CIP Technical Reference Manual (TRM) Update

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St. Paul, MN

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division of energy resources
Minnesota Department of Commerce

Who we are..

- **Minnesota Department of Commerce**
  - **Division of Energy Resources**
    - State Energy Office
  - **Providing energy information for over 35 years…**
    - Energy conservation, efficiency, & renewables
    - Through technology, analysis, grants, programs, & public outreach
    - Data, reports, publications, presentations, website, call center, training, public events

Agenda

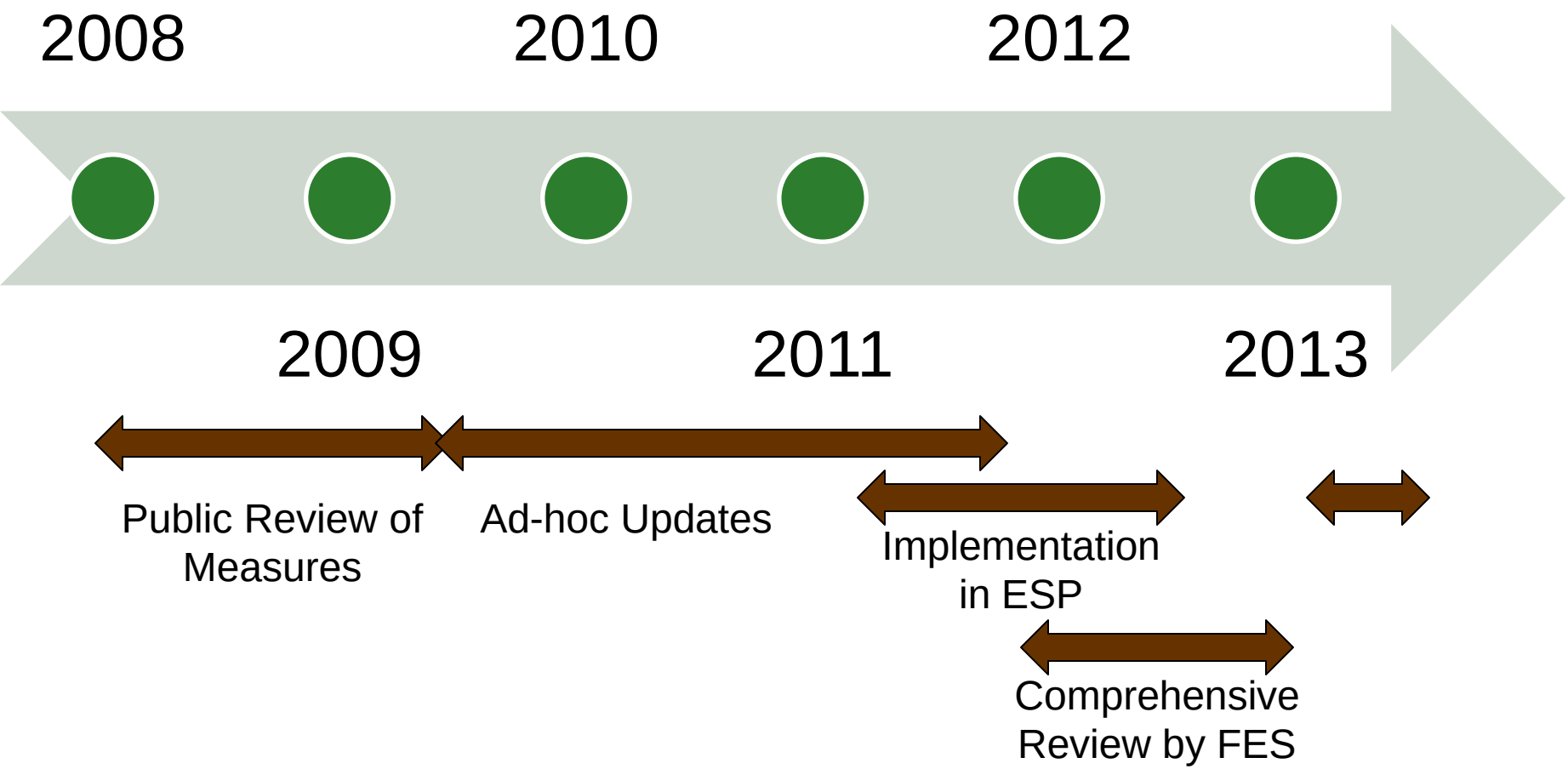
1. Welcome/Introductions	10:00-10:15
2. History of MN TRM	10:15-10:30
3. Project Tasks	10:25-10:40
4. Major Findings	10:40-11:00
5. Q/A on project and findings	11:00-11:15
6. Process Discussion	11:15-12:00

History of MN TRM

- **Minnesota Technical Reference Manual (TRM) was created in 2008 following passage of Next Gen Act to:**
  - **Standardize savings assumptions**
  - **Reduce program development costs**
  - **Help utilities**
  - **Streamline CIP review process**

