
MEMORANDUM

TO: TECHNICAL ADVISORY COMMITTEE

FROM: CHERYL JENKINS, PROJECT MANAGER and SAM DENT, TECHNICAL LEAD - VEIC

SUBJECT: TRM VERSION 5 – FIRST FULL DRAFT

DATE: 12/18/2015

Cc: ANNETTE BEITEL, SAG

VEIC has submitted the first full draft of Version 5.0 of the Illinois TRM including all the measure edits and new measures proposed, discussed and review by the Technical Advisory Committee.

Presented below is a summary table that provides all measures that have undergone edits in this round of updates with a brief description of what has changed, whether it is being considered an errata, and a link to the corresponding SharePoint Tracker Item(s). Note that additional changes following the individual measure review are highlighted in red.

Measure # and Name		Errata?	Brief description of what changed	Tracker Item(s)
Sections 1-3		N	Hotel and Motel and Low-use Small Business Definitions.	Update Building Types and Definitions in Glossary to be consistent with Building Types used in the IL-TRM Measures
			Proposed new section 3.8 Measure Incremental Cost Definition.	Update Deemed Measure Cost Descriptions
			Updates to dates, references, "Summary of Measure Revisions" and Early Replacement section. Removal of proposed additions to Section 3.2 for business closures (TAC decision to continue discussion in Policy Manual).	N/A
4.2.1	Combination Oven	N	Re-write using algorithms rather than deemed savings. Standard updates. Added electric combination ovens.	Update Deemed values from Nicor 2011-2014 plan
4.2.3	Commercial Steam Cooker	N	Formatting edits to algorithm for clarity and improved reference.	Commercial Steam Cooker
4.2.6	ENERGY STAR dishwasher	N	ENERGY STAR standard update. Reworked measure to more accurately reflect calculation. Improved reference.	Standard update for commercial dishwashers
4.2.8	ENERGY STAR Griddle	N	Fixed error in Daily Idle Energy Calculation. Improved reference.	Error in Griddle Algorithm

Measure # and Name		Errata?	Brief description of what changed	Tracker Item(s)
4.2.9	ENERGY STAR Hot Food Holding Cabinets	N	Improved reference.	None
4.2.11	High Efficiency Pre-Rinse Spray Valve	N	Added reference to IECC 2015 Minor edits	Incorporate IECC2015 Code Changes
4.3.1	Storage Water Heater	N	Changed methodology from deemed approach to algorithm. Minor clarifying edits. Removal of distinction between rated and measured volume in Standby calculation. Addition of gas baseline efficiency standards.	4.3.1 Storage Water Heater Tank Sizes
4.3.2	Low Flow Faucet Aerators	N	Fixed EPG factor dependent on water temperature.	Error in EPG_elec and EPG_gas values for Low Flow faucet aerators
4.3.5	Tankless Water Heater	N	Added reference to IECC 2015	Incorporate IECC2015 Code Changes
4.3.7	Multifamily Central Domestic Hot Water Plants	N	Updated DeOreo reference.	Update reference to DeOreo Aquacraft evaluation, to final version
		N	Added reference to IECC 2015	Incorporate IECC2015 Code Changes
New – 4.3.9	Heat Recovery Grease Trap Filter	N	New Measure	Grease trap filter
4.4.1	Air Conditioner Tune up	N	Removed SEER test for <65kBtu - now EER test for all. Added explanation of test methodology.	C&I Central AC Tune Up
4.4.2	Space Heating Boiler Tune Up	N	Added clarifying language on appropriate firing rates for combustion efficiency testing.	Clarification of Boiler Tune-Up Combustion Efficiency
4.4.3	Process Boiler Tune Up	N	Added clarifying language on appropriate firing rates for combustion efficiency testing.	Clarification of Boiler Tune-Up Combustion Efficiency
4.4.6	Electric Chiller	N	Added specifications for IECC 2015 Updated cost assumptions	Incorporate IECC2015 Code Changes
4.4.7	Lighting Power Density	N	Added specifications for IECC 2015	Incorporate IECC2015 Code Changes
4.4.9	Heat Pump Systems	N	Added specifications for IECC 2015	Incorporate IECC2015 Code Changes
4.4.11	High Efficiency Furnace	N	Update of Heating Fan hour assumptions Fix typo in example calculation Added remaining HOURS assumptions Added building specific coincidence factors	Update Pump and Fan Hours assumption
4.4.13	PTAC and PTHP	N	Added specifications for IECC 2015	Incorporate IECC2015 Code Changes
4.4.14	Pipe Insulation	N	Allow for custom 3E Plus derived entry. Added ability to use actual boiler efficiency	Use 3E Plus for Heat Loss

