



Demand-Side Management & Renewable Energy



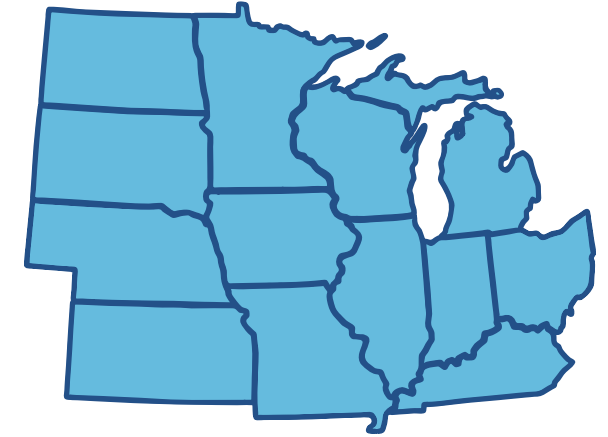
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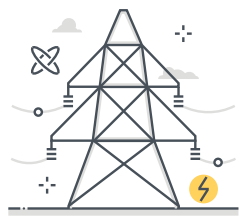
Midwest Energy Efficiency Alliance

MEEA

At MEEA, we leverage our unique position as the **Midwest's trusted resource on energy efficiency policy and programs** to help identify, understand, and implement cost-effective strategies that provide economic and environmental benefits.



MEEA is a non-profit membership organization with 160+ members, including:



Electric &
gas utilities



State & local
governments

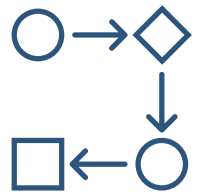


Academic &
Research institutions



Energy service
companies &
contractors

MEEA's Role



Resource

- Analysis
- Policy updates
- Messaging tools
- Expertise



Convenor/ Facilitator

- Workshops
- Education
- Stakeholder engagement



Connector

- Networking
- Policymaker outreach



Collaborator

- Program partner
- Research projects
- Strategic planning

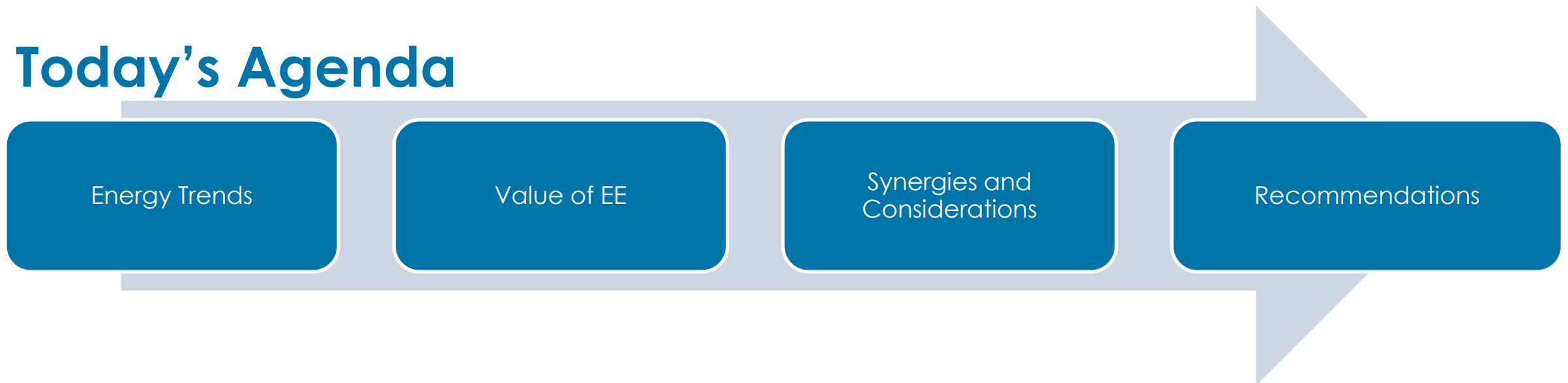


Purpose & Agenda

Purpose

- To discuss synergies, considerations, and opportunities critical to advancing renewable energy and energy storage solutions through energy efficiency and demand response

