Welcome

Conservation Applied Research & Development (CARD) Webinar

December 5, 2018

The Electrified Frontier: Sharing Results from Stakeholder Interviews

The Electrified Frontier: Sharing Results from Stakeholder Interviews

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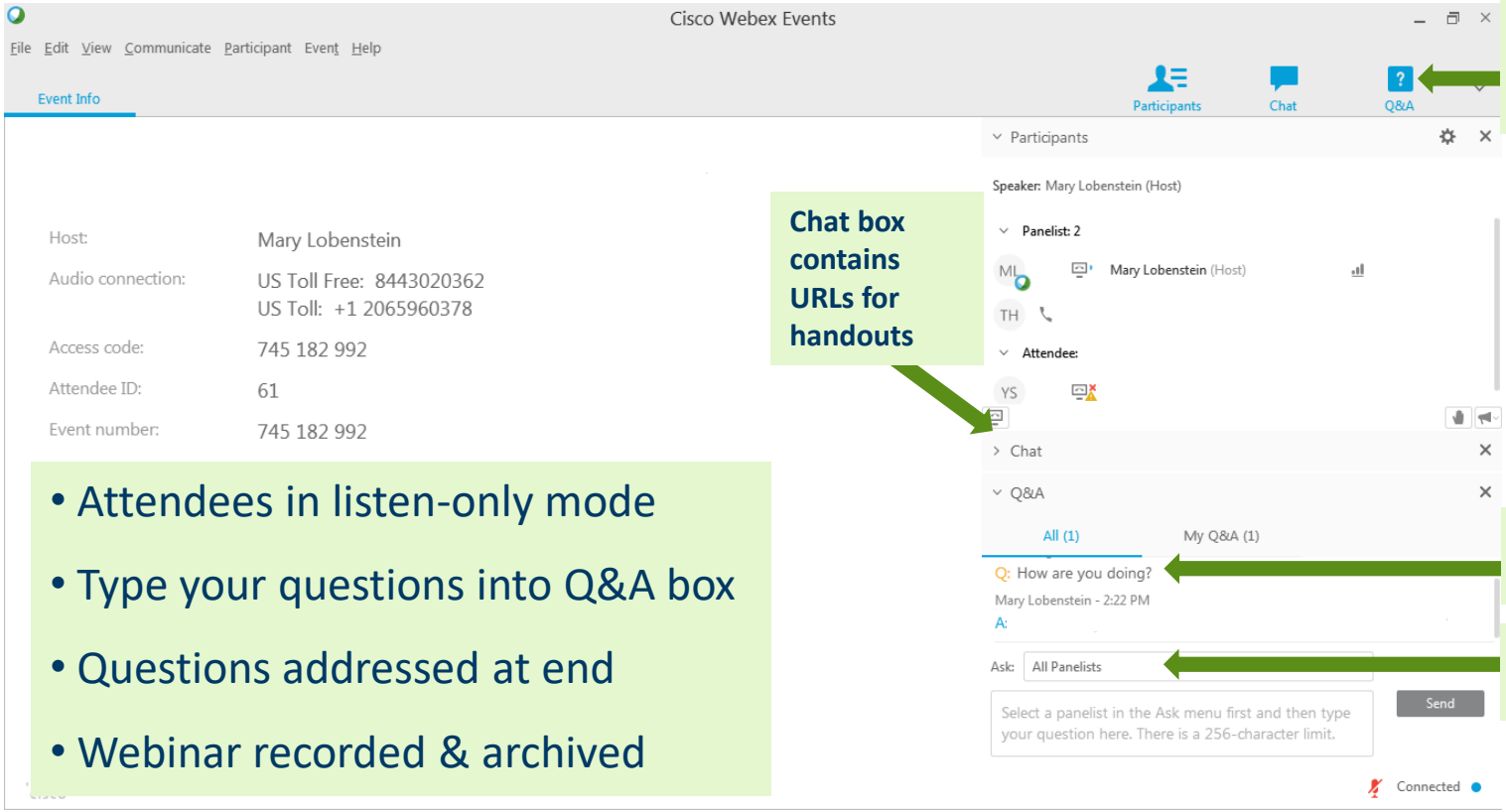
Webinar Basics



- Attendees in listen-only mode
- Type your questions into Q&A box
- Questions addressed at end
- Webinar recorded & archived