- **CARD grant awarded to Franklin Energy Services (FES) in 2011 to review and update the TRM**

History of MN TRM



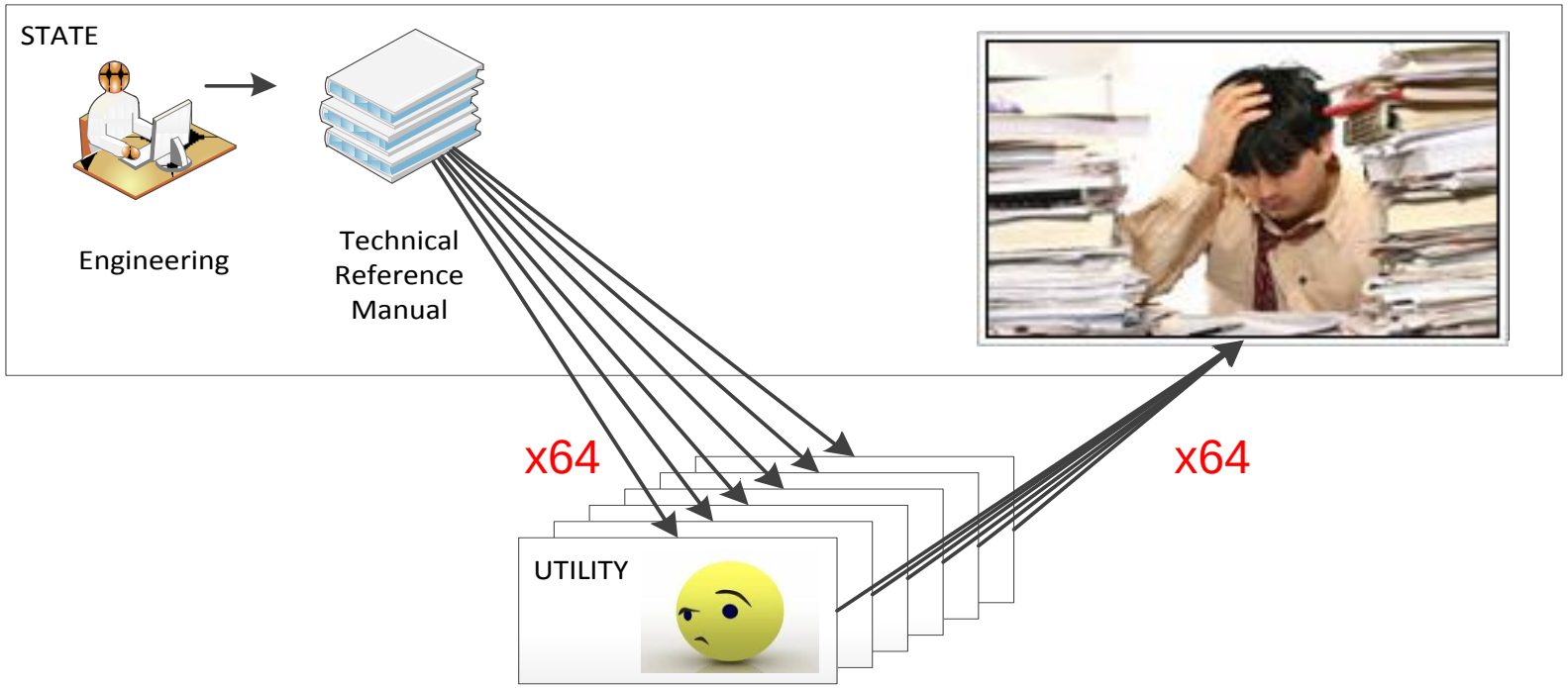
Evolution of TRM

Deemed Savings → Technical Reference Manual → Shared Calculators in Progress

With SmartMeasures in ESP®, the TRM is transformed from an approved set of specifications to an approved set of calculators available to all MN utilities

Evolution of TRM

- **Providing approved <u>calculators</u> rather than approved <u>specifications</u> avoids duplication**



Project Tasks

1. **Kick-Off Meeting: Oct. 21, 2011**
   - **Project Overview**
   - **Meet & Greet**
   - **Request for Assistance**

Project Tasks

- **Benchmark MN TRM against other TRMs.**
  - **Ohio, Michigan, California (DEER) selected**
  - **Findings:**
    - Food service measures outdated
    - Water reduction measure algorithms not supported
    - Lighting measures mostly OK
    - Motors removed as a retrofit measure in other TRMs
    - Electronics/computer measures outdated
    - Appliance measures outdated
    - Good selection of refrigeration measures by algorithms not supported
    - Good selection of heating/cooling equipment but load factor missing for cooling and correction factor for heating

Project Tasks

3. Develop cost & baseline data

- 36 measures selected for primary market research with input from Utility Advisory Board
- For remaining measures, use costs and baselines from other TRMs subject to spot checking in the market

Project Tasks

Utility Advisory Board Members – thank you!