Today's Agenda



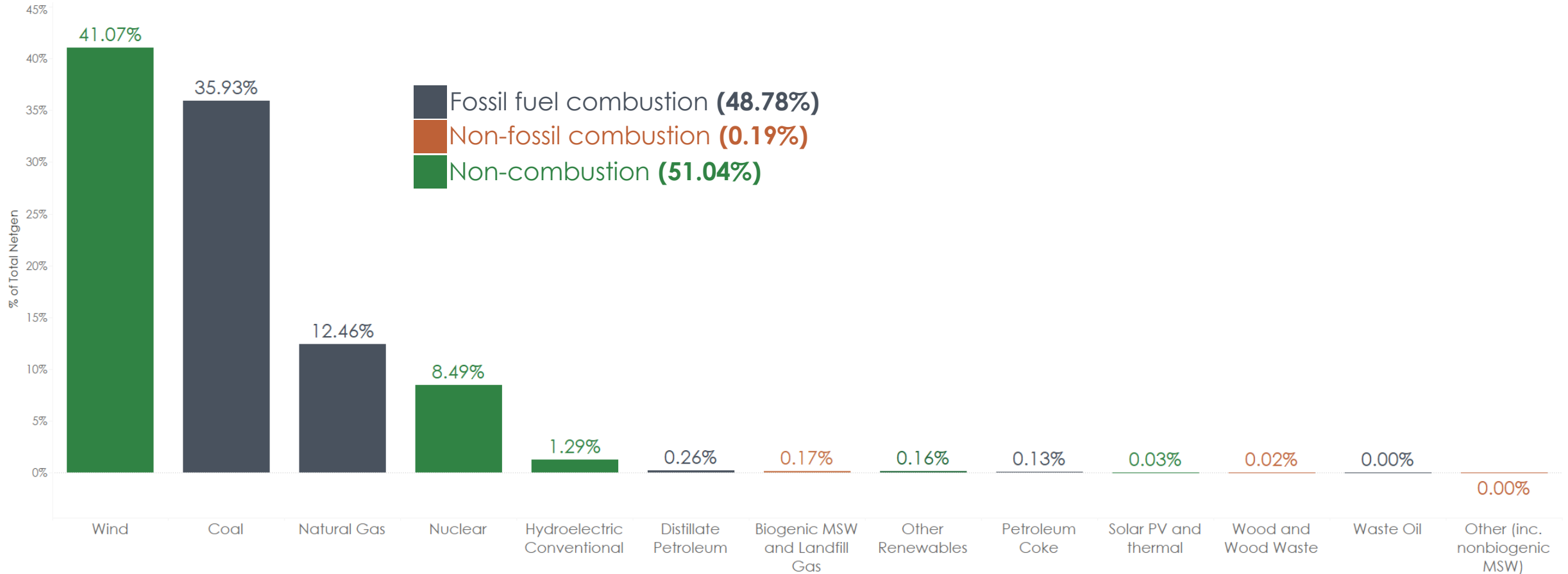
Iowa

Renewable Energy, Storage, Transportation

- First state to adopt a renewable portfolio standard (1983)
- In 2020, **wind comprised 57% of Iowa's electricity** (heavy curtailment) (EIA)
- Potential for battery storage: Between **1 and 2+ GW (90% front of the meter)** (Synapse)
- Iowa is the nation's largest fuel ethanol & biodiesel producer

Current Electric Generation

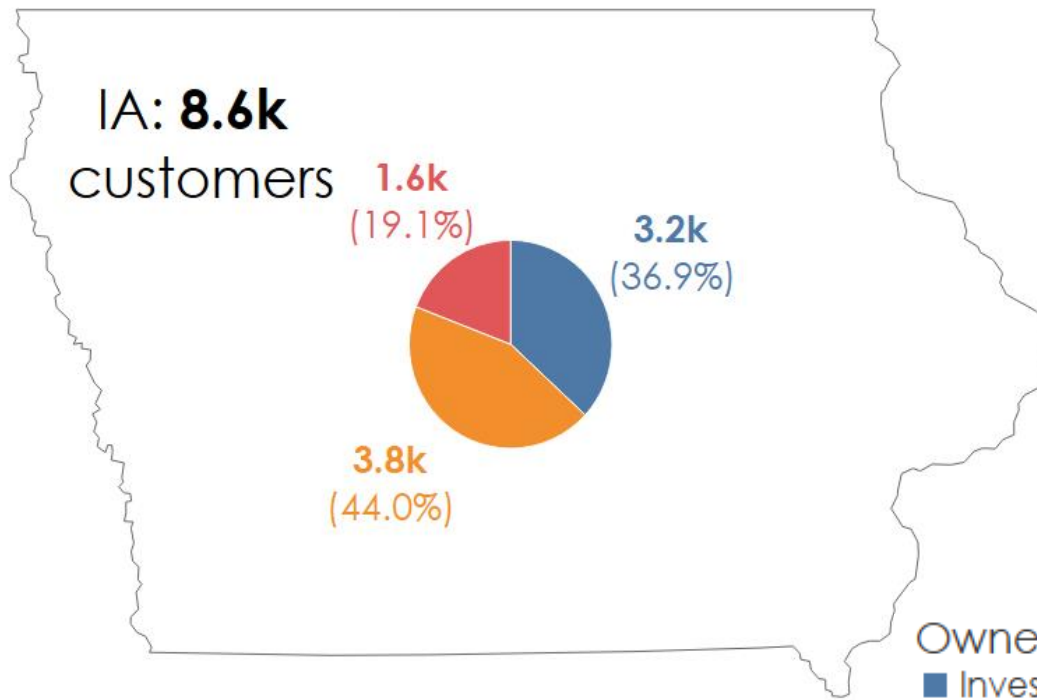
Iowa net generation percentages by fuel type



