



Minnesota TRM 5.1 Update

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Lauren will be the primary point of contact for the below items. Can also copy Jenna on TRM inquiries, we will work together to address most items.

- TRM Suggestions/Questions
- CARD research inquiries/results
- Modifications to the TRMAC distribution list

- Housekeeping
- TRM Schedule and Process
- MN Conservation Applied Research and Development (CARD) Projects
- TRM v5.1 Updates – Priority List
 - Circle Back Items
 - Edits Made to Date
 - Open Discussion Items
 - Pending Updates

Housekeeping – TRMAC Members

Name	Organization	Name	Organization	Name	Organization
Kim Lillyblad	Avant Energy	Adam Groenhuyzen	Frontier Energy	Wyatt Miller	Minnesota Power
Elyse Malherek	Big Ladder Software	Amy Martin		Kevin Hatcher	Minnkota Power Cooperative
Noah Cordoba	Building Decarbonization Coalition	Derek Neumann		Darlene Weber-Scott	Missouri River Energy Services
Andy Baeten	Center for Energy and Environment	Doug Eli		Jason Haupt	
Ben Schoenbauer		Nick Campbell		Jesse Robertson	
Carl Nelson		Matt Haley		Lisa Fischer	Otter Tail Power Company
Isaac Smith		Steve Coleman		Betty Balegana	
Kristen Funk		Tanuj Gulati		Cristina Zuniga	
Mariko Yatsuhashi		Travis Hinck	GDS Associates, Inc.	Jason Burns	
Rabi Vandergon		Kathy Baerlocher	Great Plains Natural Gas Company	Jason Grenier	
Ranal Tudawe		Larry Oswald		Jon Fabre	Pacific Northwest National Laboratory
Ritika Kumbharkar		Zach Klabo		Luke Meech	
Will Nissen		Amelinda Hendrickx		Allegra Steenson	
Eric Johansen	CenterPoint Energy	Jamie Stallman	Great River Energy	Annie Hu	
Ethan Warner		Jeff Haase		Junke Wang	Power TakeOff
Joel Lynch		Kelsey Kopp		David Siddiqui	
Marty Kapsch		Rodney De Fouw		Erin Kempster	
Tyler Glewwe		Victoria Browning	ICF	Lucas Born	
Cory Hetchler	Connexus Energy	Glen Eigo	ICF - ECO Potential Study	Peter Widmer	Resource Innovations
Zach Nyst		Nick Heid	Independant Contributor	Cory Luker	Rochester Public Utilities
Joel Zook	Dairyland Power Cooperative	Chris Trembley	Madelia Municipal Light & Power	Josh Mason	
David Reinke	Dakota Electric Association	Grey Staples	Mendota Group	Laurie Cook	Rocky Mountain Institute
Patrick Mathwig		Joel Pertzsch	Michaels Energy	Olivia Prieto	Slipstream
Deb Dynako	Energy Infrastructure Partners	Morgan Nordby	MN Chamber of Commerce - Energy Smart	Andy Lick	Southern Minnesota Municipal Power Agency
Gary Swanson	Energy Management Solutions	Jen Kimmen	Minnesota Energy Resources	Ben Ipsen	
Dean Laube	Franklin Energy Services	Huei Wong	Minnesota Energy Resources - ICF	Joe Hoffman	
Luke Gehrke		Julian Graybill Brubaker		Katy Janda	
Nick Dombrosky		Katie O'Rourke		Chris Baker	University of Oxford; UMN
Caitlin Eichten	Fresh Energy	Katy Koon		Andrew Macho	Xcel Energy
Nick Haeg		Zach Froio	mn.gov/commerce	Danny Price	
Sam Friesen		Cassie Theisen		Karl Shlanta	
		Chad Trebilcock			

TRM Schedule

Date	Event	Description
6/23/2026	Meeting 1	Kick-Off Meeting
7/20/2026	Meeting 2	Measure Workpapers Discussion Cont.
7/24/2026	Feedback Due	TRMAC v5.1 Feedback on Priority List Due
8/12/2026	Optional Presentation	Discussion on RECS and CBECS with John Staub
8/17/2026	Meeting 3	Measure Workpapers Discussion Continued
8/20/2026	New Construction Working Group - Main Topic: Develop a prescriptive process to address modeled building EFS projects	
9/21/2026	Meeting 4	Measure Workpapers Discussion Conclusion
Sep-26	Likely Working Group on M&V Protocols	
10/9/2026	Redlined TRM v5.1 Issued	Redlined TRM v5.1 Issued for TRMAC Review
10/19/2026	Review Period Concludes	TRMAC Non-Regulatory Comments Due on TRM v5.1
10/23/2026	Letter + TRM v5.1 posted on eDockets	TRM v5.1 Regulatory Process*
11/2/2026	Written Comments	
11/17/2026	Reply Comments	
12/17/2026	Decision	

