa					x		x
Kansas			x				
Kentucky			x	x		x	
Missouri			x	x		x	
Nebraska			x	x		x	
North Dakota				x	x	x	x
Ohio			x				
South Dakota				x	x		x



Insights by Audience

Stakeholder Interviews

Needs Assessment Questions

What do you see as the biggest opportunity for heat pump adoption in the Midwest?

What do you see as the biggest barriers for heat pump adoption in the Midwest?

What do you view as the most critical role the Midwest ASHP Collaborative can play in overcoming barriers in the region?

What role do you see dual fuel ASHPs playing in the market transformation to ASHPs in the Midwest?



Who we talked to

Utilities	State Governments/Energy Offices**	State Collaboratives
Alliant Energy*	City of Eau Claire*	Michigan HP Collaborative
Ameren (IL)	City of Milwaukee*	Minnesota ASHP Collaborative
MidAmerican (IA, IL)	Dane County*	
Sun Prairie Municipal Utility*	Focus on Energy*	
Xcel Energy*	Iowa	
Wisconsin Electric Cooperative Association*	Michigan	
	Missouri	
	Vernon County Energy District*	
	WI Division of Energy, Housing and Community Resources*	
	Wisconsin Public Service Commission*	
	Wisconsin Tribes*	

* Denotes an interview we leveraged from the Wisconsin ASHP Market Transformation Planning Project needs assessment

**Includes community-level organizations within the state of Wisconsin



MEEA Conference Pre-Event

- Full registration – over 145 participants
- 13 breakout discussion groups covering 5 topics, serving as the needs assessment
- Gained buy-in from regional stakeholders
- Heard from PNNL and DOE on the National Field Validation Partnership and updates on IIJA & IRA

AGENDA
ORIENTATION
Welcome <i>Molly Graham, Midwest Energy Efficiency Alliance</i>
REGIONAL CONTEXT
Regional Coordination: Midwest Heat Pump Collaborative <i>Emily McPherson, Center for Energy and Environment</i>
Workforce Landscape in the Midwest <i>Justin Margolies, Slipstream</i>
Rate Design and Optimization <i>Carl Nelson, Center for Energy and Environment</i>
NATIONAL CONTEXT
Federal Funding Updates on the IIJA and IRA <i>Antonio Bouza, Department of Energy</i>
National Field Validation Partnership Overview <i>Fredericka Brown, Pacific Northwest National Laboratory</i>
Heat Pump Manufacturer Discussion Panel <i>Daikin Manufacturing, Mitsubishi, and Carrier</i>
BREAK
UNDERSTANDING YOUR EXPERIENCE
Breakout Discussions <i>Small groups and session facilitators</i> Customer engagement; workforce development and training; electric rates optimization; heat pump program design; low-income program design
Wrap-up and Next Steps <i>Molly Garcia, Center for Energy and Environment</i> <i>Justin Margolies, Slipstream</i>





Perspective | Market Actors

Manufacturers already actively contributing to Midwest ASHP Collaborative

Desire simplicity and unity in Midwest program designs

Describe large number of regulations and policies as “distracting,” “overwhelming,” and “disruptive”

Positioned to support utilities and state energy offices and help them connect with distributors



Perspective | State Government & Regulators

- Heat pumps will be a key measure of energy efficiency program portfolios
- Contractor and customer education remains the biggest barrier to adoption
- State energy offices will manage federal rebates and incentives
- Low-income populations cannot afford operational costs of full electrification
- Weatherization should be considered alongside workforce development
- Heat pumps must be included in rate cases

