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**MEMORANDUM**

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**TO:** IL TRM TECHNICAL ADVISORY COMMITTEE

**FROM:** KEITH CRONIN, PROJECT MANAGER and SAM DENT, TECHNICAL LEAD - VEIC

**SUBJECT:** IL TRM VERSION 13.0 FINAL DRAFT - SUMMARY

**DATE:** 09/20/2024

**Cc:** CELIA JOHNSON, SAG

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VEIC has submitted the Final full draft of the version 13.0 Illinois TRM to the Technical Advisory Committee and uploaded to SharePoint. This draft includes both proposed redline changes to existing measures and new measures (also in redline) proposed to be included for the first time in this version. Changes have been made to all four volumes:

- IL-TRM\_Effective\_010125\_v13.0\_Vol\_1\_Overview\_09202024\_FINAL
- IL-TRM\_Effective\_010125\_v13.0\_Vol\_2\_C\_and\_I\_09202024\_FINAL
- IL-TRM\_Effective\_010125\_v13.0\_Vol\_3\_Res\_09202024\_FINAL
- IL-TRM\_Effective\_010125\_v13.0\_Vol\_4\_X-Cutting\_Measures\_and\_Attach\_09202024\_FINAL

VEIC have also provided on SharePoint:

- An Excel file titled 'IL Comment Matrix\_09202024' containing all comments received from Deliverable 1, 2 and Almost Final together with VEIC response and outcome.
- A Final errata memo documenting both approved changes to Version 12.0, effective 1/1/2024.

Presented below are two summary tables. The first provides the measures that have been edited or added, 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). Highlighted in red are changes made since the Almost Final deliverable.

The second table provides a list of those tracker items that have not resulted in a change.

Measure # and Name		Errata?	Brief description of what changed	Tracker Item(s)
<b>Volume 1 – Overview and User Guide</b>				
2	Organizational Structure	N	Addition of “Shell” end use category in Volume 2: Commercial and Industrial Market Sector. All shell measures have been moved to section 4.8, and Miscellaneous is now 4.9.	N/A
2.0	Measure Code Specification	N	Removal of “Equipment” from 2 end-use categories. Corresponding changes made in Volume 2.	N/A
3.9	Heating and Cooling Degree-Day Data	N	List of TMYx weather station files used has been provided.	N/A
3.11	Discount Rates, Inflation Rates, and O&M Costs	N	Nominal, Real and Inflation Rate’s for 2026-2029 provided, with footnote relating to compromise positions.	<a href="#">Discount and Inflation Rate updates</a>
<b>Volume 2 – Commercial and Industrial Measures</b>				
4.1.11	Commercial LED Grow Lights	Y	Error discovered in calculation file of CFs where additional hour beyond peak period was being included.	N/A
		N	Reliability Review. Updated to leverage new DLC Horticultural specifications, v3.0. Addition of New Construction (NC) as an applicable program type. Included 2021 IECC baseline for NC.	N/A
4.1.13	Irrigation Pump VFD	N	Reliability Review. Example added.	<a href="#">Add Calculation examples to more measures</a>
4.1.14	High Efficiency Grain Dryer	N	Reliability Review. Example added.	<a href="#">Add Calculation examples to more measures</a>
4.1.15	Grain Dryer Tune-Up	N	Reliability Review. No updates recommended.	N/A
4.1.16	Greenhouse Boiler Tune-Up	N	Reliability Review. Typo fixes.	N/A
4.1.17	Greenhouse Thermal Curtains	N	Reliability Review. Updates to measure cost	N/A
4.1.18	Infrared Film for Greenhouse	N	Reliability Review. No updates recommended.	N/A
4.1.19	ENERGY STAR Dairy Water Heater	N	Reliability Review. Updates to code language. Updated reference to effective residential water heater ENERGY STAR spec.	N/A
4.1.20	Commercial Electric Lawn Mower	N	Example added.	<a href="#">Add Calculation examples to more measures</a>

Measure # and Name		Errata?	Brief description of what changed	Tracker Item(s)
4.2.1	Combination Oven	N	Update to coincidence factor. Fix to example calculation.	<a href="#">Identify availability of data to update Food Service assumptions</a>
4.2.3	Steam Cooker	Y	Idle calculation fixed to divide preheat time by 60 minutes per hour.	<a href="#">Correction to Commercial Steam Cooker calculations</a>
		N	Addition of unknown option to CF table	<a href="#">Correct Commercial Steam Cooker Demand /CF</a>
4.2.5	ENERGY STAR Convection Oven	N	Update to coincidence factor.	<a href="#">Identify availability of data to update Food Service assumptions</a>
4.2.6	ENERGY STAR Dishwasher	N	Update measure life assumptions.	<a href="#">Identify availability of data to update Food Service assumptions</a>
4.2.7	ENERGY STAR Fryer	N	Update to coincidence factor.	<a href="#">Identify availability of data to update Food Service assumptions</a>
4.2.8	ENERGY STAR Griddle	N	Update to coincidence factor.	<a href="#">Identify availability of data to update Food Service assumptions</a>
4.2.9	ENERGY STAR Hot Food Holding Cabinet	N	Update to coincidence factor.	<a href="#">Identify availability of data to update Food Service assumptions</a>
4.2.12	Infrared Charbroiler	N	Example added.	<a href="#">Add Calculation examples to more measures</a>
4.2.16	Kitchen Demand Ventilation Controls	N	Reduction in heating interactive effect savings by reducing the 'Annual Heating Load' assumptions.	N/A
4.2.18	Rack Oven - Double Oven	Y	Fixed error in deemed savings calculation. Added Days variable to Algorithm section.	N/A
4.2.22	Automatic Conveyor Broiler	Y	Fixed error in preheat energy calculation.	N/A
		N	Example added.	<a href="#">Add Calculation examples to more measures</a>
4.3.1	Water Heater	Y	Updates to code language.	N/A
			Fixed error in large water heater fuel switch calculation.  Added fuel switch example.	<a href="#">Correction to savings algorithm for fuel switching on large commercial water heaters</a>  <a href="#">Add Calculation examples to more measures</a>
4.3.3	Low Flow Showerheads	N	Reliability Review. No updates recommended.	N/A
4.3.4	Commercial Pool Covers	N	Reliability Review. Updates to code language.	N/A