*The above Regulatory Process timing represents the Department's intended timing and is subject to change

MN TRM SharePoint (Internal)

- Direct Link: [MN TRMAC Collaboration Site – Documents](#)
- Find information on:
 - Measure Priority List
 - Measure Workpapers – Drafts for review
 - Measure Workbooks
 - Drafts for review
 - Library of finals
 - Measure Resources
 - Recordings and slide decks from related presentations
- You should all have access to this site. Please let Lauren know if you don't have access.

MN TRM Webpage (External)

- Direct Link: [Technical Reference Manual / Minnesota Department of Commerce – Energy](#)
- Find information on:
 - Previous TRM Releases
 - Recordings and slide decks from past meetings and TRMAC meetings related to TRM v5.1

TRMAC Collaboration SharePoint Site



MN TRMAC Collaboration Site

Home

Notebook

Documents

Site contents

Recycle bin

[Return to classic SharePoint](#)

Documents > MN TRM v5.1

All Documents

Name

- Draft Measure Workbooks
- Draft Measure Workpapers
- Draft TRM 5.1
- Final Excel Workbooks by Measure
- Resources and Meetings
- z. archive

TRM v5.1 Priority List - MN TRMAC.xlsx

- Priority List – updated periodically
- Full measure updates will have workpapers – in Draft folder for TRMAC review
- Minor updates to measures in tracked changes within full Draft TRM – updated periodically, live version lives elsewhere
- Excel workbooks for each full measure update – when completed
 - Draft folder for new/modified for TRMAC review
 - Final folder for running library of completed ones (from 5.0 and prior)
- Meeting recordings, other optional meetings and resources

CARD Research - Existing Projects

Recently Completed or Soon To Be Completed CARD Projects

Completed reports and webinars are within the [TRMAC SharePoint Site \(withing Folder z. CARD Research\)](#) and on the [CARD Website \(under "Research Since 2020"\)](#)

Grantee	Title	Status	Completion Date
MN CEE	Industrial Electrification Through Heat Pump Adoption for Process Loads	Webinar and Final Report posted	10/31/2025
Slipstream	Refrigeration Thermal Storage for Energy Efficiency	Final Report posted	12/31/2025
2050 Partners	Right-Sizing Water Distribution Pipes and Water Heating Systems to Save Energy and Reduce Building Costs	Webinar and Final Report posted	12/31/2025
Slipstream	Field Demonstration of ASHRAE Guideline 36-2018 High-Performance Sequences of Operation for HVAC Systems	Final Report posted	1/6/2026
U of MN - CSBR	The Market for Passive House Multifamily Projects in Minnesota	Final Report posted	1/19/2026
Slipstream	Advanced Connected Diagnostics for Commissioning Residential Heat Pumps and Central Air Conditioners	Final Report posted; Webinar to be posted soon	3/31/2026
Michaels Energy, Inc.	Ground Source Tech in Urban Buildings	Webinar and Final Report to be posted in 11/26	7/31/2026
Slipstream	Strategic Decarbonization for Larger Utility Customers	Webinar occurred: 8/26/26; F	8/31/2026
Cadmus Group	Consistent Load Shapes for Fuel-Switching Tests and Assessing Flexible Load Potential	Email to TRMAC to go out very soon.	10/30/2026
Frontier Energy, Inc.	District Geothermal Site Selection & Feasibility Study	Webinar scheduled: 10/28	11/30/2026
Slipstream	Mapping Electrical Barriers, Motivations, and Perceptions about Efficient Fuel Switching	Webinar scheduled: 11/10	1/31/2027
MN CEE	Continuous Exterior Insulation: A cold climate solution for deep savings and a pathway to cost-effective decarbonization	Active	10/31/2026
Michaels Energy, Inc.	Ventilation Control Using Occupancy Counters	Active	11/30/2026
MN CEE	CO2 Heat Pump Water Heaters for Multifamily Buildings	Active	12/31/2026
MN CEE	Establishing Protocols for a Commercial Energy Recovery Ventilation (ERV) Tune-Up Service	Active	12/31/2026
MN CEE	Packaged Terminal Air Conditioner Replacement Field Study	Active	12/31/2026
MN CEE	Floating Suction Pressure Control in Minnesota's Existing Grocery Stores	Active	12/31/2026
MN CEE	Heat Pumps with Thermal Storage: Efficient and Resilient Electric Space Heating	Active	12/31/2026
Slipstream	Indigenous Communities and Residential Electrification Pathway Demonstration	Active	4/15/2027
U of MN - CSBR	Unlocking the Potential for Safe Energy Retrofits Over Inaccessible Crawlspace	Active	1/30/2029