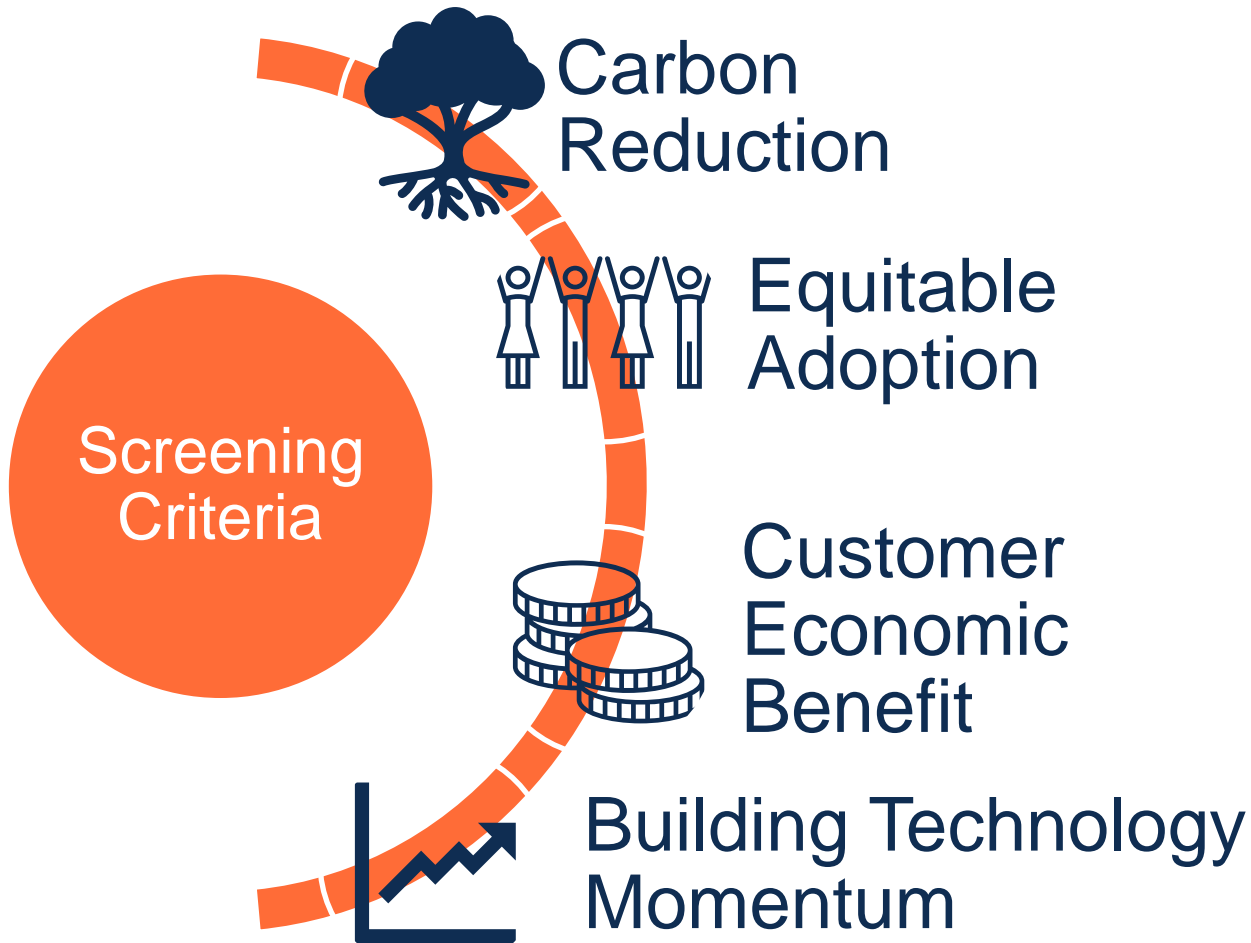


Perspective | Utilities

- Education about how heat pumps differ from baseline technology is critical
- Neutral third-party entities are best suited to provide customer education
- Contractors must overcome previous bad experiences with the technology
- High upfront and operational costs are barriers to adoption
- Utilities are most comfortable promoting dual fuel heat pump applications
- Sector-wide interest in tying heat pumps to demand response programs



Leveraging Wisconsin ASHP Market Transformation Planning



Free Heat Pump Workshop

May 3, 2023 Lussier Family Heritage Center

The residential HVAC market is changing fast.

In 2022, for the first time, US households bought more electric heat pumps than gas furnaces. The transition away from natural gas is happening locally too as heat pumps become an increasingly large portion of HVAC sales in Dane County.

Is your HVAC company ready to profit from this transition?
HVAC manufacturers and distributors are coming together to host a heat pump workshop with HVAC contractors across South Central Wisconsin. This free workshop will outline changes happening and identify the resources you need to succeed through this transition.

Join us for a free workshop May 3 from 8 am - 1 pm at the Lussier Family Heritage Center in Madison, Wisconsin.

Space is limited so **register now** at <http://bit.ly/3ZFOkVE> for this free event. Lunch will be provided.



