



Technical Reference Manual
Advisory Committee
October 20, 2015 Meeting

Agenda

- 2017-2019 evaluation and update
- Review measure findings and draft workpapers
- Next meeting / next steps
- Q/A

TRM Filing Schedule

- Program Modification Filing
- Minnesota Rules 7690.1430
- Docket # E,G999/CIP 15-896

Date	Deliverable
November 13, 2015	TRM 2.0 Initial Filing
November 30, 2015	Written Comments Due
December 10, 2015	Reply Comments Due
January 14, 2016	Commissioner Decision

TRM Evaluation & Update

- Three major tasks:
 - Evaluation and update for 2017-2019
 - Generate load profiles
 - Build Smart Measures

TRM Evaluation & Update

- Major deliverables

Date	Deliverable
January 30, 2015	Kick-off meeting with the Department and TRMAC
June 1, 2015	List of codes and standards changes
November 13, 2015	Draft TRM delivered
December 11, 2015	Final TRM delivered
December 11, 2015	Smart Measure library complete
December 11, 2015	Electric and gas load profiles delivered

Measure Categories

- Lighting
- Electric and Gas HVAC
- Gas Non-HVAC and Envelope
- Other Electric Measures
- Codes and Standards Changes

Lighting

- General Items
 - CI Lighting Format
 - T8 Ballast Standard
 - CF review
 - ISRs – Residential lighting
 - Residential Motion Sensors
 - Costs
 - Codes and Standards
 - Requirements

Lighting

– CI Lighting Format

- General lighting section with common information
- Algorithm, tables of values (IF, CF, Hrs, ML)
- Specific technology sections
- LED troffers in App B, description to be added to ‘T12 up to 4 foot’ section
- Wattage table, adding fluorescent to LED high bay mostly unchanged
- Adding High Bay Fluorescent to High Bay LED section

Lighting

- T8 Ballast Standard – EPL Act 2005/2011
 - Effective 11/14/2014
 - Introduces Ballast Luminous Efficiency (BLE) standards
 - Minimum BLE levels comparable to Premium T8 / High Performance T8 levels
- Add legislation information to measure
- Recommendation – Keep as is for 2017, update in annual updates

Lighting

- CF review – current data is consistent
- ISRs – Residential lighting
- Residential Motion Sensors
 - New detailed study shows savings by room type
- Costs
 - Bulk of costs complete, to be added to App B
 - LED pricing is largest change

Lighting

- Codes and Standards
 - Updates for controls,
 - NC new LPD table
 - Incandescent, Final EISA adjustments
 - T8s
 - Minnesota specific requirements - NC
- Requirements
 - ENERGY STAR or Design Lights Consortium (DLC)

HVAC Gas and Electric

- Draft Workpapers (**Updated since last time**)
 - Boilers
 - Boiler Modifications
 - Condensing Unit Heater
 - DCV
 - ERV
 - Parking Garage Fan Control
 - Guest Room Energy Management (GREM)

HVAC Gas and Electric

- Draft Workpapers
 - Duct Sealing
 - Furnace and Boilers
 - Furnace Tune-up
 - Forced-Air Heating Maintenance
 - Mini-Split
 - Res GSHP
 - Commercial Air Conditioning, Heat Pumps

HVAC Gas and Electric

- Thermostats
- QI/QM
- General Items
 - HDD vs EFLHrs
 - Steam Trap Hours
 - Some type of control using EFLH heating
 - Some using all heating hours

Residential Thermostats

Algorithm

- Three tiers
 - Tier I: Programmable
 - Tier II: Communicating
 - Tier III: Analytics Capable
 - Savings factors for Tier II, Tier III derived from Navigant study for DTE
 - Considered pilot studies, manufacturer claims and engineering judgement
 - Adopted in Michigan Energy Measures Database
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Residential Thermostats

- Algorithm continued
 - Tier I is based on current programmable thermostat measure, consistent with Xcel and CPE deemed savings
 - Simplified from current measure; no dependence on direct vs. non-direct install
 - Average heating and cooling weather-normalized energy use is needed
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Residential Thermostats

- Recommendations
 - Use measure for planning purposes but use EM&V for claimed savings
 - Update measure as more pilot studies completed and new ENERGY STAR rating is issued
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Residential HVAC QI/QM

- Algorithm
 - Based on HVAC SAVE program
 - Similar to furnace and A/C equipment-only measures except rated efficiencies are multiplied by conversion efficiencies (CE_base and CE_prop)
 - CE is measured in-field from temperature, enthalpy and airflow measurements
 - CE represents the ratio of actual Btu's delivered to rated Btu's
 - An assumed value for CE_base is used for Replace on Fail and New Construction based on IA field study
 - CE_base = 62% (A/C)
 - CE_base = 72% (Furnace)
 - Existing equipment can be used as a baseline
 - No electric impacts in furnace measure

Residential HVAC QI/QM

- Measure Life
 - Equals life of equipment for Replace on Fail or New Construction
 - Equals 1/3 of the life of the equipment for Replace Working or O&M
 - Incremental Cost
 - Includes equipment cost, in-field adjustment and verification labor (provided by ESI), installation labor for Replace Working
 - Need installation labor for A/C
 - Unknowns
 - Are assumed baseline conversion efficiencies accurate for MN given longstanding QI programs?
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Residential HVAC QI/QM

- Differences from A/C and furnace tune-up measures
 - Existing tune-ups are based on standard “clean and check”
 - Many programs do not include airflow adjustments
 - SAVE model includes in-field verification
 - Recommendations
 - If interest in pursuing SAVE model, start with smaller scale pilot programs
 - Could add duct sealing/optimization to measure
 - Update assumed baseline conversion efficiencies periodically from field data
 - Use measure for planning purposes but use EM&V for claimed savings
 - Update measure as more pilot studies completed
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Other Electric Measures

- Draft Workpapers
 - Ag Engine Block Heater
 - Ag Fans
 - Ag Lighting
 - Ag Livestock Waterer
 - Compressed Air Leak Repair
 - ECM Circulators Res and CI
 - Heat Pump Water Heaters
 - VSD Pool Pumps

Gas Non-HVAC and Envelope

- Draft Workpapers
 - Commercial Water Heater
 - Commercial Dishwasher
 - Thermostatic Shower Valve
 - Loading Dock Seals

Gas Non-HVAC and Envelope

- Commercial Water Heater
 - New standard
 - Savings vary by size, under and over 55 gal
- Commercial Dishwasher
 - ENERGY STAR calculator and assumptions
 - Many types and options, but savings vary considerably

Code and Standard Changes

- Summary Spreadsheet
- Main updates 2015/2016
- Main updates 2017/2019
- Minnesota Requirements
 - Three options for NC

Wrap-up

- Next Meeting/Next steps
- Questions/comments?

Thank you!

Mark.Garofano@state.mn.us

651.539.1864