CARD Research – New Projects

Recently Announced CARD Projects

Grantee	Title	Status	Completion Date
MN CEE	Navigating the North: A Practical Guide to Successful Residential HPWH Implementation in Minnesota	Active	6/30/2027
Slipstream	Energy Savings from Dual Fuel Controls Optimization across Minnesota	Active	10/31/2027
Elevate Energy	Increasing the participation of naturally occurring affordable housing in energy efficiency programs through market characterization and mapping	Active	11/1/2027
MN CEE	Recommendations for Minnesota Residential Electrical Services to Enable Electrification	Active	11/30/2027
MEEA	Readying Minnesota for Distributional Equity Analysis	Active	12/31/2027
West Monroe	Market Assessment of Next-Generation Commercial and Industrial Refrigeration Controls for Energy Efficiency and Load Management	Active	2/28/2028
Cadmus Group	Reassessing Residential Efficiency Measure Life in Minnesota	Active	3/31/2028
Michaels Energy, Inc.	Thermal Energy Storage for Industrial Heating	Active	3/31/2028
MN CEE	Heating Load Estimates and Duct Performance Diagnostics for Successful ASHP Retrofit Installations	Active	4/30/2028
MN CEE	Paths to HVAC Electrification: Evaluating Retention of Existing Radiator Distribution Systems for Cost-Effectiveness	Active	4/30/2028
MN CEE	Beneficial Electrification for Better Barns: Where Can Heat Pumps Help on the Farm?	Active	4/30/2028
Frontier Energy, Inc.	Residential Deep Maintenance for Persistent Energy Savings and Comfort	Active	4/30/2028
Slipstream	Phasing Out Industrial Compressed Air Systems	Active	5/31/2028
West Monroe	Data Center Energy Efficiency Strategies: Codes, Programs, and Cost-Effective Measures for Minnesota	Active	6/30/2028
MN CEE	Modern Air Source Heat Pump Performance in the Coldest Conditions: Savings, Peak Demand, and Design Impacts	Active	12/31/2028
Slipstream	Heat Pump Water Heaters (HPWHs) for Retrofits with Space and Electrical Constraints	Active	4/30/2029
Slipstream	Partial Displacement of Commercial Boiler Space Heating with Air-to-Water Heat Pumps	Active	4/30/2029
MN CEE	Vertical Packaged Heat Pump Field Study in Multifamily and Hospitality Buildings	Active	4/30/2029
Resource Innovations Inc.	Field Validation of PWHs in Cold-Climate Multifamily Buildings	Active	5/30/2029
Slipstream	Improving Manufactured Home HVAC Performance and Sizing	Active	5/31/2029
MN CEE	Smart Control Valve Energy Savings for Chilled Water HVAC Systems	Active	5/31/2029

Want to learn more about any of these: Please reach out to Lauren and she will connect you to the appropriate folks.

TRM v5.1 Updates

TRM v5.1 Updates – Circle Back Items (Slide 1 of 3)

- **New Construction Working Group**

- First meeting occurred 8/20, loosely determined to continue meeting monthly or bimonthly going forward, this process will continue past the TRM v5.1 schedule and will likely progress forward on a separate regulatory schedule
- First meeting topic mainly centered around how EFS savings should be structured in modeled commercial new construction projects
 - Appropriate baseline determination, fuel, systems
 - Appropriate model comparison sequence, the division of savings between EFS and EDA
- Future topics: residential modeling- similar considerations, guiding principles for prescriptive NC measures in the TRM – scope, baselines

- **M&V Protocols Working Group**

- Meeting 1 yet to be scheduled, this process will continue past the TRM v5.1 schedule and will progress forward on a separate regulatory schedule
- Contact Lauren if you'd like to be included in the meetings

TRM v5.1 Updates – Circle Back Items (Slide 2 of 3)

- Electric Vehicle Measure, and On-road Public EV Chargers Measure:
 - Department Staff are proposing not to introduce an On-road Public EV Chargers Measure in the MN TRM v5.1.
 - We've received a lot of feedback.
 - We've received Trade Secret Data from Otter Tail Power and Xcel Energy.
 - This is a measure that we're hopeful to include in a later version of the TRM after more conversations occur and additional research is completed.