Example of WI Heat Pump Coalition collaboration to build contractor momentum in Dane County





Regional Opportunities

Regional Opportunities



Policy, Programs, and Regulation



Product Specifications and Ratings



Customer Engagement



Contractor Education and Development



Electric Rates Optimization



Equitable Workforce Development



Opportunities | Policy, Programs, and Regulation



Enable statewide collaboration



Align state energy efficiency programs with federal programs and grants



Encourage pilot projects on demand response and innovative rate design



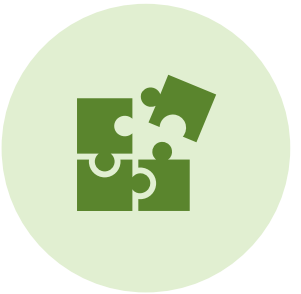
Invest resources to support equitable workforce development



Opportunities | Product Specifications and Ratings



Improve identification of real-world ASHP performance in the Midwest



Align product specifications across programs (State, IRA, Utility)



Opportunities | Customer Engagement



Provide resources with consistent messaging and terminology across service territories



Address customer concerns regarding technology performance through case studies, hard copy materials at the point of sale, and online resources



Create customer guides for applicable technology applications in your area



Utilize new forms of media to increase both customer knowledge and trust in the technology



Connect customers with qualified contractors via contractor designation programs



Encourage proactive replacements with online resources, such as a cost savings calculator



Opportunities | Contractor Education and Development



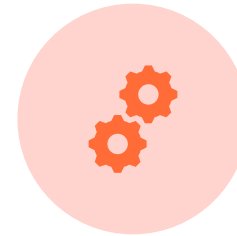
Partner with market actors to support training and education at the community level



Build up a network of qualified contractors and formalize with a designation.



Support contractor business development to serve as electrification solution providers.



Motivate current installers to overcome previous negative experiences with ASHPs by increasing firsthand experience with the technology



Test and scale use of innovative methods and tools to improve contractor training, education, and workflows



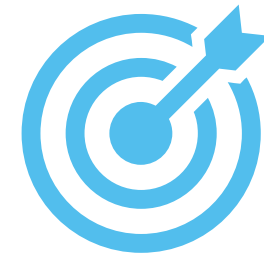
Opportunities | Electric Rates Optimization



Develop, justify, and advocate for heat pump-specific rates to incentivize adoption of ASHPs



Leverage special rate programs to prepare for an eventual switch from summer to winter peaking