Chat box contains URLs for handouts

Click "?" Icon to get the Q&A box to popup below

Enter Questions in Q&A box

Send Question to All Panelists

Minnesota Applied Research & Development Fund

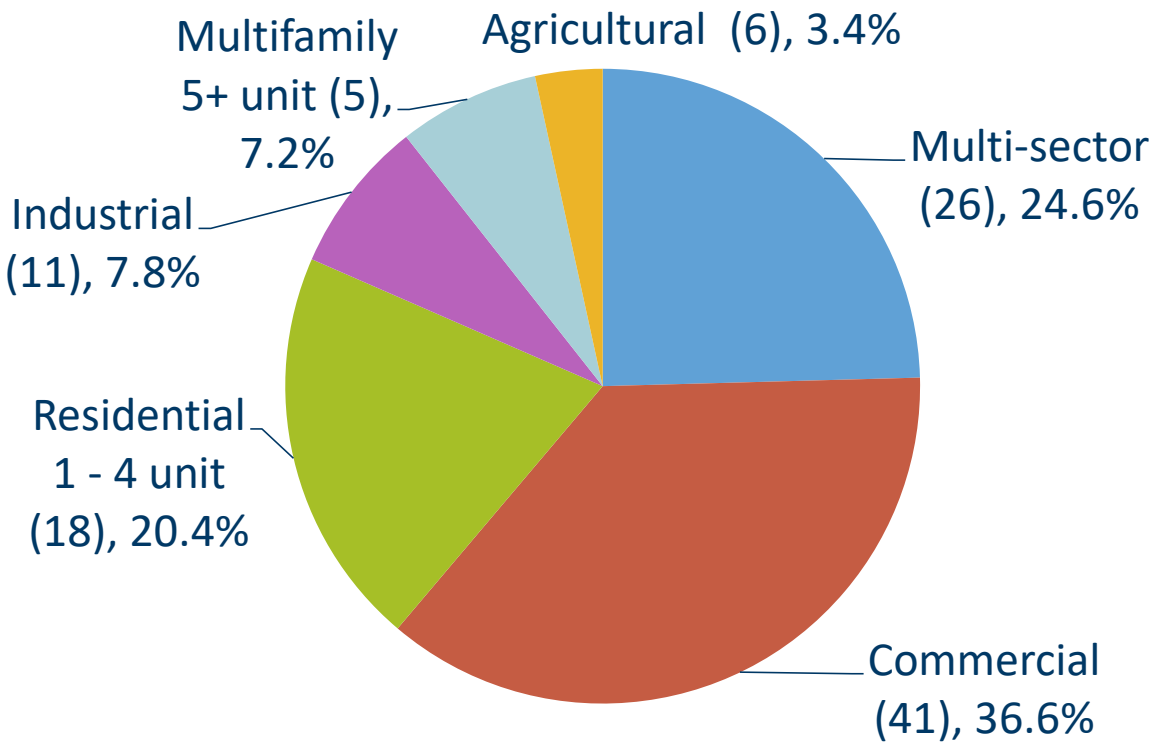
- **Purpose - to help Minnesota utilities achieve 1.5% energy savings goal by:**
  - ***Identifying new technologies or strategies to maximize energy savings;***
  - ***Improving effectiveness of energy conservation programs;***
  - ***Documenting CO_2 reductions from energy conservation programs.***

Minnesota Statutes §216B.241, Subd. 1e

- **Utility may reach its energy savings goal**
  - **Directly through its Conservation Improvement Program (CIP);**
  - **Indirectly through energy codes, appliance standards, behavior, and other market transformation programs.**

State Capitol Image: Courtesy Minnesota Department of Administration

CARD RFP Spending by Sector thru June 2018 (FY2018)



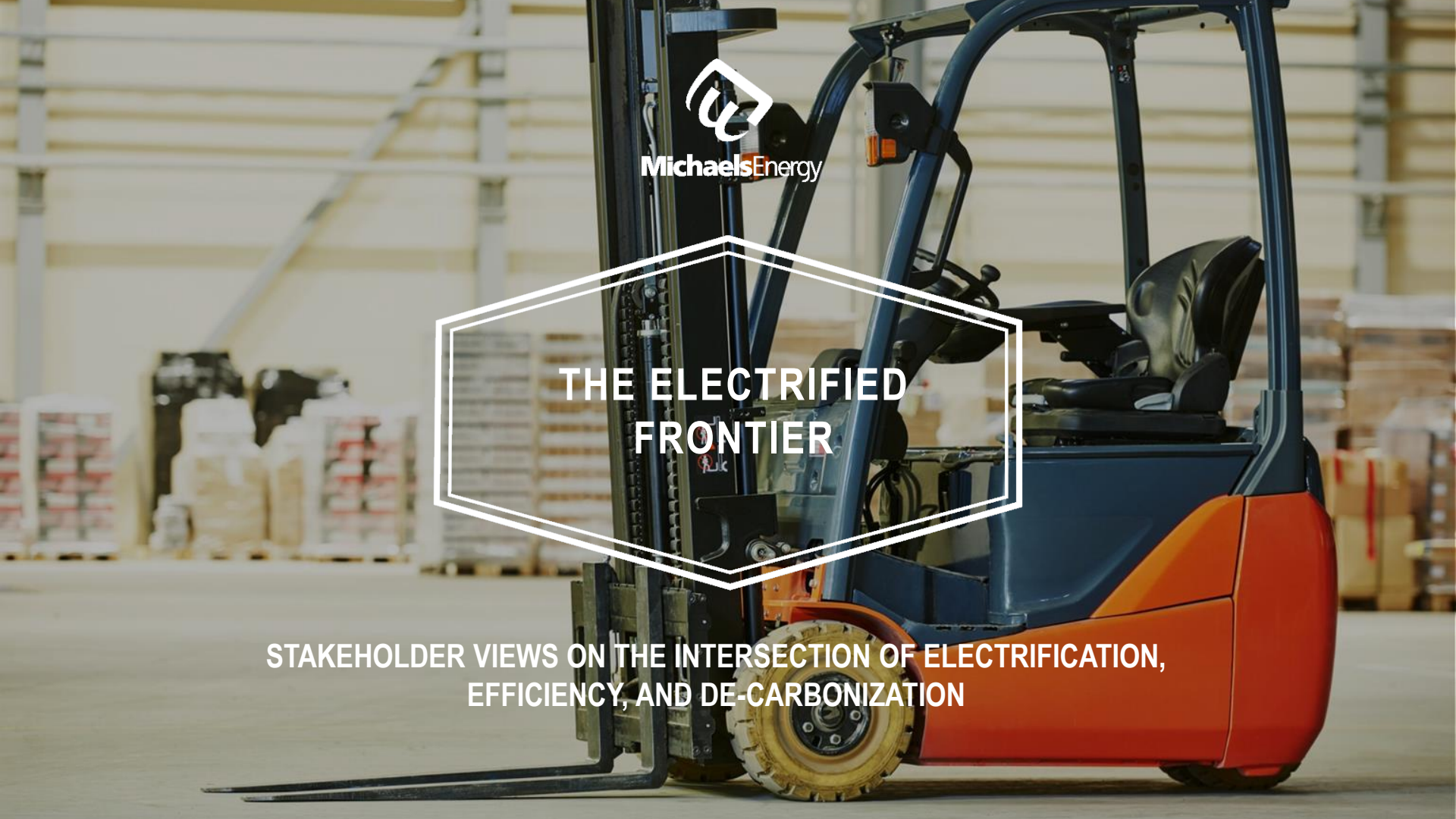
- 9 funding cycles
- Over 420 proposals
- 107 projects funded
- Almost $24.5 million in research

Current CIP Fuel Switching Policy

- Department order issued in 2005 prohibits inclusion of targeted fuel-switching projects in CIP.
- Department guidance issued in 2012 provided exception:
  - Electric utilities may provide direct space heating and domestic hot water energy savings measures to low-income delivered fuel customers and low-income small gas utility customers offered in conjunction with the Weatherization Assistance Program.