Measure # and Name		Errata?	Brief description of what changed	Tracker Item(s)
4.3.7	Multifamily Central Domestic Hot Water Plants	N	Reliability Review. Updates to code language. Update to MF Household assumption. <b>Typo fixed.</b>	N/A
4.3.8	Controls for Central Domestic Hot Water	N	Clarification to boiler capacity assumption	N/A
4.3.10	DHW Boiler and Water Heater Tune-up	N	Addition of all water heater types in addition to DHW boiler. Addition of methodology to calculate consumption by number of people for multifamily. Update to MF Household assumption. Update to incoming water temperature $T_{In}$ assumption.	<a href="#">DHW Boiler Tune-up - Additional HW Gal/Year Option</a>
4.3.11	Tunnel Washers	N	Update to incoming water temperature $T_{In}$ assumption.	N/A
4.4	HVAC End Use	N	<del>Updates to EFLH assumptions based on TMYx climate data and utilizing latest version of OpenStudio (3.6.1).</del> Fixing label for a number of building types that values are based on eQuest models as opposed to OpenStudio. Note Working Group will be set up next year to work through the models and update these assumptions. <b>Typos fixed.</b>	N/A
4.4.1	Air Conditioner Tune-Up	N	Reliability Review. No updates recommended.	N/A
4.4.2	Space Heating Boiler Tune-Up	N	Reliability Review. No updates recommended.	N/A
4.4.6	Electric Chiller	N	Update to measure costs. Example added.	<a href="#">Electric Chillers (IL TRM v12, 4.4.6)</a> <a href="#">Add Calculation examples to more measures</a>
4.4.7	ENERGY STAR and CEE Tier 2 Room AC	Y	Update to ENERGY STAR and CEE Tier 2 specifications that came into effect in October 2023. Measure cost update.	<a href="#">Code and Standard Updates</a>
4.4.9	Air and Water Source Heat Pump Systems (Centrally Ducted and Ductless)	N	Combining ducted and ductless (4.4.59) measures. Updates to code language. Addition of deemed early replacement and full v partial displacement assumptions. Addition of accounting for distribution savings.	<a href="#">Apply Res HP Methodology to Commercial Measure</a>

Measure # and Name		Errata?	Brief description of what changed	Tracker Item(s)
			<p>Addition of ability to analyze partial displacement scenarios – addition of HeatLoadFactor and PD_Adj.</p> <p>Clarifications for Water Source Heat Pump to use EER in calculation, and to use 1.0 in HeatLoadFactor and PDAdj for both WSHP and cold climate heat pumps.</p> <p>Fix example calculations.</p>	
4.4.10	High Efficiency Boiler	Y	Update to baseline after the 2023 Federal Standard update was vacated.	<a href="#">Federal Standard for Commercial Boilers</a>
4.4.11	High Efficiency Furnace	N	Update to residential sized unit's measure cost.	N/A
4.4.12	Infrared Heaters	N	Reliability Review. Minor clarifications added.	N/A
4.4.13	Package Terminal Air Conditioner (PTAC) and Package Terminal Heat Pump (PTHP)	N	<p><del>Update to example calculations with new EFLH assumptions.</del></p> <p>Correction to RUL label to match measure life section.</p>	N/A
4.4.14	Pipe Insulation	N	Reliability Review. Minor clarifications added. Example calculation added	N/A <a href="#">Add Calculation examples to more measures</a>
4.4.15	Single-Package and Split System Unitary Air Conditioners	N	Updates to code language. Fix example calculations.	N/A
4.4.16	Steam Trap Replacement or Repair	N	Reliability Review. Minor clarifications added	N/A
4.4.17	Variable Speed Drives for HVAC Pumps and Cooling Tower Fans	N	Reliability Review. Updates to code language. Updated reference sources, provided more incremental cost options for differing motor sizes. Added a motor efficiency table instead of a single static default motor efficiency.	N/A
4.4.20	High Turndown Burner for Space Heating Boilers	N	Reliability Review. Updated heating run hours and hours when boiler is cycling with new TMYx data. Updated reference sources.	N/A
4.4.26	Variable Speed Drives for HVAC Supply and Return Fans	N	Updates to code language.	N/A