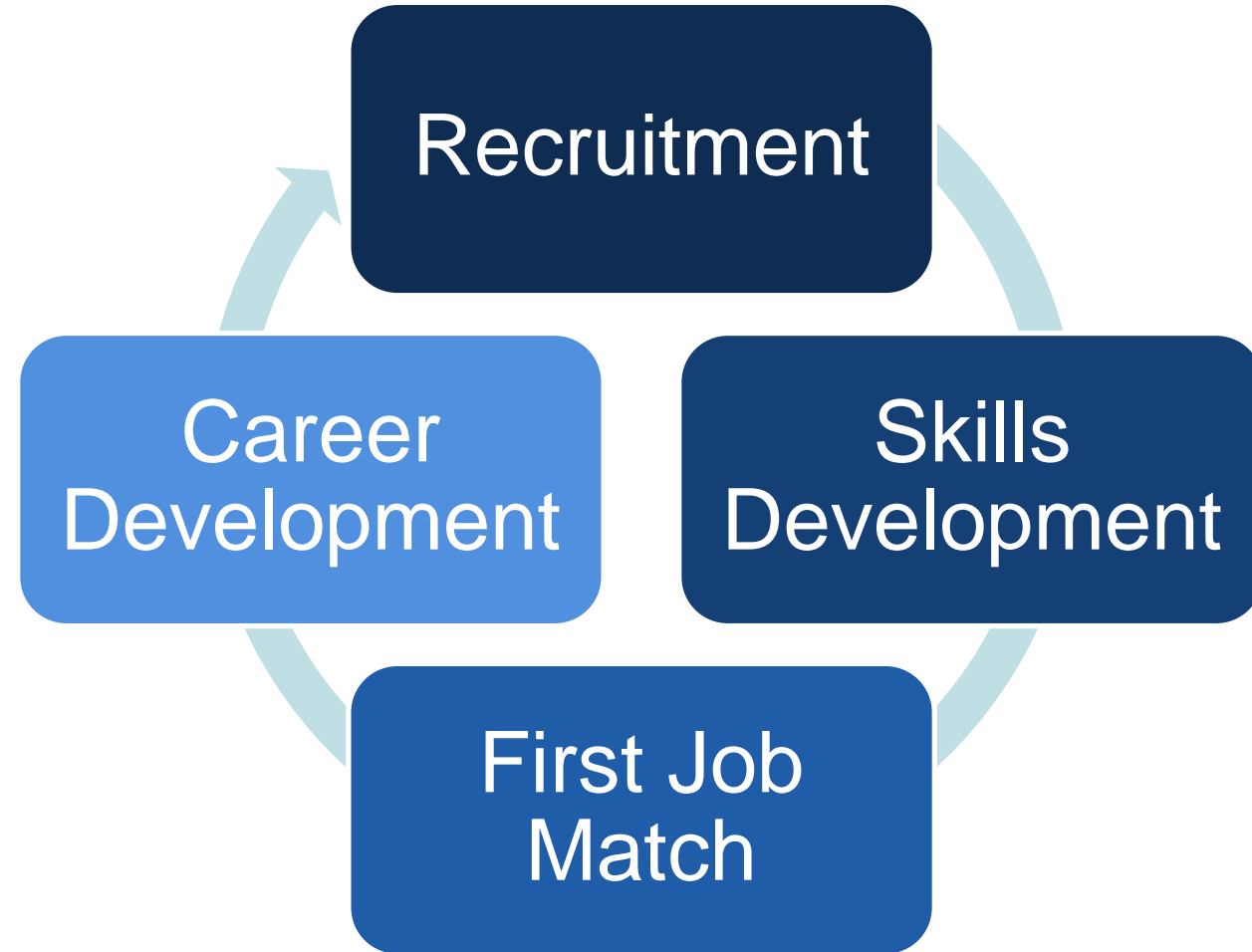


Use greenhouse gas reduction targets to drive program goals



Opportunities | Equitable Workforce Development

- Foster partnership collaboration cycles and disseminate models for local replication
 - Market actors, educational providers, community-based organizations
 - Wrap-around services
- Disseminate educational materials to local communities (i.e. DOE [building science education center](#))
- Prioritize economic and social investments that directly address the lack of diversity and equity across all four spheres of influence



4 Primary Spheres of Influence for Equitable Workforce Development



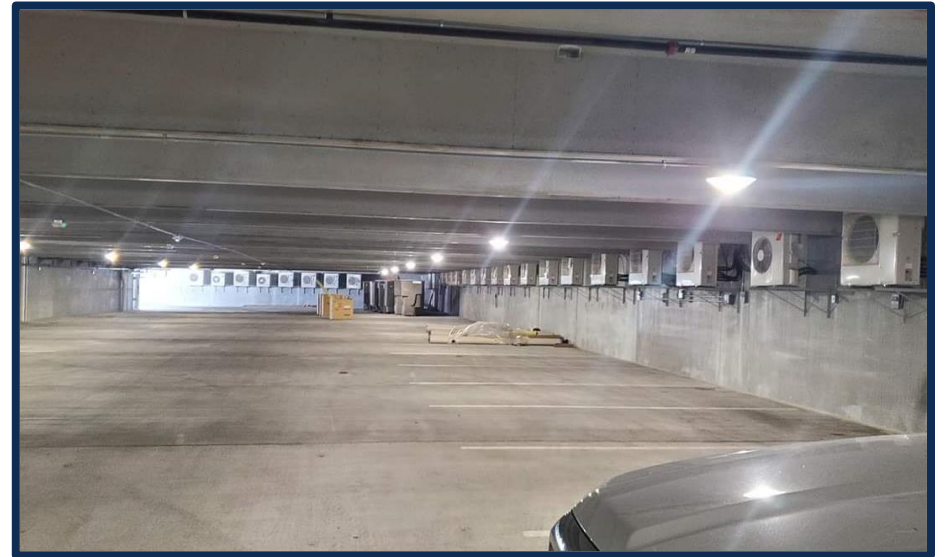
More attention to Multi-family ASHP applications

Unique Challenges:

- Split landlord/tenant incentives
- Estimation of savings is more challenging
- Lack of building owner/resident/contractor interest and knowledge
- High electrical upgrade costs in electrification scenarios

Unique opportunities:

- Serve disadvantaged communities and promote equitable adoption of ASHPs
- Regions with high proportion of electric resistance heat (i.e. Wisconsin)
- Further investigation of emerging window ASHPs