Department of Commerce Initiatives

1. Electrification White Paper
2. Fuel Switching Stakeholder Process
3. US DOE Funded Electrification Action Plan


MichaelsEnergy
THE ELECTRIFIED FRONTIER
STAKEHOLDER VIEWS ON THE INTERSECTION OF ELECTRIFICATION, EFFICIENCY, AND DE-CARBONIZATION

Michaels Energy

Who We Are

- ✓ Headquarters in La Crosse, Wisconsin
- ✓ Engineering and energy efficiency consulting
- ✓ Program implementation and program evaluation

Overview of White Paper

- ✓ Explore the topics of electrification and fuel switching – in the context of Minnesota and CIP

- ✓ MN Policy Context
- ✓ Literature Review
- ✓ Technology Review
- ✓ Policy Review
- ✓ Stakeholder Interviews

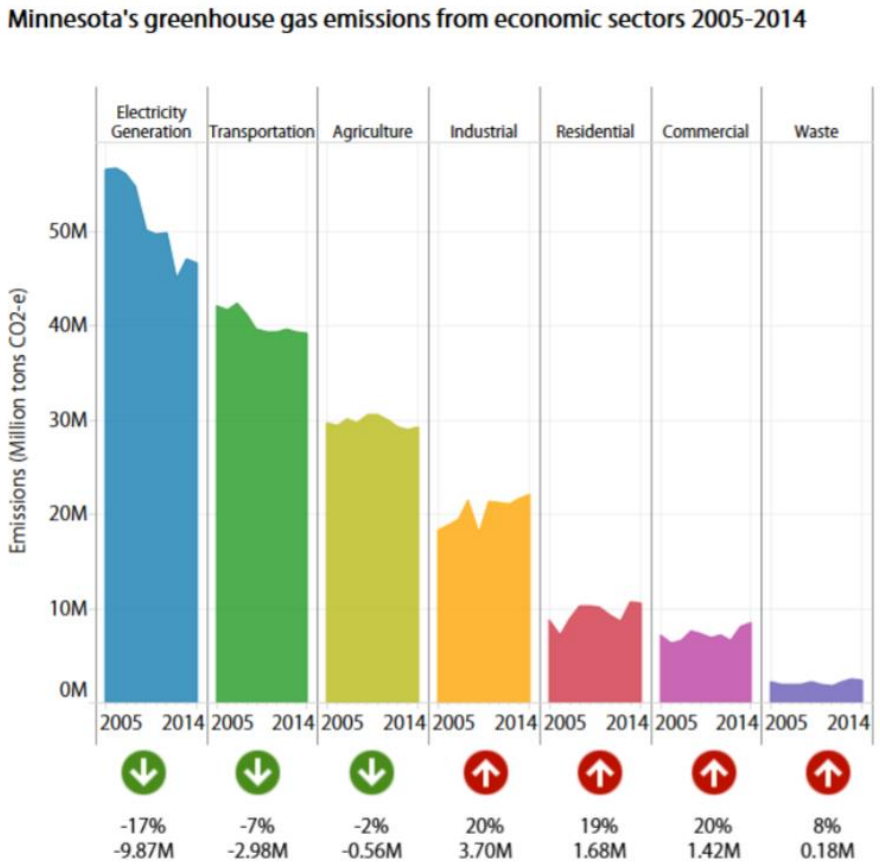
Project Goal

- ✓ Provide Minnesota-centric analysis
- ✓ Be a primer to inform CIP stakeholders
- ✓ Frame-up key questions

Background

Minnesota is behind on reaching its

State GHG Reduction Goal



Core premise

Electrification is Beneficial When…

Saves consumers money over the long run

Reduces environmental impacts

Enables better grid management

*Must achieve at least one of the three, without negatively impacting the other two.

Source: Regulatory Assistance Project

A new era of electrification has benefited from

Three Enabling Trends

Efficient Technology

Renewable Energy

Advanced Control

Source: Regulatory Assistance Project

MN Policy Context

- 2005 Fuel Switching Prohibition
- 2012 Low Income Exception
- 2017 Otter Tail Power Program Modification

A Hot Topic in 2018

Groups releasing papers or holding conferences about electrification this year:

- Regulatory Assistance Project
- American Gas Association
- Midwest Energy Efficiency Alliance
- Southwest Energy Efficiency Partnership
- National Renewable Energy Laboratory
- Rocky Mountain Institute
- Center for Energy and Environment
- Electric Power Research Institute
- And more…..