TRM v5.1 Updates – Circle Back Items (Slide 3 of 3)

- Electric Vehicle Measure

- Proposed changes to date (expected to be final):
 - Updated kWh/mile metric utilized in analysis based on MPUC dataset from 2025 (published 2026). Decreases electric penalty slightly in BEVs, greater decrease in PHEVs
- Net Result of above changes:
 - EFS savings BEVs increase by 7%, and PHEVs increase by 12%
- Changes not made in v5.1:
 - Considered rural/urban split given differences in VMT patterns, but elected to not add unnecessary complexity
 - Charging ratio will not be added to the measure until a public charger measure with EFS savings is also added
 - VMT not updated to MnDOT value – provided value still in draft form, not published yet and might change prior to final published report

TRM v5.1 Updates – Res Edits Made to Date

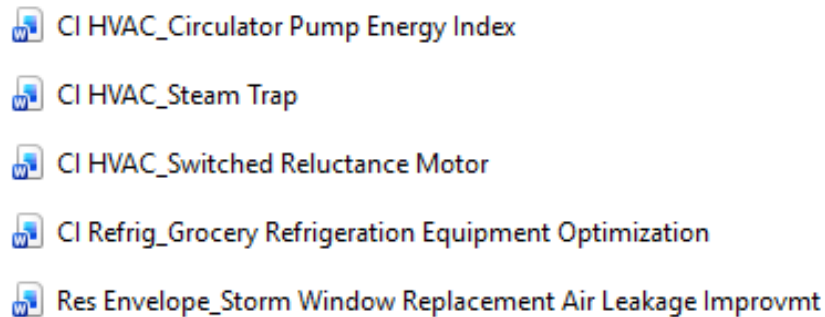
Measure	ID	Edit to Review	Wkbk	Edit Made
HVAC – ASHP	1.02.03	W/in Draft TRM	Existing from last meeting	Updates to incremental costs from MEEA study findings. Actuals still noted as allowed and preferred. Analysis included datasets of installed ASHP provided by several MN utilities, however did not find a good fit to produce a simplified algorithm or bucketed costs by size or HSPF2 from the provided data.
Envelope – Storm Window Replacement for Air Leakage Improvement	1.03.06	New measure - workpaper	New	Based on MN ETA recent research findings.
Transportation – EVs	1.10.02	W/in Draft TRM	Existing, modified	See prior slides for details. Final changes include update to kWh/mile metric on electric penalty side based on 2025 MPUC dataset. Propose no changes to VMT metric and % Charging ratio given both rely on data not yet published/final or not yet conducted. Version of workbook in drafts folder expected to be final now.

TRM v5.1 Updates – C/I Edits Made to Date

Measure	ID	Edit to Review	Wkbk	Edit Made
Refrig – Grocery Refrigeration Equipment Optimization	2.05.15	New measure - workpaper	New	Based on completed CARD study research findings for optimization actions (some capital, some lower cost) results in deemed % savings by action applied to calculated compressor system energy consumption
HVAC – Circulator Pump Efficiency Index (CEI)	2.02.23	New measure - workpaper	New	New measure developed similar to pump efficiency index measure, but slightly different algorithm for the CEI necessitated separate measure.
Appendix J	J	TBD, only in workbook form presently	New	Load shape output tables by measure

TRM v5.1 Updates – Still Pending Updates

- Workpapers yet to be incorporated into Draft TRM



- Continue to extract load shape data into Appendix J – Yet to place in drafts folder for review
- Residential Air Fryer Measure
 - Received documentation to develop this measure last week. Thank you to that team who completed this research.
 - This documentation is currently within the [MN TRMAC SharePoint Site](#).
 - We may be able to include this measure in the redlined version of the MN TRM v5.1 still on track to be sent your way ~10/9.
 - However if this doesn't make it into the redlined version of MN TRM v5.1, we'll include it with our work on the MN TRM v5.2.

Discussion and Next Steps

General Discussion Points:

- What are measures/topics that you would like to see included within the TRM?
- Current pain points or interest areas TRM can help to flesh out or explore?
- Do you have questions or concerns regarding this list?

Next Steps:

- Please reach out to Lauren if you do not have access to the SharePoint Site.
- You'll receive a follow up email soon with the
 - Slide deck
 - Updated TRM v5.1 Priority List, and
- Today's slide deck and recording will be posted on the [MN TRM Webpage](#)

Thank You



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