Measure # and Name		Errata?	Brief description of what changed	Tracker Item(s)
4.4.27	Energy Recovery Ventilator	N	Updates to code language.	N/A
4.4.28	Stack Economizer for Boilers Serving HVAC Loads	N	Reliability Review. Minor clarifications added	N/A
4.4.29	Stack Economizer for Boilers Serving Process Loads	N	Clarification added to measure life to be consistent with change made in 4.4.28.	N/A
4.4.33	Commercial & Industrial Air Curtain	N	Reliability Review. Edited to include Commercial as well as Industrial air curtains. Additional size options added. Deemed HVAC efficiencies provided.	<a href="#">Commercial Air Curtain</a>
4.4.34	Destratification Fan	N	Reliability Review. Updated efficiency table with code updates	N/A
4.4.38	Covers and Gap Sealers for Room Air Conditioners	N	Addition of tables if floor of AC is unknown. <del>Update to example calculations with new EFLH assumptions.</del>	<a href="#">Room AC Covers - Algorithm Modification for Number of Floors</a>
4.4.40	Gas High Efficiency Single Package Vertical Air Conditioner	N	Update to EFLH assumptions to match multifamily assumptions in Residential volume. Example calculations updated.	N/A
<del>4.4.43</del>	<del>Packaged RTU Sealing</del>	<del>N</del>	<del>Update to example calculations with new EFLH assumptions.</del>	<del>N/A</del>
4.4.44	Commercial Ground Source and Ground Water Source Heat Pump	N	Reliability Review. Updates to code language. <del>Fix to new construction example calculation.</del>	N/A
4.4.48	Small Commercial Thermostats	N	Example added. <del>Update to example calculations with new EFLH assumptions.</del>	<a href="#">Add Calculation examples to more measures</a>
4.4.51	Advanced Rooftop Controls with High Rotor Pole Switch Reluctance Motors	Y	Addition of load factor and motor efficiency into the energy savings algorithm since study used is calculated on brake horsepower and not nominal horsepower. Updates to code language.	<a href="#">Advanced Rooftop Controls with High Rotor Pole Switch Reluctance Motors</a>
4.4.53	HVAC Supply, Return and Exhaust Fans – Fan Energy Index	N	Reliability Review. No updates recommended.	N/A
4.4.54	Process Heating Boiler	Y	Update to baseline after the 2023 Federal Standard update was vacated.	<a href="#">Federal Standard for Commercial Boilers</a>
4.4.55	Commercial Gas Heat Pump	N	Reliability Review. Updates to code language.	N/A

Measure # and Name		Errata?	Brief description of what changed	Tracker Item(s)
			Update to T <sub>in</sub> assumption. <del>Update to example calculations with new EFLH assumptions.</del>	
4.4.56	Commercial Duct Sealing	N	Fixing labelling issue of Avg_Htg_OAT and Avg_Duct_Htg_SAT. <del>Update to example calculations with new EFLH assumptions.</del>	N/A
4.4.57	Condensate Recovery System	N	Fix error in default measure cost. TAC determined this does not need to be an errata.	N/A
4.4.59	Ductless Heat Pumps	N	Measure removed and combined with 4.4.9 Air and Water Source Heat Pump System (Centrally Ducted and Ductless)	N/A
4.4.60	<del>Variable Refrigerant Flow HVAC System</del>	<del>N</del>	<del>Update to example calculations with new EFLH assumptions.</del>	<del>N/A</del>
4.4.62	Cooling Tower Water Side Economizer	N	Reliability Review. Minor clarifications added	N/A
4.4.65	Computer Room Air Conditioner (CRAC)	N	New measure	N/A
4.4.66	Steam Leak Repair	N	New Measure. Clarification of measure life providing 6 years for steam traps and mechanical components but 18 years for welding/piping fixes. <b>Additional edits made to Description, Definition of Efficient and Baseline conditions. Default cost added. Addition of Commercial Dry Cleaners and additional Low Pressure Steam options (consistent with other leak repair measures).</b>	<a href="#">Add Measure for Steam Leak Fix-it-Now</a>
4.5	Lighting End Use	N	<del>Updates to Waste Heat Factors based on TMYx climate data and utilizing latest version of OpenStudio (3.6.1).</del>	N/A
4.5.2	Fluorescent Delamping	N	<del>Examples updated to use new WHFs.</del>	N/A
4.5.4	LED Bulbs and Fixtures	N	Addition of mogul LED ISR assumption. Clarification of measure life for lamps impacted by EISA to limit at 8 years. Examples updated to use correct WHFs.	<a href="#">BUS LED - Update Mogul LED ISRs</a>
4.5.5	Commercial LED Exit Signs	N	Examples updated to use correct WHFs.	N/A
4.5.7	Lighting Power Density	N	Updates to code language.	N/A

Measure # and Name		Errata?	Brief description of what changed	Tracker Item(s)
4.5.10	Lighting Controls	N	Example added. Added Energy Savings Factor assumptions for Exterior Networked Lighting Controls; with LLLC, without LLLC and unknown. <del>Examples updated to use new WHFs.</del>	<a href="#">Add Calculation examples to more measures</a>
4.5.13	Occupancy Controlled Bi-Level Lighting Fixtures	Y	Reliability Review. Clarification that measure is limited to 24/7 operation and therefore CFbaseline fixed to 1.0.	N/A
4.5.16	LED Streetlighting	N	Reliability Review. No updates recommended.	N/A
4.6.2	Beverage and Snack Machine Controls	N	Reliability Review. No updates recommended.	N/A
4.6.4	Electronically Commutated Motors (ECM) for Walk-in and Reach-in Coolers/Freezers	N	Reliability Review. Measure cost update	N/A
4.6.5	ENERGY STAR Refrigerated Beverage Vending Machine	N	Reliability Review. Minor clarifications added	N/A
4.6.6	Evaporator Fan Control for Electrically Commutated Motors	N	Reliability Review. No updates recommended.	N/A
4.6.8	Refrigeration Economizers	Y	Fixed analysis error where condenser fan savings had not been appropriately adjusted to reflect Illinois climate.	<a href="#">4.6.8 - Refrigeration Economizers</a>
4.6.12	Variable Speed Drive for Condenser Fans	N	Reliability Review. Minor clarifications added	N/A
4.6.15	Zero Energy Doors for Refrigerated Cases	N	New measure	<a href="#">New Measure- Zero Energy Refrigerated Case Doors</a>
4.6.16	Door Gaskets for Walk-in and Reach-in Coolers and Freezers	N	New measure	<a href="#">Door Gaskets for Walk-in and Reach-in Coolers and Freezers</a>
4.7.3	Compressed Air No-Loss Condensate Drains	N	Reliability Review. Measure life update. Coincident Factor update.	N/A
4.7.4	Efficient Compressed Air Nozzles	N	Example added.	<a href="#">Add Calculation examples to more measures</a>