Measure # and Name		Errata?	Brief description of what changed	Tracker Item(s)
4.4.15	Single-Package and Split System Unitary AC	N	Added specifications for IECC 2015	Incorporate IECC2015 Code Changes
4.4.16	Steam Trap Replacement or Repair	N	Providing clarifying edits and secondary equations to calculate maximum steam loss. Allowing actual steam pressure and HOU entry. Update values for deemed average pressure and operating hours based on program data. Minor updates to table format	Update Deemed values from Nicor 2011-2014 plan
4.4.17	Variable Speed Drives for HVAC Pumps and Cooling Tower Fans	N	Added reference to IECC 2015	Incorporate IECC2015 Code Changes
			Updated Heating and Cooling HOU assumptions	Update Pump and Fan Hours assumption
			Added remaining HOURS assumptions Fixed reference to CT methodology	None
4.4.19	Demand Control Ventilation	N	Added heating savings for electrically heated buildings (resistance and heat pump).	4.4.19 DCV Heating and Cooling Equipment Types
4.4.21	Linkageless Boiler Controls for Space Heating	N	Clarity on VSD measure referred to for electric savings	None
4.4.24	Small Pipe Insulation	N	Allow for custom 3E Plus derived entry.	Use 3E Plus for Heat Loss
4.4.26	Variable Speed Drives for Supply and Return Fans	N	Added reference to IECC 2015	Incorporate IECC2015 Code Changes
			Updated Heating, Cooling and Ventilation HOU assumptions	Update Pump and Fan Hours assumption
			Added remaining HOURS assumptions	None
4.4.27	Energy Recovery Ventilator	N	Added reference to IECC 2015	Incorporate IECC2015 Code Changes
		N	Removed reference to previously deleted table of building characteristics and replaced with table showing occupied hours.	None
4.4.30	Notched V Belts for HVAC Systems	N	Updated Heating, Cooling and Ventilation HOU assumptions	Update Pump and Fan Hours assumption
			Added remaining HOURS assumptions	None
4.4.31	Small Business Furnace Tune-Up	N	Added clarifying language on appropriate firing rates for combustion efficiency testing.	Clarification of Boiler Tune-Up Combustion Efficiency
New – 4.4.33	Industrial Air Curtains	N	New Measure	Industrial Air Curtains