EPRI Efficient Electrification

Modeling of Economy Wide Trends

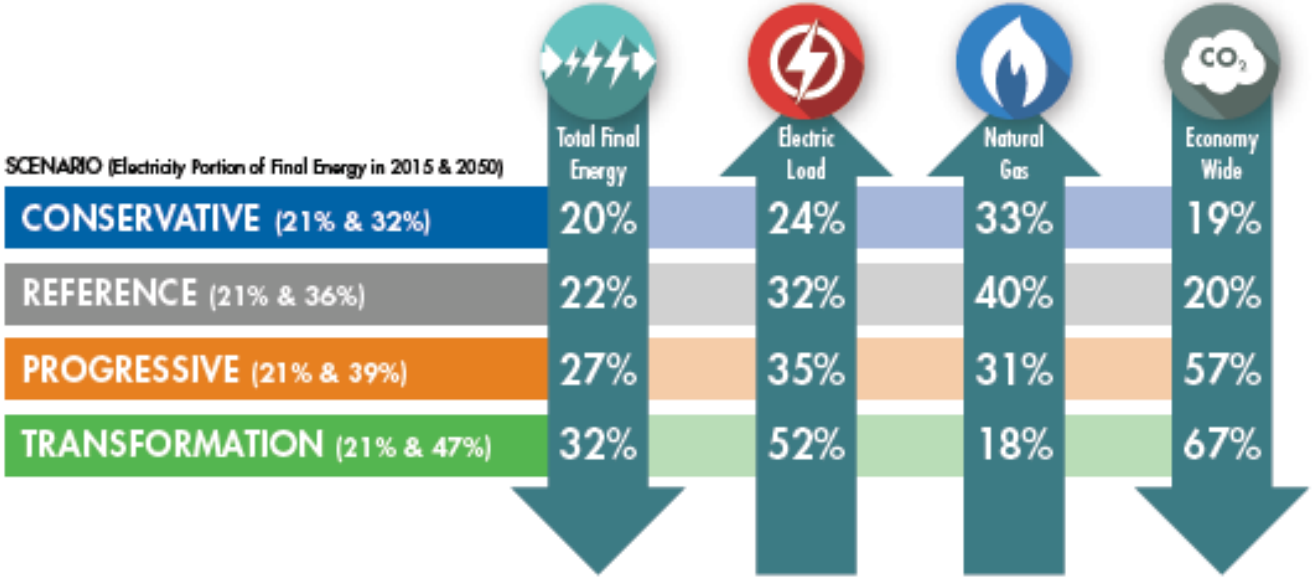


Figure ES-2. High-level Overview of Modeling Results

Source: EPRI Efficient Electrification Report 2018

Other State Policy Efforts

How other states are addressing

Fuel Switching Policy

- ✓ Illinois
  - > Definition in state statute
  - > TRM measures for Heat Pumps, CHP
- ✓ Maine
  - > High fuel oil use
  - > RGGI funds support carbon reductions
- ✓ California
  - > Allowed under three-prong test
  - > Test criticized as too onerous

How other states are addressing

Electrification Policy

- ✓ Vermont
  - > Energy Transformation included in RES
- ✓ Massachusetts
  - > New language in statute as of summer 2018
- ✓ New York
  - > REV emphasis on renewable heat
- ✓ British Columbia
  - > Allow state-owned utility to pursue electrification

Action Without Specific Policy Direction

- ✓ Sacramento Municipal Utility District
  - > Large rebates of home electrification
- ✓ Tennessee Valley Authority
  - > Offering only electrification programs


Technologies

Components

Primer includes:

- ✓ Description
- ✓ Metrics
- ✓ Other notes
- ✓ Gap analysis

Analysis includes:

- ✓ Site efficiency
- ✓ Source energy consumption
- ✓ Annual emissions
- ✓ First cost and operating cost
- ✓ Impact on coincident peak

In the weeds…

Source Energy

- ✓ Used DOE EERE “captured energy” approach
- ✓ Gives renewables a heat rate of 3412 Btus to 1 kWh

Emissions

- ✓ Used average annual emissions for Minnesota
- ✓ Marginal emissions would improve the analysis
- ✓ Of keen interest to stakeholders

Home Heating with Heat Pumps

- ✓ Air and ground source
- ✓ Ductless and ducted
- ✓ Need to consider back-up heating source
- ✓ See MN CEE's Cold Climate Air Source Heat Pump field assessment

Heat Pumps:

Nuance Matters

Heating System Type	Heating Efficiency	Annual Heating Energy Cost	Annual Source Energy	Annual Utility Emissions	Installed Cost	Impact on Winter Coincident Peak Demand
Electric-resistance heating	1.0 (COP) 3.1 (HSPF)	$2,000	196 MMBtu	27,800 lbs CO2	$3,600 - $4,400	11 kW
Furnace (natural gas)	80% (AFUE)	$700	91 MMBtu	10,200 lbs CO2	$4,400 - $5,400	None
Condensing furnace (natural gas)	95% (AFUE)	$600	77 MMBtu	8,600 lbs CO2	$4,900 - $6,000	None
Furnace (propane)	80% (AFUE)	$1,600	88 MMBtu	12,100 lbs CO2	$4,400 - $5,400	None
Condensing furnace (propane)	95% (AFUE)	$1,400	74 MMBtu	10,200 lbs CO2	$4,900 - $6,000	None
Air-source heat pump (electric-resistance backup heat)	2.3 (COP) 7.7 (HSPF)	$1,100	109 MMBtu	15,400 lbs CO2	$3,700 - $4,600	5 - 11 kW
Air-source heat pump (natural gas backup heat, 80% AFUE)	2.3 (COP) 7.7 (HSPF)	$900	88 MMBtu	11,900 lbs CO2	$3,700 - $4,600	5 kW
Ground-source heat pump	3.7 (COP)	$400	43 MMBtu	6,100 lbs CO2	$9,800 - $12,000	2 kW

Heat Pump Water Heaters

- ✓ Very efficient water heater in terms of site energy consumption
- ✓ Well established technology
- ✓ Natural gas condensing water heater is a strong competitor
- ✓ Controls could mitigate peak

https://www.greenbuildingadvisor.com/article/heat-pump-water-heaters-come-of-age

Electric Lift Trucks

- ✓ Long history of electrification
- ✓ Reduction of operating cost, emissions (including indoor emissions)
- ✓ 20-30% higher first cost

Electric Trailer Refrigeration Units

- ✓ Replace diesel fuel
- ✓ Requires access to “shore power”
- ✓ Clear savings in operating cost and emissions.
- ✓ Equivalent first cost.

https://www.trucknews.com/products/carrier-transicolds-new-electric-refrigeration-unit/