Measure # and Name		Errata?	Brief description of what changed	Tracker Item(s)
4.7.12	AODD Pump Controls	N	Reliability Review. Provided default assumptions for the system power reduction per air demand if compressor control type unknown.	N/A
4.7.13	Compressed Air Leak Repair	N	Example added.	<a href="#">Add Calculation examples to more measures</a>
4.8.1 (previously 4.8.2)	Roof Insulation for C&I Facilities	N	Updates to code language. Addition of loadshapes C04 Commercial Electric Heating and C05 Commercial Electric Heating and Cooling.	N/A
4.8.2 (previously 4.8.12)	Spring Loaded Garage Door Hinge	N	<del>Update to new EFLH assumptions and corresponding savings assumptions.</del>	N/A
4.8.4 (previously 4.8.27)	C&I Air Sealing	N	Change of heating/cooling load methodology to be EFLH * ΔT (as opposed to using HDD/CDDs) to better reflect different commercial building types and to align with Roof Insulation measure.  <del>Update to example calculations with new EFLH assumptions.</del>	N/A
4.8.7 (previously 4.8.30)	Commercial Wall Insulation	N	Measure cost updates.  Change of heating/cooling load methodology to be EFLH * ΔT (as opposed to using HDD/CDDs) to better reflect different commercial building types and to align with Roof Insulation measure.  <del>Update to example calculations with new EFLH assumptions.</del>	N/A
4.8.8	Commercial Secondary Windows	N	New measure	<a href="#">(4.8.New) Commercial Secondary Windows</a>
4.9.4 (previously 4.8.5)	High Speed Clothes Washer	N	Additional options for high speed clothes washer upgrades.	<a href="#">High Speed Clothes Washers - Additional Options</a>
4.9.8 (previously 4.8.9)	High Frequency Battery Chargers	Y	Fixed error in kW algorithm.	N/A
		N	Update to measure cost. Adjustment to savings factors resulting in reduction in savings.	N/A

Measure # and Name		Errata?	Brief description of what changed	Tracker Item(s)
			Addition of EREP as applicable market and "Actuals" to many variables. Updated calculated values using higher number of significant figures.	
4.9.11 (previously 4.8.13)	Variable Speed Drives for Process Fans	N	Reliability Review. Updates to code language.	N/A
4.9.13 (previously 4.8.15)	Smart Irrigation Controls	N	Example added.	<a href="#">Add Calculation examples to more measures</a>
4.9.15 (previously 4.8.18)	ENERGY STAR Low Wattage Uninterruptible Power Supply	N	Restriction of measure to low wattage applications (less than or equal to 1,875 watts). Savings updated utilizing the latest ENERGY STAR qualified product list.	<a href="#">Data Center Efficient UPS/(Uninterruptible Power Supply)</a>
4.9.16 (previously 4.8.19)	Energy Efficient Rectifier and High Wattage UPS	N	Addition of high wattage UPS applications (greater than 1,875 watts).	<a href="#">Baseline UPS efficiency tables are not valid at larger sizes</a>
4.9.19 (previously 4.8.22)	Smart Sockets	N	Reliability Review. No updates recommended.	N/A
4.9.20 (previously 4.8.23)	Lithium Ion Forklift Batteries	N	Reliability Review. No updates recommended.	N/A
4.9.21 (previously 4.8.24)	Building Operator Certification	N	Reliability Review. No updates recommended.	N/A
4.9.22 (previously 4.8.25)	Warm-Mix Asphalt Chemical Additives	Y	Reliability Review. Fixed error in SF table for Additives.	N/A
4.9.24	Elevator Modernization	N	New measure	<a href="#">Elevator Modernization</a>
<b>Volume 3 – Residential Measures</b>				
5.1.1	ENERGY STAR Air Purifier/Cleaner	N	Reliability Review. Addition of ENERGY STAR Most Efficient. Update to Federal Standard. Default savings update. <b>Typo in footnote about assumed age of secondhand unit fixed.</b>	<a href="#">Update Air Purifier for ENERGY STAR market conditions and DOE Conservation Standard</a>