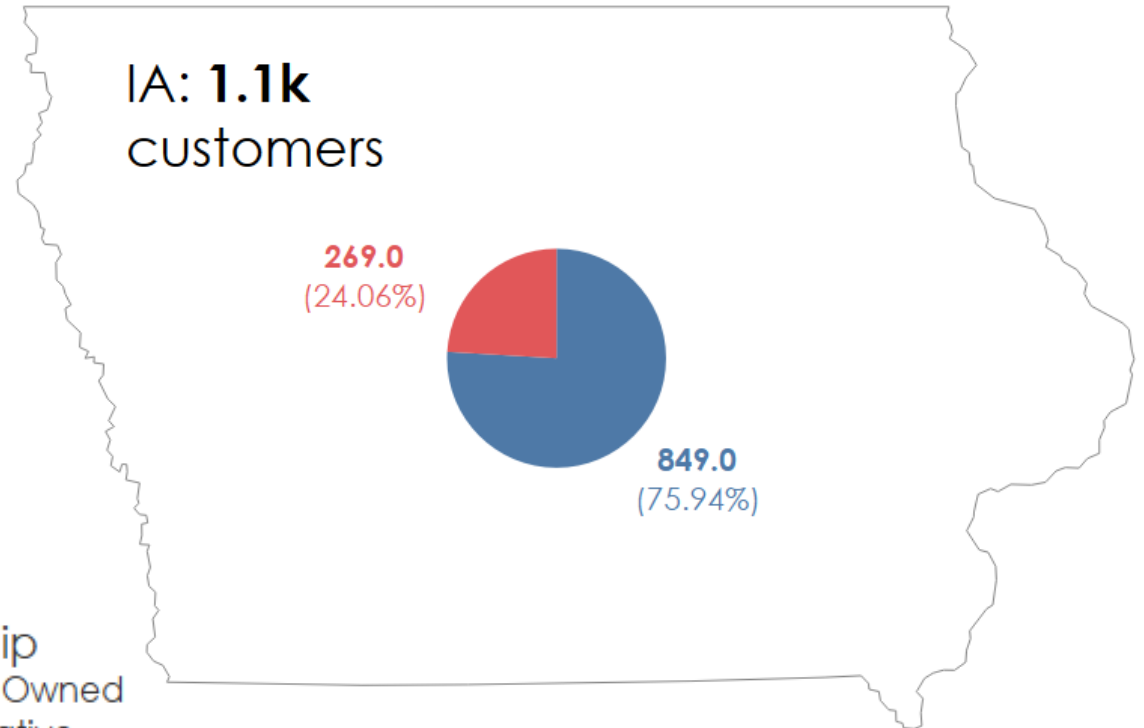
Industrial customer counts & utility ownership

Iowa's Industrial sector customers

Electric



Gas



Ownership
■ Investor Owned
■ Cooperative
■ Municipal

Source: EIA-861 (2019)

Source: EIA-176 2019

The Midwest's Top 5 Energy Use Industrial Subsectors

Food, Chemicals & Primary Metals are the top 3 for both electricity and gas

Electricity

NAICS Code	Subsector and Industry	Fuel - Net Electricity
331	Primary Metals	142
325	Chemicals	131
311	Food	113
336	Transportation Equipment	85
326	Plastics and Rubber Products	74