Industrial Electrification

- ✓ Large variety of industrial applications
  - > Especially process heat
- ✓ No one-size-fits-all solutions
- ✓ ROI depends on non-energy benefits

http://hartleycorp.com/?portfolio=powder-coating-ovens

Electric Vehicles

- ✓ Rapid sales growth
- ✓ Declining costs
  - > Including battery costs
- ✓ Reduction of carbon emissions on today's grid
- ✓ Customer and infrastructure barriers

https://www.caranddriver.com/reviews/2018-tesla-model-3-performance-track-mode


Stakeholder Interviews

28

Interview Participants

Participant Organizations

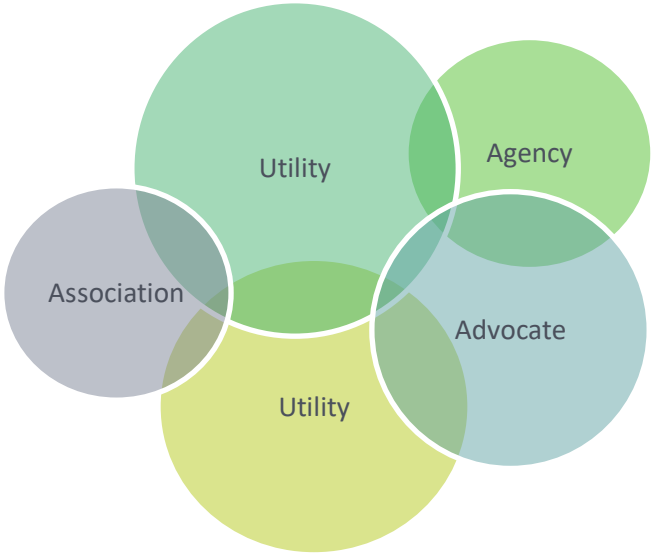
ACEEE
Center for Energy and Environment
CenterPoint Energy
Connexus Energy
EPRI (Electric Power Research Institute)
Fresh Energy
Fuels Institute
Geothermal Exchange
Great Plains Institute
Great River Energy
GTI (Gas Technology Institute)
McKnight Foundation
Minnesota Chamber of Commerce
Minnesota Citizen's Utility Board
Minnesota Environmental Quality Board
Minnesota Municipal Utilities Association
Minnesota Public Utilities Commission
Missouri River Energy Services
National Rural Electric Cooperative Association
Otter Tail Power Company
Regulatory Assistance Project
Rochester Public Utilities
Southern Minnesota Municipal Power Agency
Xcel Energy

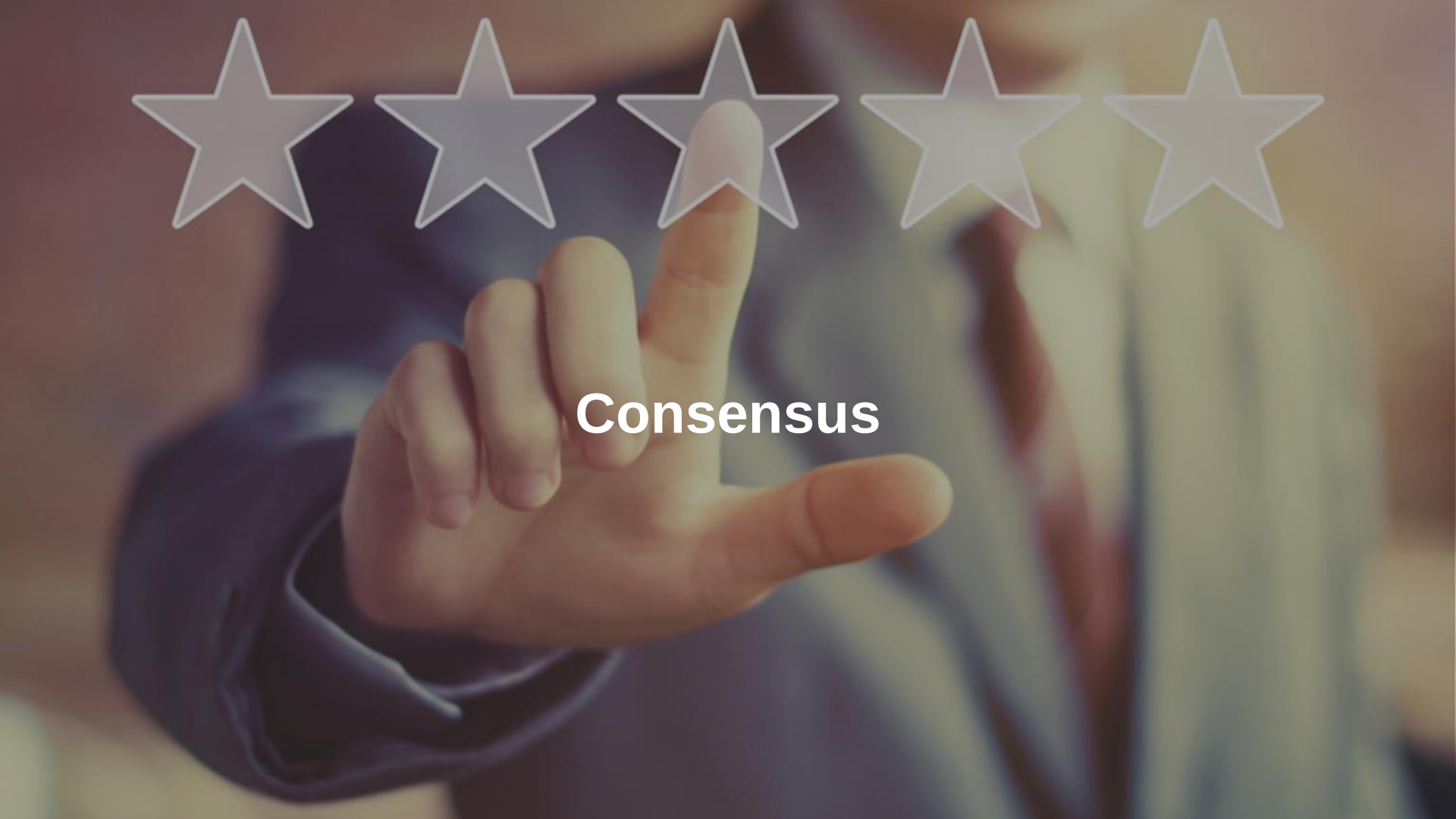
Interview Goals:

1. Information Gathering
2. Input on Process and Policy

Stakeholder groups demonstrated

Cross-Cutting Cleavages




Consensus

Benefits: Carbon Reduction

- ✓ **Broad agreement: Electrification *could* reduce carbon emissions**
  - > Especially for transportation
  - > But not in all cases, at least not at this point in time

Stakeholder quote:

One of my big worries through a lot of this process is that people are taking a paint roller to what really needs to be a pretty fine brushed sort of picture.”