Measure # and Name		Errata?	Brief description of what changed	Tracker Item(s)
5.1.2	ENERGY STAR Clothes Washer	Y	Fixed transcription error in electric v fuel DHW split for Peoples Gas unknown, and resultant all DU value.	N/A
		N	<p>Reliability Review. Measure cost update. Updated in draft 2. After review and discussion, decision that v12 costs likely better reflect real-world costs.</p> <p>Update to IQAdj. Update to number of cycles assumption. Updated in draft 2 and footnote clarified in draft 3. <b>Typo in footnote about assumed age of secondhand unit fixed.</b></p> <p>Updates to %Electric_DHW and %Fossil_DHW assumption. Note under table updated relating to how to deal with joint programs. Defaults updated.</p>	<p><a href="#">Residential TRM Incremental Cost Data Assumption Review and update - Residential HVAC (Gas and Electric) End Uses Space heating, Water Heating and cooking</a></p> <p>N/A</p> <p><a href="#">Update gas &amp; electric space heat and DHW assumptions using implementation contractor data.</a></p>
5.1.3	ENERGY STAR Dehumidifier	N	Addition of Whole Home Dehumidifiers. Measure cost update. <b>Typo in footnote about assumed age of secondhand unit fixed.</b>	<a href="#">Update Dehumidifier ENERGY STAR market conditions and consider adding whole-home</a>
5.1.4	ENERGY STAR Dishwasher	Y	Fixed transcription error in electric v fuel DHW split for Peoples Gas unknown, and resultant all DU value.	N/A
		N	<p>Updates to %Electric_DHW and %Fossil_DHW assumption. Note under table updated relating to how to deal with joint programs. Update to measure cost for standard units.</p>	<a href="#">Update gas &amp; electric space heat and DHW assumptions using implementation contractor data.</a>
5.1.5	ENERGY STAR Freezer	N	<b>Typo in footnote about assumed age of secondhand unit fixed.</b>	N/A
5.1.6	ENERGY STAR, CEE Tier 2 or CEE Tier 3 Refrigerator	N	Measure cost update. <b>Typo in footnote about assumed age of secondhand unit fixed.</b>	<a href="#">Residential TRM Incremental Cost Data Assumption Review and update - Residential HVAC (Gas and Electric) End Uses Space heating, Water Heating and cooking</a>
5.1.7	ENERGY STAR and CEE Tier 2 Room Air Conditioner	Y	Update to ENERGY STAR and CEE Tier 2 specifications that came into effect in October 2023.	<a href="#">Code and Standard Updates</a>
		N	Reliability Review. Combining IQ and non-IQ version of measure.	<a href="#">Possibly merge 5.1.7 and 5.1.13 for Room AC</a>

Measure # and Name		Errata?	Brief description of what changed	Tracker Item(s)
5.1.10	ENERGY STAR Clothes Dryer	N	Update to number of cycles assumption. Updated in draft 2. <b>Typo in footnote about assumed age of secondhand unit fixed.</b>	N/A
5.1.12	Ozone Laundry	Y	Fixed transcription error in electric v fuel DHW split for Peoples Gas unknown, and resultant all DU value.	N/A
		N	Updates to %Electric_DHW and %Fossil_DHW assumption. Note under table updated relating to how to deal with joint programs. Update to number of cycles assumption. Hours assumption aligned and MF assumption added.	<a href="#">Update gas &amp; electric space heat and DHW assumptions using implementation contractor data.</a>
5.1.13	Income Qualified: ENERGY STAR and CEE Tier 2 Room Air Conditioner	Y	Update to ENERGY STAR and CEE Tier 2 specifications that came in to effect in October 2023.	N/A
		N	Measure removed and combined with 5.1.7 ENERGY STAR and CEE Tier 2 Room Air Conditioner	<a href="#">Possibly merge 5.1.7 and 5.1.13 for Room AC</a>
5.1.14	Residential Induction Cooking Appliances	N	Updates to %ElectricHeat and %FossilHeat assumption. Note under table updated relating to how to deal with joint programs.	<a href="#">Update gas &amp; electric space heat and DHW assumptions using implementation contractor data.</a>
5.1.15	Residential Bolt-On Smart Dryer Sensor	N	Reliability Review. Minor clarifications added Update to number of cycles assumption.	N/A
5.1.17	ENERGY STAR All-in-One Clothes Washer-Dryer	N	New measure Update to number of cycles assumption.	<a href="#">All-in-one Washer/Electric Dryer and All-in-one Washer/Heat Pump Dryer</a>
5.2.1	Advanced Power Strip – Tier 1	N	Clarification on direct install installations.	<a href="#">Define DI installation guidelines</a>
5.2.3	ENERGY STAR Televisions	N	Reliability Review. Minor clarifications added	N/A
5.3.1	Centrally Ducted Air Source Heat Pump (Central, Ductless and Portable)	N	Addition of Portable Heat Pumps. Cooling EFLH for portable heat pumps in non-IQ updated to use Room AC values. HeatLoadFactor for portable HPs set at 47F switchover temperature.  Clarification that CEER is used for room AC and portable HPs.  Addition of full load hour assumption for ductless minisplit HPs providing supplemental cooling or portable heat pumps.	<a href="#">Portable Heat Pumps</a>  <a href="#">Clarify treatment of zone-specific Residential Heat Pumps</a>  <a href="#">Furnace/Boiler - AFUE Exist Default and Derating</a>  <a href="#">Update Heat Pump measure for simultaneous operation</a>