Measure # and Name		Errata?	Brief description of what changed	Tracker Item(s)
NEW – 4.4.34	Destratification Fans	N	New Measure	Thermal Equalizer Destratification Fans
NEW – 4.4.35	Economizer Repair and Optimization	N	New Measure	HVAC Optimization (Economizer Repair & Optimization)
NEW – 4.4.36	Multi-Family Space Heating Steam Boiler Averaging Controls	N	New Measure	Averaging Controls for Steam Pipe Systems without Thermostat Radiator Valves
NEW – 4.4.37	Unitary HVAC Condensing Furnace	N	New Measure	High Efficiency Condensing RTUs
4.5	Lighting End Use	N	Updated hours of use and coincidence factors assumptions for select building types based on IL evaluation. Updated hours of use for remaining building types based on eQuest modeling. Provide updated “Unknown” assumptions based on weighted averages. Recalculated WHFd factor to be based on peak period average rather than peak hour.	Non-Residential Lighting Operating Hours Data Aggregation
			Updated lighting waste heat factors (fixing autosizing issues). Updated remaining building type CFs based on eQuest models.	Error in Lighting IFkWh interaction factors
				WHFd - fix eQuest modeling autosizing issue
				Discuss if eQuest models should be used to develop C&I Lighting CFs
4.5.3	High Performance and Reduced Wattage T8 Fixtures and Lamps	N	Adjustment of T12 baseline.	T-12 Baseline
		N	Table review – providing nominal and ballast factor assumptions. Adding significant digits to show difference in values.	HP and RW T8 Fixtures
4.5.4	LED Bulbs and Fixtures	N	Adjusted language for PAR, MR, and MRX Lamps.	Refine PAR, MR and MRX Base Watt Algorithm (LEDs and CFLs)
		N	Adding incremental cost to reference tables. Updating O&M for Standard Omnidirectional lamps. Updating and consolidating reference tables.	LED Bulbs and Fixtures
4.5.9	Multi-Level Lighting Switch	N	Added reference to IECC 2015	Incorporate IECC2015 Code Changes
4.5.10	Occupancy Sensor Lighting Controls	N	Update to costs, kW connected and % savings. Minor edits	Occupancy Sensor Lighting Controls - add Energy Savings Factor
4.5.13	Occupancy Controlled Bi-Level Lighting Fixtures	N	Added reference to IECC 2015	Incorporate IECC2015 Code Changes

Measure # and Name		Errata?	Brief description of what changed	Tracker Item(s)
4.5.14	Commercial ENERGY STAR Specialty Compact Fluorescent Lamp	N	Adjusted language for PAR, MR, and MRX Lamps.	Refine PAR, MR and MRX Base Watt Algorithm (LEDs and CFLs)
NEW – 4.7.5	Cycling Compressed Air Dryer	N	New Measure	New Measure - Cycling Refrigerated Compressed Air Dryers
4.7.6 – Changed to: 4.8.2	Roof Insulation for C&I Facilities	N	Added specifications for IECC 2015	Incorporate IECC2015 Code Changes
NEW – 4.8.4	Modulating Commercial Gas Clothes Dryer	N	New Measure	Modulating Dryers
5.1.1	ENERGY STAR Air Purifier	N	Updated using more recent ENERGY STAR calculator.	5.1.1 Air Purifier - update ESTAR calculation
5.1.2	ENERGY STAR and CEE Tier 2 and 3 Clothes Washers	N	Added unknown DHW/ known Dryer and known DHW/unknown Dryer to tables. Added decimal place to % of combustion table to bring calculated and algorithm derived values closer. Fixed parentheses issue.	Few edits to RES Clothes Washer
5.1.3	ENERGY STAR Dehumidifier	N	Removed old ENERGY STAR spec values. Fixed hour assumption listing - calculated deemed values correct.	Dehumidifier calculation hours
5.1.6	ENERGY STAR and CEE Tier 2 Refrigerator	N	Fix typo in algorithm table	None
5.1.7	ENERGY STAR Room AC	N	Update of Federal Standard and ENERGY STAR specifications Changed to EER (not CEER) for existing units since they will not be rated in CEER. Added adjustment from EER to CEER to allow appropriate comparison.	None
5.1.8	Refrigerator and Freezer Recycling	Y	Added customers value on lost amenity to measure cost	Update Deemed Measure Cost Descriptions
5.2.1	Advanced Power Strip Tier 1	N	Changed name of existing measure (Smart Strip) as proprietary name by single manufacturer.	Optimize measure name to industry-standard term
NEW – 5.2.2	Tier 2 Advanced Power Strips – Residential AV	N	New Measure Minor text additions and clarifications.	Advanced Power Strip - Tier 2
5.3.1	Air Source Heat Pump	N	Clarification of Early Replacement determination Clarifying that if status is unknown, use time of sale assumptions.	Residential Air Conditioner Decision Tree
		N	Measure cost update	Update incremental measure costs - ASHP, CAC, ductless mini-splits