Gas

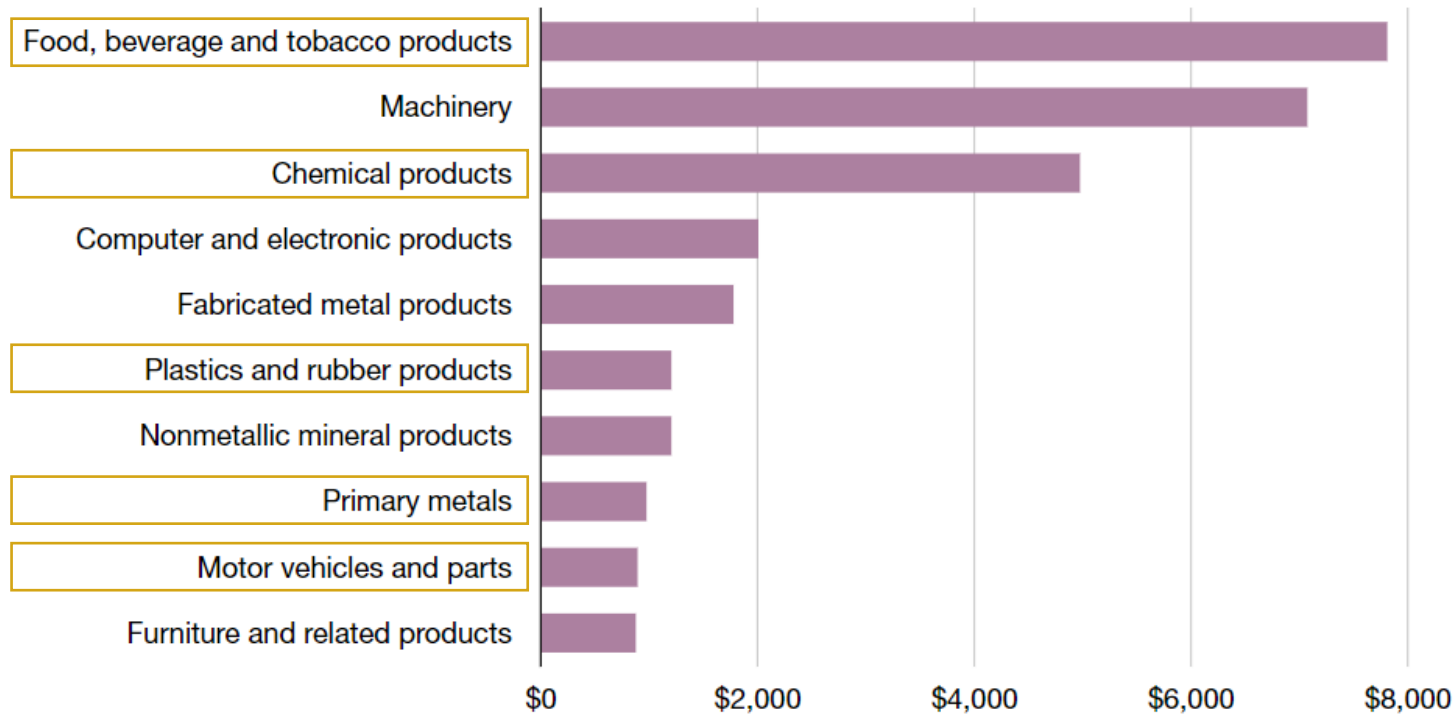
NAICS Code	Subsector and Industry	Fuel - Natural Gas
325	Chemicals	559
331	Primary Metals	334
311	Food	304
324	Petroleum and Coal Products	136
322	Paper	110

source: EIA MECS 2018 Table 3.2

Industrial Subsectors in Iowa

Iowa consistent with the region's most energy intensive industries

Top 10 Iowa Manufacturing Sectors, in Millions of Dollars, 2017



- Food and chemical products are in the top 3 for both the region's energy use and Iowa's manufacturing GDP
- Iowa is 5th in the nation for energy use per capita due to industry

source: National Association of Manufacturers (nam.org)