An Important Topic

A Route to an Equitable Process

- ✓ Transparency
- ✓ Clearly defined goals
- ✓ Understand costs and who pays
- ✓ Determine metrics

Status Quo Needs to Change

Stakeholder Quote:

"The reason those [fuel switching] provisions were put in place still exists. Electrification can certainly be done for the benefit of the utility only, increasing sales."

Treat All Fuels in a Unified Manner

- ✓ Existing policy only applied to propane, fuel oil, and CIP-exempt natural gas
- ✓ Consensus recommended no technical distinction
- ✓ Some pragmatic justifications

Stakeholder Quote:

“I think that we should be evaluating fuel switching on a list of criteria, not simply by fuel.”

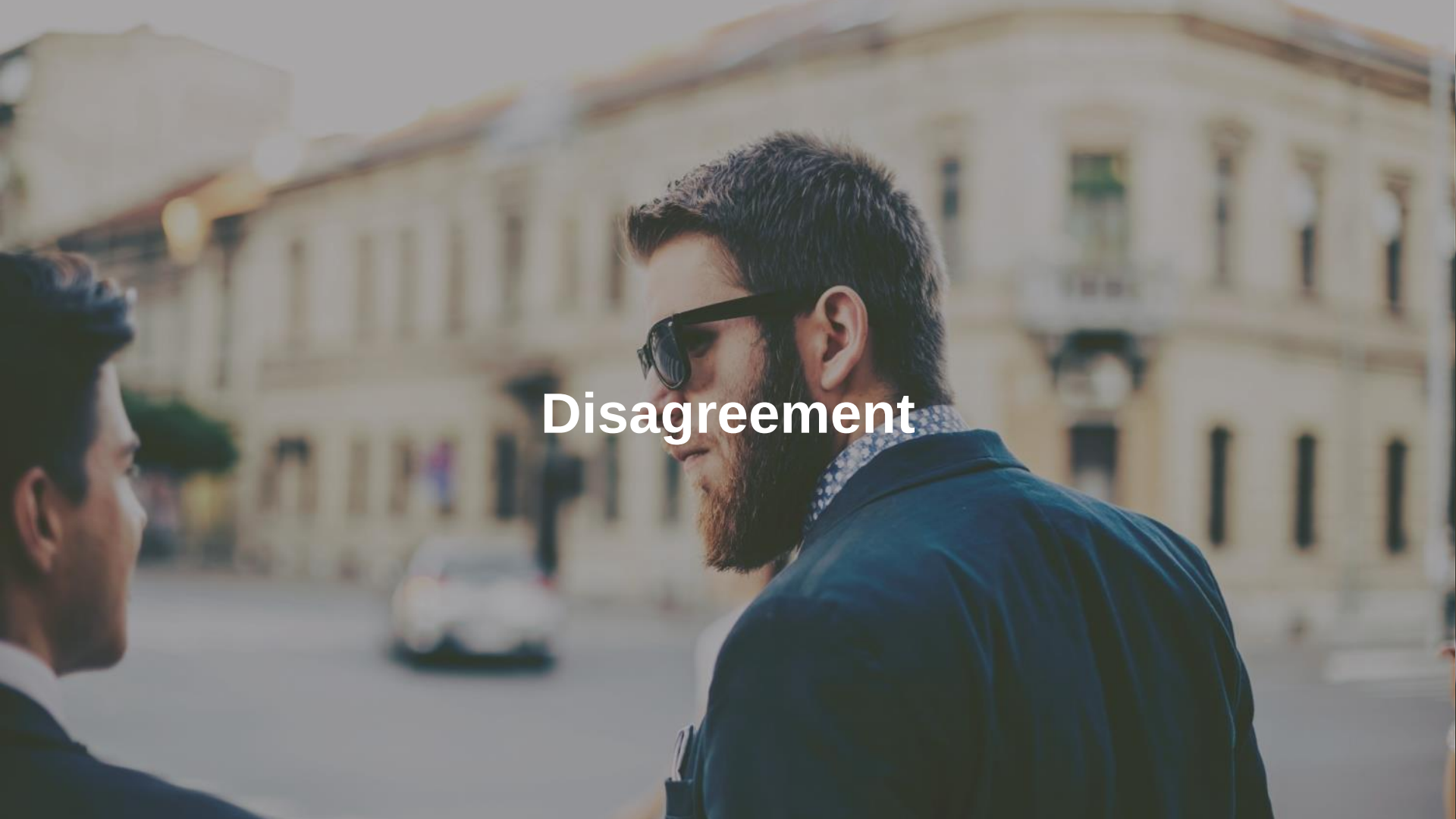
Electric Vehicle Enthusiasm

Advantages:

- ✓ Clear market demand
- ✓ Every stakeholder was tracking EV opportunities
- ✓ Plenty of room for utility-customer engagement