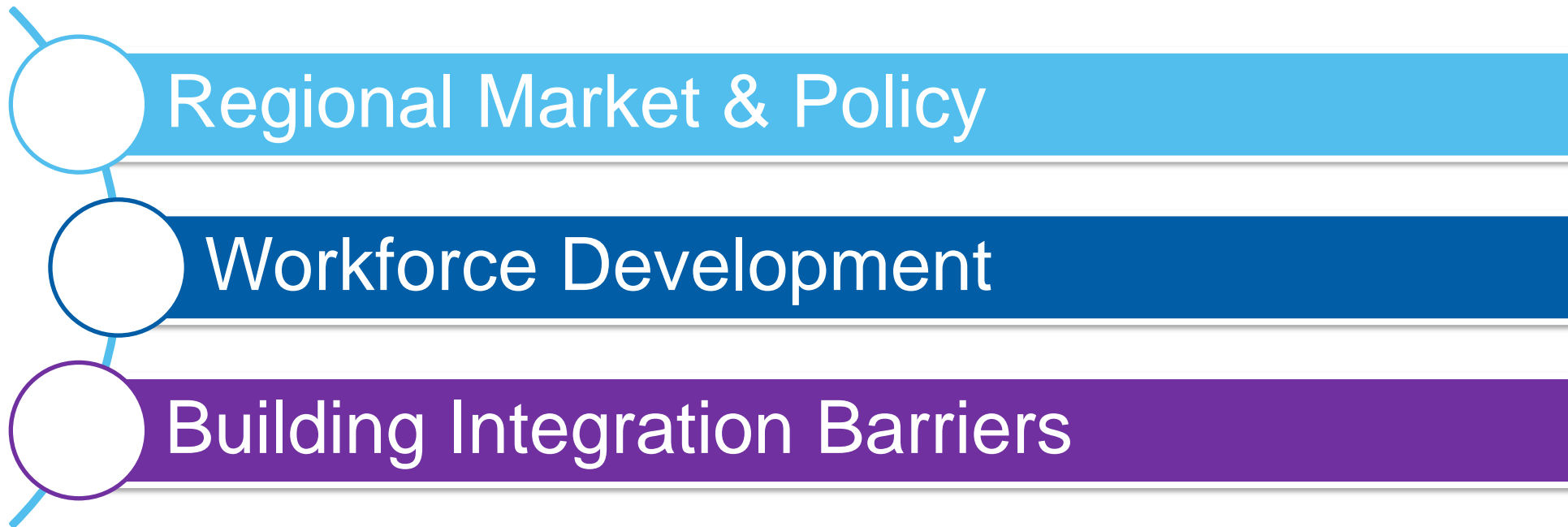
Example of multi-family new construction parking garage installation of “outdoor” units (Credit: Mitsubishi Electric)



Connection to National Field Validation Study

Integration with Field Validation Partnership

MEEA is serving as a two-way conduit of information on the challenges faced and the opportunities present to accelerate the adoption of heat pumps and heat pump water heaters



How it connects

- The outcomes of the needs assessment align with the critical gaps identified in the National Field Validation Partnership
- At present, the core committees are reviewing the many submissions received during the gap analysis process, aiming to identify the top five gaps that demand prompt attention in each respective group
- MEEA's core committees:
 - Workforce Development
 - Need for Heat Pump Training for Contractors
 - Skilled Labor Shortage
 - Building Integration Barriers
 - Retrofit Challenges
 - Workforce Knowledge and Abilities
 - Regional Market and Policy
 - High Upfront Cost
 - Lack of Separate Rate Classes for All Electric Customers
 - Consumer Education Needed
 - Lack of cohesive and coordinated market transformation approach or entity





What's Next



Needs Assessment

Data Analysis
Stakeholder interviews



Regional Strategy

Equitable Workforce Development
Electric Rates Optimization



Program Best Practices

Interactive Website



Stay up to date with the Collaborative

Join us for upcoming Collaborative webinars showcasing our work to date

- June 1 | Electric Rates Optimization
- July 20 | Equitable Workforce Development
- August/September | Best Practices Website Launch

Sign up for emails from the Collaborative



Contact Information



Joe Ricchiuto
Technical Manager
jricchiuto@mwalliance.org



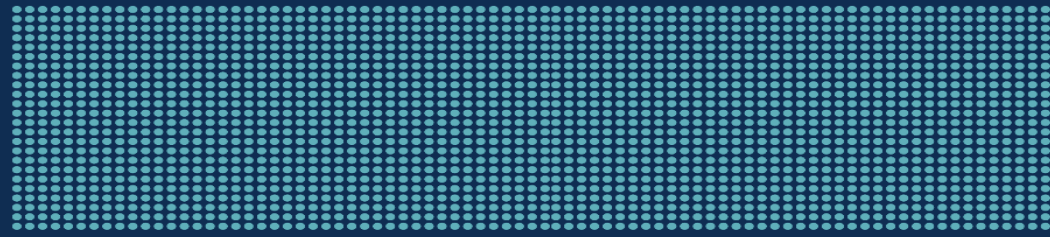
Molly Garcia
Program Development Manager, Beneficial Electrification
mgarcia@mncee.org



Justin Margolies
Senior Product Developer
jmargolies@slipstreaminc.org



Emily McPherson
Sr. Manager of Market Development
emcpherson@mncee.org



**THANK
YOU!**