Measure # and Name		Errata?	Brief description of what changed	Tracker Item(s)
			<p>Footnote added to instruct user to use Supplemental EFLHs when calculating Full Displacement for ductless ASHPs &lt;kBtuh.</p> <p>Clarification of Fe term.</p> <p>Clarification that unknown efficiency ratings should not be derated by age.</p> <p>Clarification that partial displacement with simultaneous operation should use HeatLoadFactor and PDAdj of 1.</p> <p>Clarification that cold climate heat pumps likely to be full displacement and therefore use 1.</p> <p>For portable heat pumps, clarification that unless its confirmed that unit will be used through heating system, HeatLoadFactor at switchover temperature of 47F should be used.</p> <p>Example calculations updated to reflect current algorithms.</p>	
5.3.2	Boiler Pipe Insulation	N	Reliability Review. Measure life and measure cost update.	N/A
5.3.3	Central Air Conditioning	N	<p>Addition of assumptions for mobile homes.</p> <p>Clarification that unknown efficiency ratings should not be derated by age.</p> <p>Existing unit efficiency assumption updated to 9.2 SEER2 and 7.4EER2 to align with the ASHP measure and the referenced document.</p>	<p><a href="#">CAC for Mobile Homes</a></p> <p><a href="#">Furnace/Boiler - AFUE Exist Default and Derating</a></p>
5.3.4	Duct Insulation and Sealing	N	<p>Addition of methodology for duct insulation savings.</p> <p>Clarification of multifamily application.</p> <p>Updates to %ElectricHeat and %FossilHeat assumption. Note under table updated relating to how to deal with joint programs.</p>	<p><a href="#">Add Measure for Residential Duct Insulation</a></p> <p><a href="#">Multifamily Common Use Spaces</a></p> <p><a href="#">Update gas &amp; electric space heat and DHW assumptions using implementation contractor data.</a></p>
5.3.6	Gas High Efficiency Boiler	N	<p>Clarification that unknown efficiency ratings should not be derated by age.</p> <p>Measure cost update.</p>	<p><a href="#">Furnace/Boiler - AFUE Exist Default and Derating</a></p> <p><a href="#">Residential TRM Incremental Cost Data Assumption Review and update - Residential</a></p>

Measure # and Name		Errata?	Brief description of what changed	Tracker Item(s)
				<a href="#">HVAC (Gas and Electric) End Uses Space heating, Water Heating and cooking</a>
5.3.7	Gas High Efficiency Furnace	N	Clarification that unknown efficiency ratings should not be derated by age.  Measure cost update.	<a href="#">Furnace/Boiler - AFUE Exist Default and Derating</a>  <a href="#">Residential TRM Incremental Cost Data Assumption Review and update - Residential HVAC (Gas and Electric) End Uses Space heating, Water Heating and cooking</a>
5.3.8	Ground Source Heat Pump	N	Clarification of multifamily application.  Clarification that unknown efficiency ratings should not be derated by age.  Update to Household assumption (number of people) based on draft Baseline Study Data.	<a href="#">Multifamily Common Use Spaces</a>  <a href="#">Furnace/Boiler - AFUE Exist Default and Derating</a>
5.3.9	High Efficiency Bathroom Exhaust or Radon Mitigation Fan	N	Addition of Radon mitigation fan.	<a href="#">Radon Mitigation - Energy Star fans</a>
5.3.10	HVAC Tune Up (Central Air Conditioning or Air Source Heat Pump)	N	Proposed edits provided to provide an a-la-carte selection of tune-up measures with new savings factors. This needs to be discussed in the IQ Working Group and/or TAC in the next phase.  After discussion with IQ Working Group and TAC, decision NOT to move forward with these edits this year. If programs design program with specific requirements for tune-up activities, we will work on reflecting this in a future iteration.  Clarification of multifamily application.	<a href="#">Multifamily Common Use Spaces</a>
5.3.11	Programmable Thermostats	N	Reliability Review. Minor clarifications added Clarification of multifamily application.	<a href="#">Multifamily Common Use Spaces</a>
5.3.13	Residential Furnace Tune-Up	Y	Typo fix in algorithm – 100,000 Btu per therm.	<a href="#">Res Furnace Tune-up Typo</a>
		N	Reliability Review. No updates recommended.	N/A
5.3.16	Advanced Thermostats	N	Clarification of multifamily application.  ISR for self install added.	<a href="#">Multifamily Common Use Spaces</a>  <a href="#">Update to ISR For Self-install Smart Thermostats with no verification</a>

Measure # and Name		Errata?	Brief description of what changed	Tracker Item(s)
5.3.17	Gas High Efficiency Combination Boiler	N	Update to Household assumption (number of people) based on draft Baseline Study Data. Unknown value added.	N/A
5.3.20	Residential Energy Recovery Ventilator (ERV)	Y	Remove erroneous 24 factor from cooling algorithm.	N/A
		N	Reliability Review. Update to loadshape. Update to HDD and CDD based on updated climate data.  Updates to %ElectricHeat and %GasHeat assumption. Note under table updated relating to how to deal with joint programs.	N/A  <a href="#">Update gas &amp; electric space heat and DHW assumptions using implementation contractor data.</a>
5.4.1	Domestic Hot Water Pipe Insulation	Y	Fixed transcription error in electric v fuel DHW split for Peoples Gas unknown, and resultant all DU value.	N/A
		N	Reliability Review. Update to measure life.  Updates to %Electric_DHW and %Fossil_DHW assumption. Note under table updated relating to how to deal with joint programs.	N/A  <a href="#">Update gas &amp; electric space heat and DHW assumptions using implementation contractor data.</a>
5.4.2	Gas Water Heater	N	Reliability Review. Update to measure life and measure cost. Update to Household assumption (number of people) based on draft Baseline Study Data. Unknown value added.	N/A
5.4.3	Heat Pump Water Heaters	N	Adjustment to the % heat removed from surrounding air that results in increased heating loan.  Updates to %ElectricHeat and %FossilHeat assumption. Note under table updated relating to how to deal with joint programs.  Update to Household assumption (number of people) based on draft Baseline Study Data. Unknown value added.	<a href="#">HPWH - v.13 - Heating System Interactive Effect</a>  <a href="#">Update gas &amp; electric space heat and DHW assumptions using implementation contractor data.</a>
5.4.4	Low Flow Faucet Aerators	Y	Fixed transcription error in electric v fuel DHW split for Peoples Gas unknown, and resultant all DU value.	N/A
		N	Reliability Review. Update to Direct Install ISR.	<a href="#">Updates to MF Direct Install Values</a>