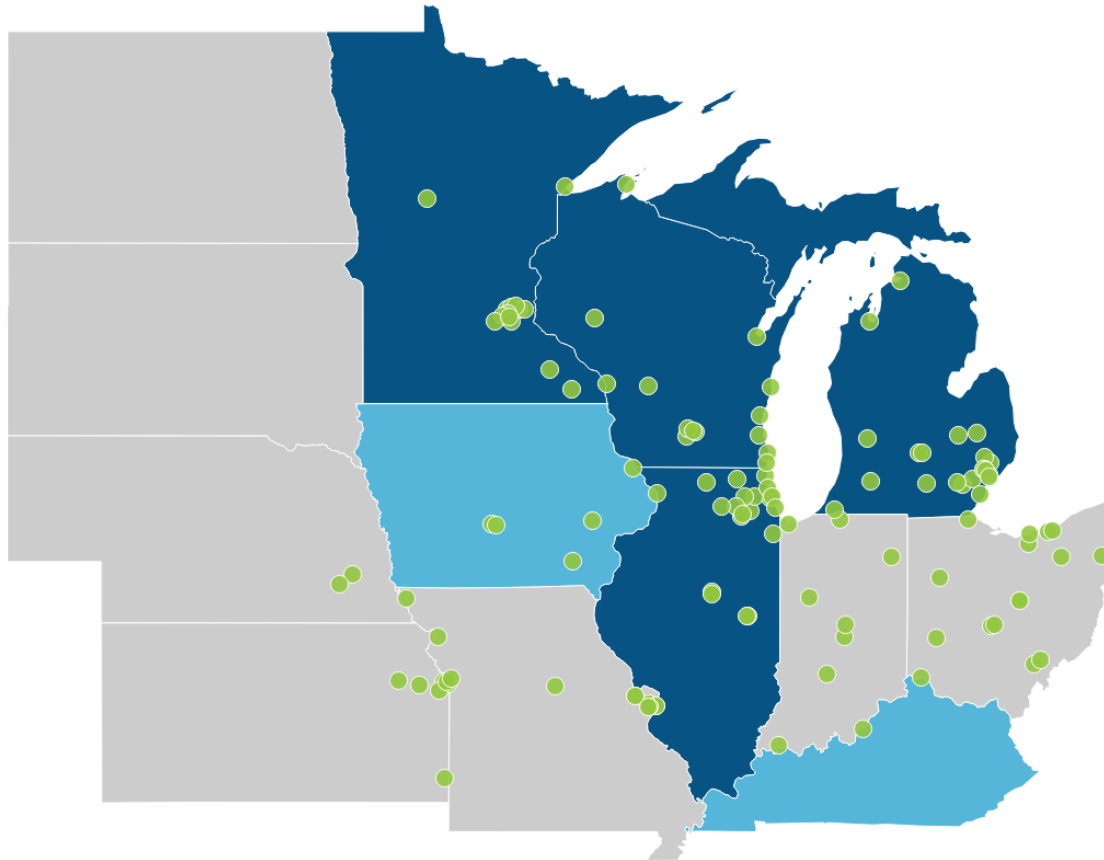
Energy Trends

Energy infrastructure and generation planning and investment

- Energy efficiency programs
- Integrated resource planning
 - Solar and wind account for 70% of new electricity generating capacity in 2021
- Distribution system planning
- State energy planning
- State, local, and utility decarbonization policies and resilience planning
- Electrification of buildings and vehicles

States with **Emission Reduction Goals**

Four Midwest states have statewide decarbonization goals that meet or exceed Paris Accord standards



**State Climate Action Plan &
Decarbonization Goal**
State Climate Action Plan
No state climate or
decarbonization goals
Local climate goals

Ambitious Decarbonization Goals

The Midwest is going to need **ambitious PLANS**

Corporate
Goals

Municipal
Goals

Utility
Goals

Biden

▼ 50-52% by 2030

Minnesota

▼ 30% by
2025

▼ 80% by
2050

Michigan

▼ 28% by
2025

Neutral by
2050

Illinois

▼ 100%
clean
power by
2050



- How can energy efficiency support clean energy?
- What some considerations for policy?

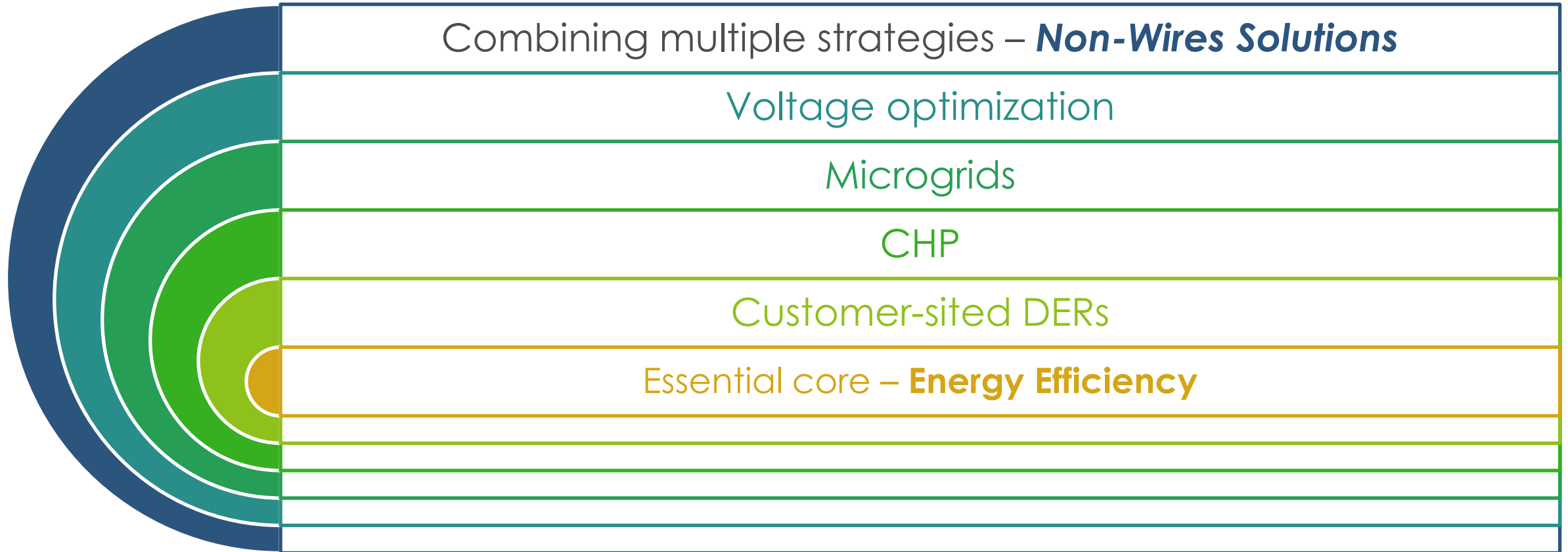
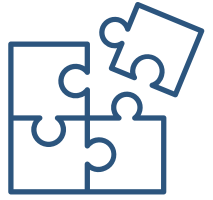
Benefits of Energy Efficiency