Measure # and Name		Errata?	Brief description of what changed	Tracker Item(s)
		N	Update to CF and ELFH for multifamily homes CF and EFLH updated using TRM defined efficiency assumptions rather than those from metering study.	Metered data for ASHP. Mini-split algorithm
5.3.2	Boiler Pipe Insulation	N	Clarity in algorithm for pipe circumference with insulation	None
5.3.3	Central AC	N	Clarification of Early Replacement determination. Clarifying that if status is unknown, use time of sale assumptions.	Residential Air Conditioner Decision Tree
		N	Measure cost update	Update incremental measure costs - ASHP, CAC, ductless mini-splits
5.3.4	Duct Insulation and Sealing	N	Added semi-conditioned space savings by use of Thermal Regain Factor.	5.3.4. Duct Insulation and Sealing
5.3.6	Gas High Efficiency Boiler	N	Clarification of Early Replacement determination. Clarifying that if status is unknown, use time of sale assumptions. Addition of HF in algorithm	Residential Air Conditioner Decision Tree
5.3.7	Gas High Efficiency Furnace	N	Clarification of Early Replacement determination. Clarifying that if status is unknown, use time of sale assumptions. Addition of HF in algorithm	Residential Air Conditioner Decision Tree
5.3.8	Ground Source Heat Pump	N	Updated DeOreo reference.	Update reference to DeOreo Aquacraft evaluation, to final version
		N	Clarification of Early Replacement determination. Clarifying that if status is unknown, use time of sale assumptions.	Residential Air Conditioner Decision Tree
5.3.10	HVAC Tune Up	N	Fix typo of variable name. Adding CF_{PJM} for Heat Pumps	None
5.3.12	Ductless Heat Pumps	Y	Removed /1000 from kW calculation since capacity is already in kBtu.	Ductless Heat Pump - kW units error
		N	Measure cost update	Update incremental measure costs - ASHP, CAC, ductless mini-splits
		N	Change of algorithm to be based on Capacity and EFLH as opposed to %displaced and annual load. Update to CF and ELFH. Fixing existing efficiency assumptions. Additional minor edits	Metered data for ASHP. Mini-split algorithm
5.3.13	Residential Furnace Tune-Up	N	Added clarifying language on appropriate firing rates for combustion efficiency testing.	Clarification of Boiler Tune-Up Combustion Efficiency

Measure # and Name		Errata?	Brief description of what changed	Tracker Item(s)
New – 5.3.16	Advanced Thermostats	N	New Measure Updated heating savings factor and provided strawman for cooling pending further data. Added additional input received on eligibility criteria.	Differentiate the Residential Programmable Thermostat Measure based on Thermostat Capabilities
5.4.2	Gas Water Heater	N	Updated DeOreo reference.	Update reference to DeOreo Aquacraft evaluation, to final version
5.4.3	Heat Pump Water Heater	N	Updated DeOreo reference.	Update reference to DeOreo Aquacraft evaluation, to final version
5.4.4	Low Flow Faucet Aerators	N	Updated DeOreo reference.	Update reference to DeOreo Aquacraft evaluation, to final version
			Adding ISR assumptions for Efficiency Kits Distinction added for School Efficiency kits	Update ISR for Efficiency Kits
5.4.5	Low Flow Showerheads	N	Adding ISR assumptions for Efficiency Kits Distinction added for School Efficiency kits	Update ISR for Efficiency Kits
5.5.2	ENERGY STAR Specialty CFL		Adjusted language for PAR, MR, and MRX Lamps.	Refine PAR, MR and MRX Base Watt Algorithm (LEDs and CFLs)
5.5.6	LED Specialty Lamps	Y	Changed name of existing measure (LED Downlight) to LED Specialty Lamps. Made consistent with CFL Specialty assumptions. Removed default efficient wattages as always actuals used.	Update LED Savings Parameters for non-standard, non-direction LED projects
			Adjusted language for PAR, MR, and MRX Lamps.	Refine PAR, MR and MRX Base Watt Algorithm (LEDs and CFLs)
5.5.8	LED Screw Based Omnidirectional Bulbs	N	Addition of missing Natural Gas penalty section	None
5.6.1 ERRATA	Air Sealing	Y	Changing Latent Multiplier assumption to be based on calculation of hours sensible and total loads. Latent Multiplier values updated slightly based on minor mistake in calculation (as per Bruce Harley)	None – recommendations from Bruce Harley, CLEAResult
5.6.1		N	Changing Latent Multiplier as above. Latent Multiplier values updated slightly based on minor mistake in calculation (as per Bruce Harley) Change cooling and heating n-factor values based on applying LBNL infiltration model. Revert HDD assumption back to base temperature 60F. Adjusting default gas efficiency to 72%.	None – recommendations from Bruce Harley, CLEAResult
		N	Adding prescriptive air sealing savings for	Include prescriptive residential air sealing measures