Measure # and Name		Errata?	Brief description of what changed	Tracker Item(s)
			<p>Updates to %Electric_DHW and %FossilDHW assumption. Note under table updated relating to how to deal with joint programs.</p> <p>Update to Household assumption (number of people) based on draft Baseline Study Data. Unknown value added.</p>	<a href="#">Update gas &amp; electric space heat and DHW assumptions using implementation contractor data.</a>
5.4.5	Low Flow Showerheads	Y	Fixed transcription error in electric v fuel DHW split for Peoples Gas unknown, and resultant all DU value.	N/A
		N	<p>Reliability Review. Update to Direct Install ISR.</p> <p>Updates to %Electric_DHW and %FossilDHW assumption. Note under table updated relating to how to deal with joint programs.</p> <p>Removal of Low Flow GPM table and left as custom value. Update to Household assumption (number of people) based on draft Baseline Study Data. Unknown value added.</p>	<p><a href="#">Updates to MF Direct Install Values</a></p> <p><a href="#">Update gas &amp; electric space heat and DHW assumptions using implementation contractor data.</a></p>
5.4.8	Thermostatic Restrictor Shower Valve	Y	Fixed transcription error in electric v fuel DHW split for Peoples Gas unknown, and resultant all DU value.	N/A
		N	<p>Reliability Review. Updated measure cost.</p> <p>Updates to %Electric_DHW and %FossilDHW assumption. Note under table updated relating to how to deal with joint programs.</p> <p>Update to Household assumption (number of people) based on draft Baseline Study Data. Unknown value added.</p>	<p>N/A</p> <p><a href="#">Update gas &amp; electric space heat and DHW assumptions using implementation contractor data.</a></p>
5.4.9	Shower Timer	Y	Fixed transcription error in electric v fuel DHW split for Peoples Gas unknown, and resultant all DU value.	N/A
		N	Updates to %Electric_DHW and %FossilDHW assumption. Note under table updated relating to how to deal with joint programs.	<a href="#">Update gas &amp; electric space heat and DHW assumptions using implementation contractor data.</a>



Measure # and Name		Errata?	Brief description of what changed	Tracker Item(s)
			Update to Household assumption (number of people) based on draft Baseline Study Data. Unknown value added.	
5.4.11	Drain Water Heat Recovery	N	Update to Household assumption (number of people) based on draft Baseline Study Data. Unknown value added.	N/A
5.4.12	Recirculating Pump Controls	N	Reliability Review. Updated measure cost. Assumptions updated to reflect residential applications. Unknown assumptions added. Update to Household assumption (number of people) based on draft Baseline Study Data.	N/A
5.4.13	Auto-Diverting Tub Spout System	N	New measure Update to Household assumption (number of people) based on draft Baseline Study Data. Unknown value added.	<a href="#">Add Measure for Auto Diverting Tub Spout System</a>
5.5.10	Holiday String Lighting	N	Reliability Review. No updates recommended.	N/A
5.5.11	LED Nightlights	N	Reliability Review. Replacement of 3 year ISR to single lifetime ISR assumption.	N/A
5.5.12	Connected LED Lamps	N	Removal of erroneous default wattage and replacement with standard lumen range/wattage table. Note our understanding is this is always actual wattage.	N/A
5.6.1	Air Sealing	N	Additional footnote to explain why n-factor and Latent Multipliers use different locations for zone 4 and 5. Clarification for prescriptive measure installation locations.  Clarification of multifamily application.  Updates to %ElectricHeat and %FossilHeat assumption. Note under table updated relating to how to deal with joint programs.  Clarification that unknown efficiency ratings should not be derated by age.	<a href="#">Define DI installation guidelines</a>  <a href="#">Multifamily Common Use Spaces</a>  <a href="#">Update gas &amp; electric space heat and DHW assumptions using implementation contractor data.</a>
5.6.2	Basement Sidewall Insulation	N	Reliability review.	N/A
5.6.3	Floor Insulation Above Crawlspace		Clarification of multifamily application.	<a href="#">Multifamily Common Use Spaces</a>