System-wide value in an increasingly renewable landscape

- Right-sizes the grid
 - Avoided costs of generation, transmission and distribution
- Flexible load strategy
 - Supports renewable energy meeting demand (matching)
- Better use of energy
 - Enables optimization of resources, including renewable energy

Avoiding T&D Upgrades

Non-wires solutions provide a flexible strategy



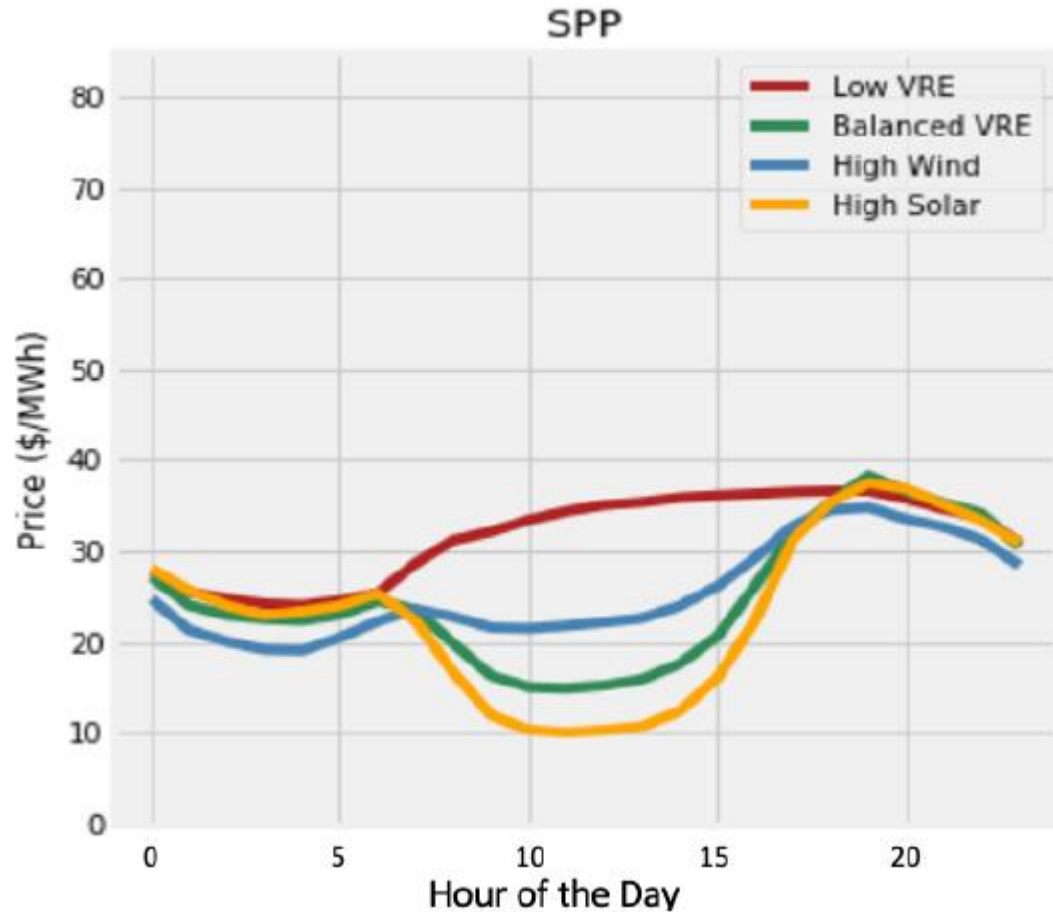
Energy Efficiency and Renewable Energy

Synergies and considerations

- International Renewable Energy Agency
 - Combining implementation of RE and EE could lead to a 21% reduction in growth of total primary energy supply by 2030 and 54% higher RE share in power sector (compared to BAU)
 - Reduced energy use intensity of economy (50-75% attributable to energy efficiency)

Renewable Energy Duck Curve

Variable RE's Impacts on Energy Prices for Weekdays in SPP



- Potential over-generation, need to ramp-up
- Greater renewable penetration = shifting load
- Need to study impacts of RE's impacts on value of EE measures
 - Space heating/cooling
 - Example: air conditioners at night
- Bi-directional charging for storage and electric vehicles

source: Lawrence Berkeley National Laboratory (2018)