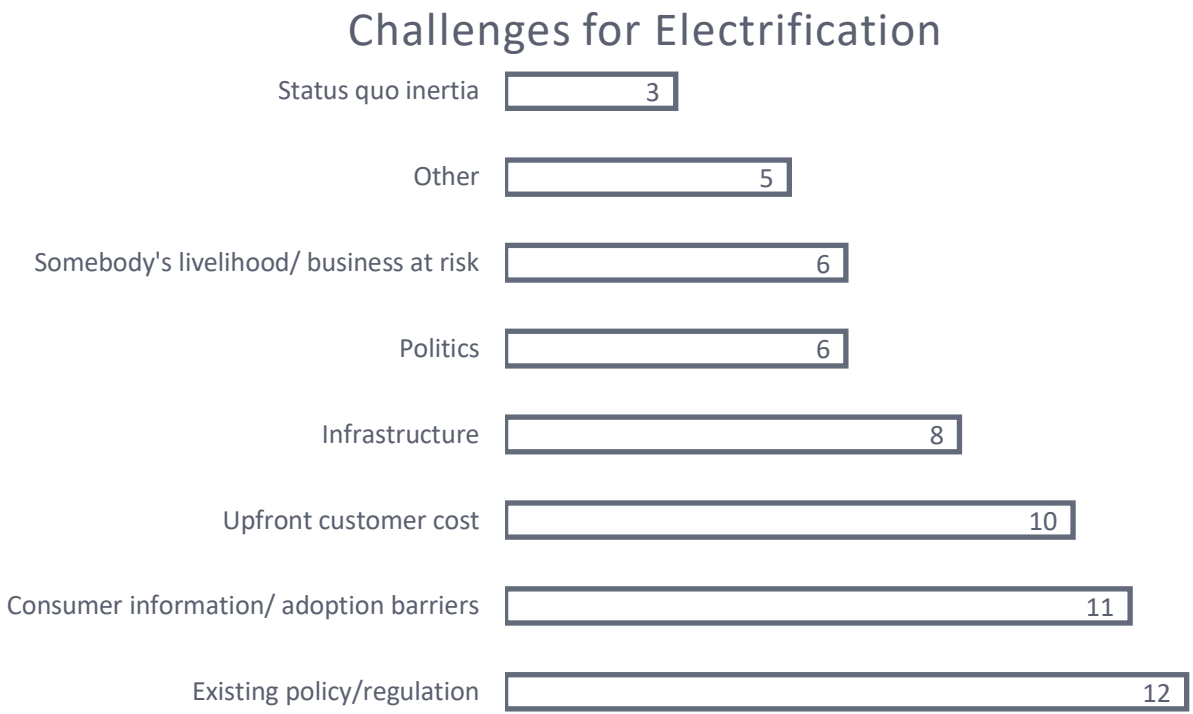
Opportunities:

- ✓ Not a clear fit within CIP
- ✓ Need for regulatory guidance


Disagreement

Diversity of

Challenges



Desired Outcomes for Regulation

- ✓ Policy Outcomes
  - > Modest adjustments
  - > Drastic changes
  - > Maintain commitment to efficiency
- ✓ Consumer and Market Outcomes
  - > Protect consumers
  - > Be cost-effective
  - > Enable market expansion

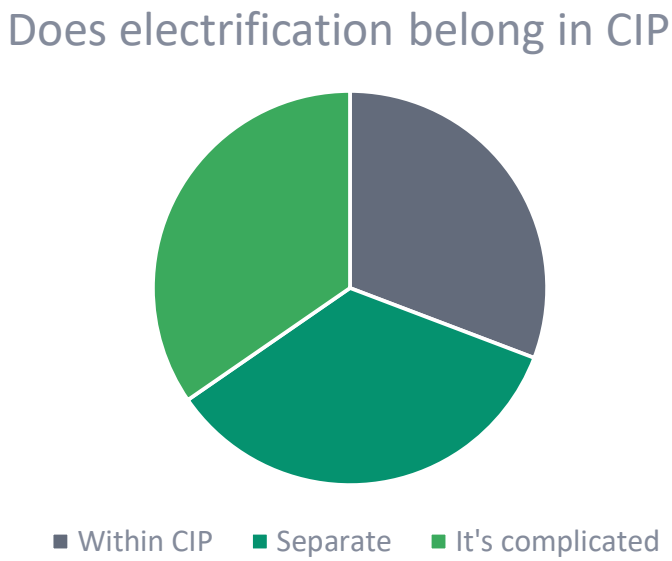
Stakeholder Quote:

“I hope we get to, not to a point where [electrification] is required, but allowed.”

Cost-Effectiveness

- ✓ Address cost-benefit testing methodology
- ✓ Program and project level
- ✓ Cost effectiveness matters to stakeholders
  - > Businesses
  - > Consumers

Within CIP or Outside of CIP



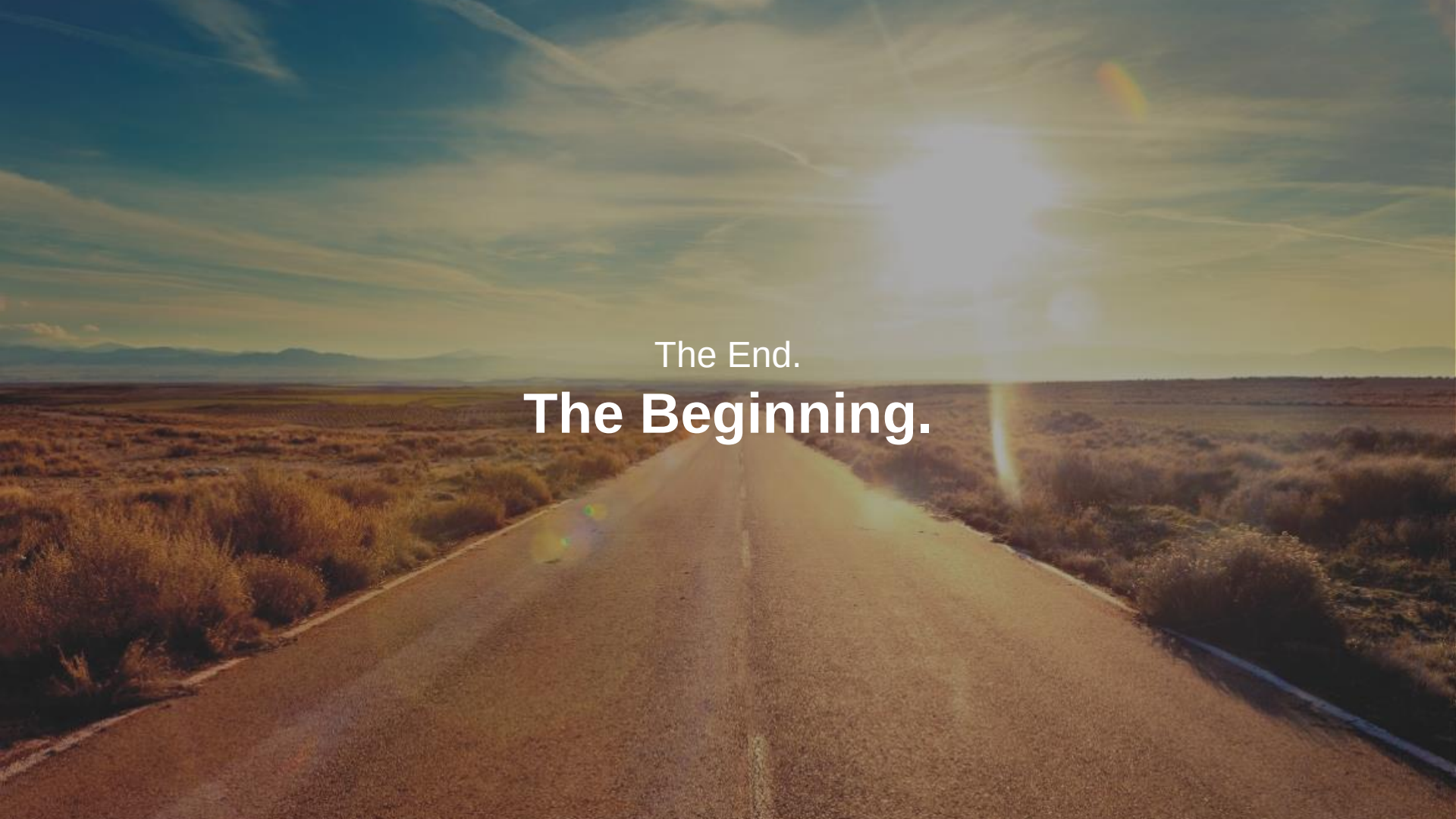
Stakeholder Quote:

“If electrification is simply lumped into CIP, I think there's a real risk of a zero-sum game adversely affecting energy efficiency.”

Ideas for discussion and further engagement

Stakeholder Engagement Needed

- **Relationship with CIP**
  - Policy direction
  - Effect on goals
  - Utility compensation
- **Goal of CIP**
  - EE as a resource, time and place specific value
- **Costs and Benefits**
  - Methodology
  - Carbon emissions, marginal emissions
- **Equitability**
  - Value to non-participants, regulators responsibility to customers
  - Accessibility, price concerns for business and consumers


The End.
The Beginning.

Questions?

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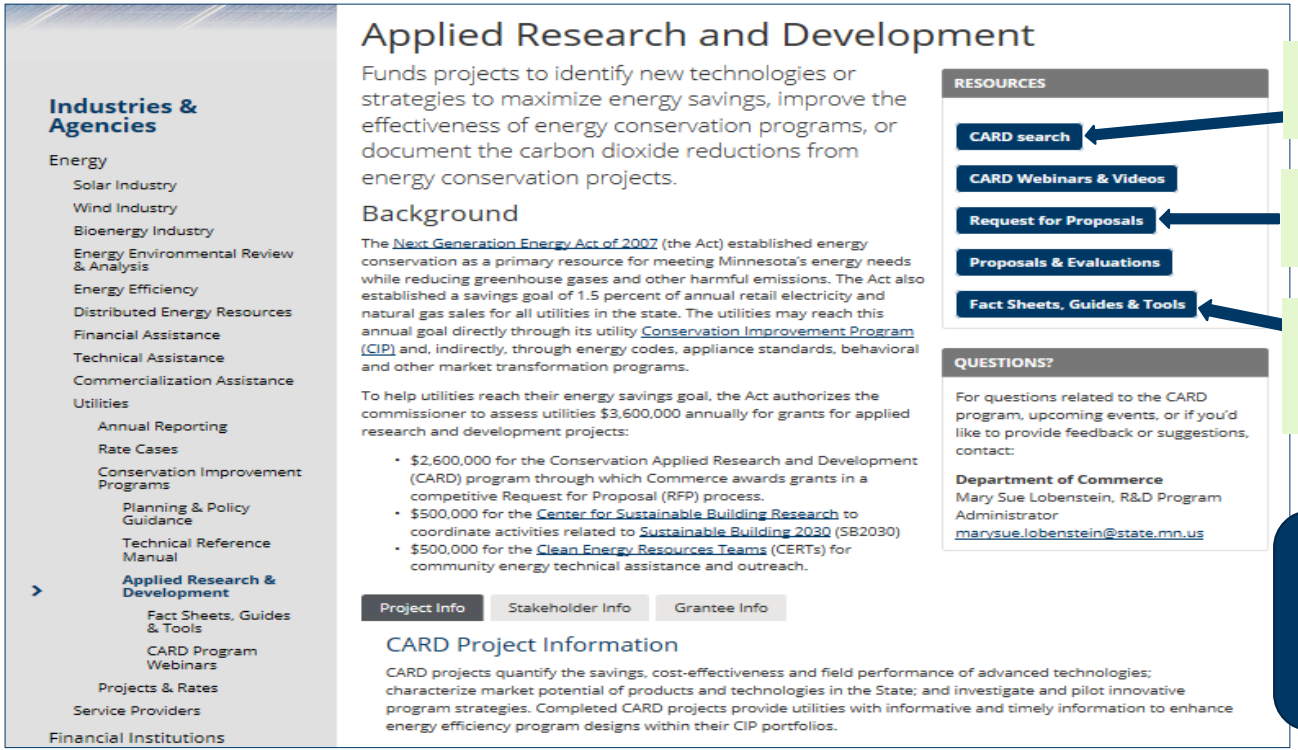
CARD Project Resources



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For **Other** research documents use **CARD Fact Sheets, Guidelines & Tools** Quick Link

Webinar Recording & Final Report available in few weeks

R&D Web Page (https://mn.gov/commerce/industries/energy/utilities/cip/applied-research-development/)

Thanks for Participating!

Upcoming CARD Webinar:

- **Dec 12:** Examining Potential for Prepay as an Energy Efficiency Program

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Commerce Division of Energy Resources e-mail list sign-up

If you have questions or feedback on the CARD program contact:

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