Measure # and Name		Errata?	Brief description of what changed	Tracker Item(s)
			when blower door testing is not possible	
5.6.2	Basement Sidewall Insulation	N	Applying 80% adjustment factor to cooling savings and 60% adjustment factor to heating savings as discussed in 11/17 TAC meeting. Adjusting default gas efficiency to 72%.	Air Sealing and Insulation Measures Adjustment Factor Update. Review TRM v metering / billing study results
5.6.3	Floor Insulation above Crawlspace	N	Applying 80% adjustment factor to cooling savings and 60% adjustment factor to heating savings as discussed in 11/17 TAC meeting. Adjusting default gas efficiency to 72%.	Air Sealing and Insulation Measures Adjustment Factor Update. Review TRM v metering / billing study results
5.6.4	Wall and Ceiling Insulation	N	Applying 80% adjustment factor to cooling savings and 60% adjustment factor to heating savings as discussed in 11/17 TAC meeting. Adjusting default gas efficiency to 72%.	Air Sealing and Insulation Measures Adjustment Factor Update. Review TRM v metering / billing study results
NEW – 6.1.1	Residential Behavior Change	N	New Measure Added multi-year persistence assumptions based on industry evidence. Updated savings adjustment algorithm to reflect effects of multiple years of persistence. Adjusted load shape to reflect industry information. Updated kW adjustment algorithm to reflect effects of multiple years of persistence; added CF approach to use if not measured directly. Minor clarifying edits.	Residential Behaviour Change
Section 4.7 and 4.8		N	Section 4.7 has become Compressed Air and Section 4.8 has become Miscellaneous. Measure numbers have been updated accordingly	Compressed Air
All			Added Footnote to all pages showing “Version 5.0 DRAFT 12/18/2015”	Footnote Formatting

The second table below provides tracker items that have not been part of the deliverables to date as they have either been closed, are repeats of other tracker items, are more general in nature, or will be tackled in the next Full v5.0 Draft.

Tracker Items:	Comments
Updating Incremental Cost for Small Commercial Programmable Thermostats and Gas High Efficiency Furnace	Tracker item removed as per request from Bridgid Lutz, Nicor.
Res Thermostats - add furnace fan savings for homes with heat pumps	Decided to put on hold as there are concerns around programmable thermostats and heat pumps
Missing and Broken Links in TRM Sections	Improved format of reference folders. Direct linking possible by moving to web-based database.
Default Fixture Wattage Reference Table	ComEd proposed pulling all fixture wattage assumptions out of the measures and in to a master table. VEIC reviewed this request and have determined it requires a more lengthy effort that could be attempted in a future round.
Revise minimum R-value of residential insulation measures	Not implemented as algorithms already over claiming as per ODC evaluations
Standardization of Algorithm Terms	Will attempt to fix some in next full draft. Possible reliability review process.
Update ISR for aerators, showerheads, CFLs	Repeat of Tracker entry from Hammad Chaudhry (Nicor).
Adding non-energy benefits to residential "whole house" measures and multi-family measures And Adding non-energy benefits to C&I .	After multiple discussions and proposals provided, there is not consensus in the TAC to move forward with the inclusion of NEBs. Many policy issues remain and they will need to be discussed in a different forum. VEIC will provide early next year a memo pulling together the comments received.
Improving TRM documentation, quality, transparency, and replicability	Reliability reviews will improve. Process still to be defined.
New measure request for Tier 1 commercial Advanced Power Strip	VEIC did not receive a workpaper for this measure.
New measure request for RES Advanced Power Strip - Tier 2	Repeat tracker entry