Tom Balster	Alliant Energy
Bruce Boerner	Xcel Energy
Robert C. Jagusch	MMUA
Phil Dunlay	Xcel Energy
Jeremy Fischer	Great Plains Natural Gas
Jeff Haase	Great River Energy
Kurt Hauser	Missouri River Energy Services
Eric Johansen	CenterPoint Energy
Kim Lillyblad	Avant Energy
Roger Warehime	The Triad
Huei Wong	Applied Energy Group

Project Tasks

Measures Selected for Primary Research

Gas condensing water heaters	LED Exterior - Parking	ECM Motors
Heat Pump Water Heater	LED Freezer/Fridge	Boiler Tuneup
Pre Rinse Sprayers	LED Lamp	Modulating Burners
High Volume Low Speed Fans 18 Ft Diameter (3)	LED Luminaire	Centrifugal Chillers
heat recovery from exhaust hoods	CFL	Air-Cooled Chillers
Central HVAC system Economizer retrofit	Fluorescent T8	VSDs
Variable-Speed Tower Fans replace Two-Speed	Fluorescent T5	Ground source heat pumps
HVAC automated controls	VendingMiser	Faucet aerators
Infrared Heater	ENERGYSTAR ceiling fan w light	VSD compressors (<50 HP)
ENERGY STAR lighting fixtures	Condensing Efficiency Boilers	Steam traps
CFL - High Wattage	Heating maintenance	Energy Recovery Wheels & Plates
LED Exterior - Wall	Insulation and air sealing	Destratification fans

Project Tasks

4. Research and Review Code Changes, Evaluations, Non-Energy Impacts

- Evaluations were useful for determining deemed hours of operation and lifetimes
- Each measure reviewed for pending code and standard changes
- Little information found on non-energy impacts at the measure-level

Project Tasks

5. Determine Peak Demand Periods

- **Information requested from Utility Advisory Board on peak demand periods**
  - No significant differences found from respondents except one utility's peak period went later into the evening
  - Recommendation to use standard summer peaking coincidence factors (CFs) but allow utilities to provide justification for different CFs

Project Tasks

6. Identify Add'l Measures for Inclusion

- **Reviewed other TRMs, CARD studies and interviewed utility advisory board to determine new measures to add to TRM**

Type	Residential	Commercial/Industrial
HVAC	Furnace ECMs	Destratification Fans
	Furnace Tune-up	VSDs
	Hearth	Demand Control Ventilation
		Energy Recovery Ventilation
		Air-side Economizers
		Heat Pump Systems
Hot Water	Heat Pump Water Heaters	Faucet Aerators
		Pre-Rinse Spray Valves
		Heat Pump Water Heaters
Other		C/A No Loss Drains
		VSD Compressors

Project Tasks

7. Measure-by-Measure Technical Review

- Measures cross-checked against recently updated TRMs
- Building modeling performed for weather-dependent measures using new 30-year climate normals

8. Measure Specifications Documentation

- Template created referencing other leading TRMs including attributes and concepts from ESP

Project Tasks

9. Research Process for Continuous Development

- **Schedule of pending codes & stds changes**
- **MN advisory board members interviewed to provide feedback on:**
  - Improving efficiency of TRM process
  - Willingness to serve on technical committee
  - Primary purpose of technical committee
  - How often the technical committee should meet
  - Other feedback

Project Tasks

- Feedback from board members
  - Frequent/better communication needed
  - Formalize the process
  - Have a set schedule for updates
  - Process for people to submit recommendations for changes
  - General willingness to serve on technical committee
  - Changes should be made prospectively

Project Tasks

- **Feedback from board members continued**
  - **Purpose of technical committee**
    - Providing ongoing feedback and recommendations to COMM for changes
    - Evaluate new technologies, methodologies
    - Monitor codes and standards changes
    - Review of best practices
    - Considering modifications that arise from third parties
  - **Frequency of technical comm. meetings**
    - General consensus is 2-4 times per year with email/other communication as needed, though one member suggested as often as needed

Major Findings

- **Updated deemed hours for lighting**

Building Type	Old	New	Change
Office	3,435	4,439	1,004
Restaurant	4,156	3,673	(483)
Retail	3,068	4,719	1,651
Grocery/Supermarket	4,612	5,802	1,190
Warehouse	2,388	4,746	2,358
Elementary School	2,080	2,422	342
Secondary School	2,080	4,311	2,231
College	5,010	3,540	(1,470)
Health	3,392	5,095	1,703
Hospital	4,532	6,038	1,506
Hotel/Motel	2,697	3,044	347
Manufacturing	5,913	5,200	(713)
Other/Misc.	2,278	4,576	2,298
24-Hour Facility	8,700	8,766	66
Safety or Code Required	8,760	8,766	6
Exterior lighting	4,380	4,903	523
Average	**4,218**	**5,003**	**785**