Energy Efficiency and Demand Response

Building-level interactions

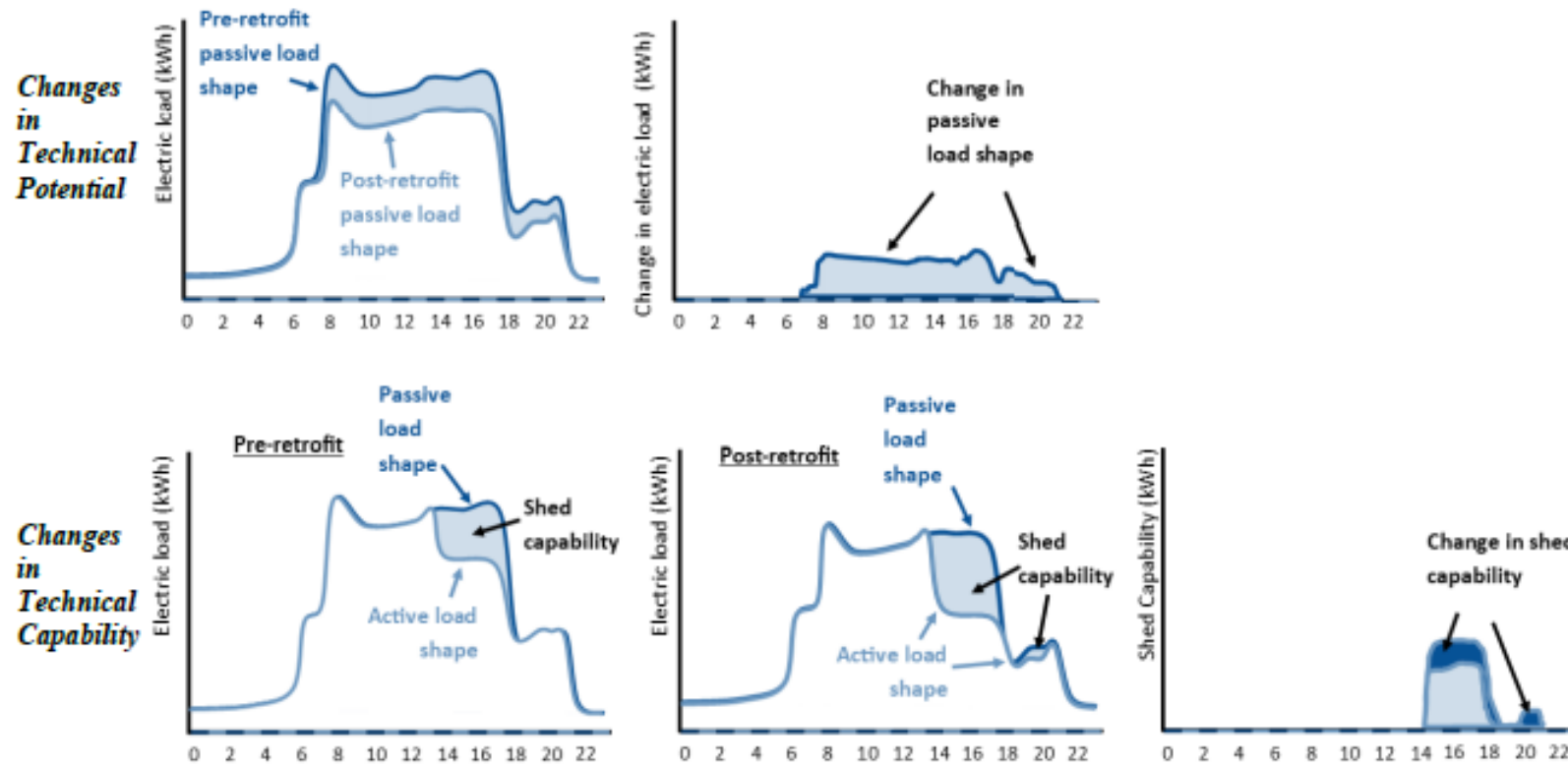


Figure 2: Illustrating Changes in Technical Potential & Capability Available for Demand Response

Source: Satchwell et. al. (2020)—Lawrence Berkeley National Laboratory, *A Conceptual Framework to Describe Energy Efficiency and Demand Response Interactions*