Measure # and Name		Errata?	Brief description of what changed	Tracker Item(s)
5.6.4	Wall Insulation		Updates to %ElectricHeat and %FossilHeat assumption. Note under table updated relating to how to deal with joint programs.	<a href="#">Update gas &amp; electric space heat and DHW assumptions using implementation contractor data.</a>
5.6.5	Ceiling/Attic Insulation			
5.6.6	Rim/Band Joist Insulation		Clarification that unknown efficiency ratings should not be derated by age.	
5.6.7	Low-E Storm Window	N	Clarification of multifamily application.	<a href="#">Multifamily Common Use Spaces</a>
5.6.8	High Performance Windows	Y	Fixed transcription error in savings tables for single pane windows.	N/A
		N	Removal of Retrofit as applicable program type. Clarification of baseline for Time of Sale applications. Update of code level windows to include IECC 2021 levels. Note the savings assumptions from a 2021 IECC baseline have been requested and should be provided in the third deliverable. Values are now provided in Draft 3.	<a href="#">5.6.8 High Performance Windows Update</a>
5.6.9	Insulated Cellular Shades	N	Clarification of multifamily application. Clarification that unknown efficiency ratings should not be derated by age.	<a href="#">Multifamily Common Use Spaces</a>
5.6.11	Insulated Concrete Forms	N	Updates to %ElectricHeat and %FossilHeat assumption. Note under table updated relating to how to deal with joint programs. Clarification of multifamily application. Clarification that unknown efficiency ratings should not be derated by age.	<a href="#">Update gas &amp; electric space heat and DHW assumptions using implementation contractor data.</a> <a href="#">Multifamily Common Use Spaces</a>
5.7.1	High Efficiency Pool Pumps	N	Reliability review. Assumptions updated based on updated QPL.	N/A
5.7.2	Low Flow Toilets	N	Reliability Review. Update to Household assumption (number of people) based on draft Baseline Study Data. Unknown value added.	N/A
5.7.3	Level 2 Electric Vehicle Charger	N	Reliability Review. No updates recommended.	N/A
5.7.5	Tree Planting	N	Clarification of multifamily application. Updates to %ElectricHeat and %FossilHeat assumption. Note under table updated relating to how to deal with joint programs.	<a href="#">Multifamily Common Use Spaces</a> <a href="#">Update gas &amp; electric space heat and DHW assumptions using implementation contractor data.</a>

Measure # and Name		Errata?	Brief description of what changed	Tracker Item(s)
5.7.6	Light Duty Electric Vehicle	N	New measure Measure removed as per requester (Ameren)	<a href="#">Electric Vehicles/EV Efficiency</a>
<b>Volume 4 – Cross-Cutting Measures and Attachments</b>				
6.1.1	Adjustments to Behavior Savings to Account for Persistence		Addition of Retention Rates for when first year savings are negative.	<a href="#">Clarification to Retention Rate and a Wave with Negative Savings</a>

The following table provides a list of those tracker items still pending with progress made to date and those requests that have not resulted in a change.

Tracker Items:	Comments
Clarify efficiency calculation for commercial boilers and furnaces	Question about why the formula in this measure includes efficiency terms as: $(\text{EFF}_{\text{new}} - \text{EFF}_{\text{base}}) / \text{EFF}_{\text{base}}$ , while other measure use $(1/\text{EFF}_{\text{base}} - 1/\text{EFF}_{\text{new}})$ . Difference is because CACs and HPs tend to be rated in output capacity, while boilers/furnaces tend to be rated in input capacity. Discussed and resolved on TAC 05/13.
ERV Update for 2021 IECC Code	Requests for adding savings above new code minimum. Decision that this will not be completed this year. VEIC will likely be able to perform the re-analysis using the OpenStudio models in 2025.
Combined Heat and Power	TAC decided that we should wait a further year before restarting the discussions on this measure. No updates this year.
Ductless Heat Pump Demand Savings	Request to add demand savings algorithm to the commercial ductless heat pump measure. This measure has now been combined with the 4.4.9 Air and Water Source Heat Pump measure.
ENERGY STAR Clothes Dryer	Item indicating that the ENERGY STAR specification is being updated (to v2). The specification update is still pending any will likely be multiple years before it is effective.
Update HVAC Tune-up Measure	A small cross utility/evaluator group met to discuss potential updates to future tune-up programs. VEIC prepared proposed edits in draft 2 including providing a-la-carte options for savings for different tune up components, <b>however the TAC decided not to adopt the savings and that programs should first determine the specifications for any future tune-up program that can then be characterized.</b>
HVAC Tune-Up Measure Adjust	
Update gas heating measures to apply to hybrid gas + electric heat pump configurations	Duplicate of another request.
EUL assumptions for IQ populations	Ongoing discussion in IQ working group on potential changes to IQ measure lives.
Use Standard Algebraic Expressions	On hold until a decision for any potential future change to the TRM format.
Label Equations and Tables	On hold until a decision for any potential future change to the TRM format.

Tracker Items:	Comments
Review climate data and assumptions	Updates to commercial modeling outputs using new TMYx data were put on hold. The TAC was not comfortable with some of the changes to the model outputs and decided to have a Working Group set up in 2025 to review the models and recalculate using the new climate data.
Reliability Review v13	VEIC performed a reliability review on 76 measures.
IQ Systematic Review	No further updates forthcoming.
Residential Electric Water Heater	Items not being pursued as per requestor. Some may be reviewed again in v14.
Commercial Chillers	
Commercial Heat Pumps	
Integrated Variable Frequency Drives	
Residential Heat Pump	
Update Res HP Measure Factors	
Update unknown assumptions for space heat & water heating	
Update Showerhead GPM Low Table	
5.7.4 Heat Pump Pool Heater Update	
IQ Behavior program - Enhanced Energy Education	
Heat Pump Market Adder	
Commercial Water Heater Timer	
Thermal Energy Storage System	
Efficient Rooftop Unit	
Laundry Center	
High Lumen Screw Based Garage Lights	
Cordless pruners	
Pruning chainsaws	
<a href="#">PROVISIONAL On Demand Package Sealer</a>	No significant uptake of measure or evaluation effort. No updates at this time.
<a href="#">PROVISIONAL Energy efficient hydraulic oils</a>	No significant uptake of measure or evaluation effort. No updates at this time.
<a href="#">PROVISIONAL Energy Efficient Gear Oils</a>	No significant uptake of measure or evaluation effort. No updates at this time.