Major Findings

- **Updated peak coincidence factors for lighting**

Building Type	Old	New	Change
Office	78%	70%	-8%
Restaurant	94%	80%	-14%
Retail	94%	83%	-11%
Grocery/Supermarket	94%	69%	-25%
Warehouse	96%	70%	-26%
Elementary School	73%	71%	-2%
Secondary School	73%	58%	-15%
College	71%	81%	10%
Health	84%	75%	-9%
Hospital	84%	75%	-9%
Hotel/Motel	51%	21%	-30%
Manufacturing	96%	92%	-4%
Other/Misc.	96%	66%	-30%
24-Hour Facility	94%	100%	6%
Safety or Code Required	100%	100%	0%
Exterior lighting	0%	0%	0%
Average	**80%**	**69%**	**-10%**

Major Findings

- **Updated effective full load hrs for C/I HVAC**

Building Type	Old (Zone 3)	New (Zone 3)	Change
Convenience Store		986	n/a
Education - Community College/University		785	n/a
Education - Community College	632		n/a
Education - University	828		n/a
Education - Primary		408	n/a
Education - Secondary	384	563	179
Health/Medical - Clinic	756	865	109
Health/Medical - Hospital	1408	1298	-110
Lodging	1193	754	-439
Manufacturing		589	n/a
Office	902		n/a
Office-Low Rise		446	n/a
Office-Mid Rise		651	n/a
Office-High Rise		1263	n/a
Restaurant		652	n/a
Retail	867		n/a
Retail - Large Department Store		686	n/a
Retail - Strip Mall		574	n/a
Warehouse		409	n/a
Average	**871**	**729**	**-143**

Major Findings

- **Correction factor recommended for residential and commercial boilers/furnaces to account for setbacks, internal gains, solar gains, etc.**
  - **CF = 0.7**

Old: MMBtu/yr savings = Btuh_output x HDD x 24 x OversizeFactor x [1/(T_indoor - T_design)] x (1/Eff_Base - 1/Eff_High) / 1,000,000

New: MMBtu/yr savings = Btuh_input x HDD65 x 24 x LF x CF x [1/(T_indoor - T_design)] x (1/Eff_Base - 1/Eff_high) x Eff_Base / 1,000,000

Major Findings

- **Food Service Measures**
  - **Food service measures do not reflect new ENERGY STAR standards.**
  - **Recommended methodology is like-for-like replacement**
  - **Current methodologies allow for switching between equipment classes (e.g., steamer to combination oven)**

Q/A on Project, Findings

- **Questions on project itself or findings?**

Process Discussion

- **We want to know your thoughts on the TRM review project.**
  - **What went well?**
  - **What did not go so well?**
  - **How can the process be improved in the future?**

Process Discussion

- **Process for approving new measures**
  - **Measures requested for further analysis will be discussed in workgroups**
  - **COMM will coordinate process with goal of approving & implementing all measures in ESP by end of 2013**
    - Regression testing required for SmartMeasure implementation
  - **Minutes, workgroup attendance and updated specs will be posted on COMM website**
  - **Final set of specs will be posted to eDockets and approved by Commissioner order**

Process Discussion

- **Vision for TRM**
  - **Individual spreadsheets will be converted to a single PDF (COMM summer intern project)**
  - **Policies and procedures will be added**
    - Process and requirements for proposal, review, and adoption of new measures or changes to existing measures
    - Policies for proposal, review and approval of utility-specific measures
  - **Measures specification source documents to reside in ESP**
    - Export all specs from a library to create a TRM

Process Discussion

- **Vision for continuous improvement**
  - **TRM will remain a pre-approved set of measures**
  - **Utility/Consultant creation of new measures for adoption in utility CIPs subject to COMM review**
  - **After sufficient evaluation or engineering analysis, measures can be adopted in MN TRM**
    - Regression testing required for approval of Smart Measures

Process Discussion

- **Vision for Continuous Improvement**
  - **Standing Technical Committee**
    - Membership: 10-15 members, chaired by COMM
      - Utilities, non-utility CIP administrators, independent consultant, other stakeholders
    - Meet 2-4 times per year with additional email, phone calls as needed
    - Purpose
      - Monitor codes and standards changes
      - Evaluate new technologies, methodologies
      - Review best practices and updates to other TRMs
      - Propose field studies or other research as needed leveraging CARD
      - Recommend changes and updates to COMM
  - **Comprehensive Third Party Reviews every 2-3 years**
    - Ongoing work of Tech Committee will help to contain scope of review

Process Discussion

- **Your thoughts and feedback?**

Thank you!

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