Energy Efficiency and Demand Response

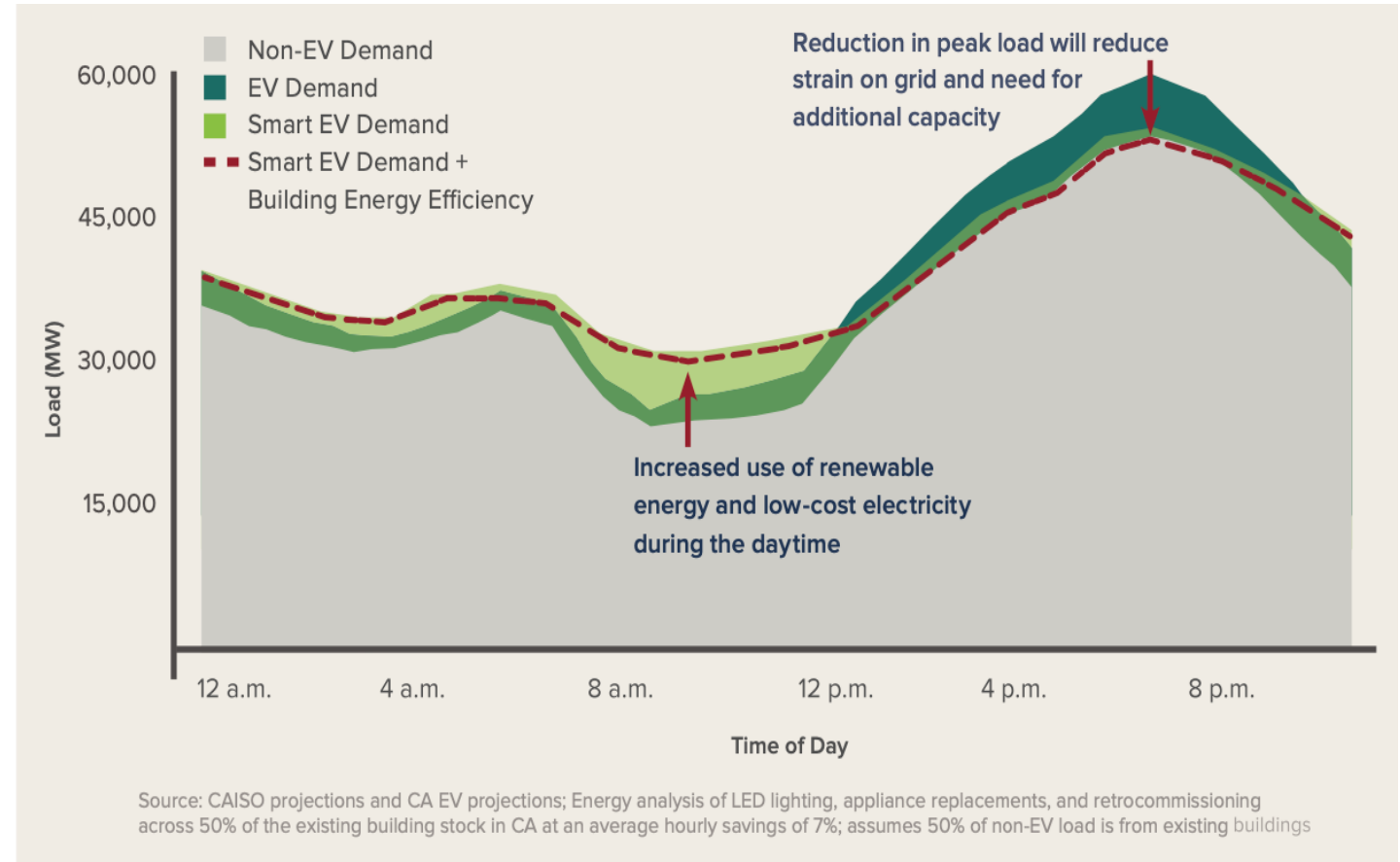
Synergies and considerations

- Efficient technologies unlock demand flexibility for system operators
- Paired together, EE + DR helps smooth out curves, reducing sharp curtailment and ramp-up due to renewable energy
- However, storage is key to having greatest impact

Energy Efficiency and Electric Vehicles

Synergies and considerations

- Roughly 25% increase in nation's annual electricity demand today (RMI)
 - Alters energy time of use
- EE creates demand flexibility
 - Minimizes risks
 - Grid + building modernization
 - Supports adoption



EE, DR and RE Policy Synergies

Study: Relationship between EE and RE / DR in states w/ utilities w/ generation assets

- States with mandatory RPS saw **96.8% greater energy savings** than states without RPS
 - EE maximizes return on RPS
 - EE reduces cost of compliance
- States with a mandatory energy resource standard saw **389% greater energy savings through demand response** than states without EERS
 - EERS demand creativity and innovation

Recommendations

Maximizing benefits of Renewable Energy through EE and DR

- Programs
 - Double down on energy efficiency
 - At-need communities, industries, buildings
 - Bundle DERs (e.g. solar + storage + EE as DSM)
- Policy & regulation
 - Consider broad alternative energy standards
 - Coordinate distribution planning and IRPs
 - Establish forward capacity markets and support third-party DER aggregation (FERC 2222)
 - Greater alignment between regulators and utilities

Thank you!

Questions?

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