

**MEMORANDUM**

**TO:** IOWA TRM OVERSIGHT COMMITTEE

**FROM:** CHERYL JENKINS, PROJECT MANAGER and ASA PARKER, TECHNICAL LEAD - VEIC

**SUBJECT:** IOWA TRM VERSION 4.0 – 5<sup>TH</sup> DELIVERABLE: FINAL TRM

**DATE:** 8/9/2019

**Cc:** CHAZ ALLEN - IUA

VEIC has submitted the Final v.4 of the Iowa TRM with updated and new measures. These updates have been developed, reviewed, and discussed with the Iowa TRM Technical Advisory Committee and no non-consensus items resulted.

VEIC has uploaded all documents to the SharePoint site. The full TRM includes the following documents, each with a clean Word copy, a PDF copy, and a version with redlines of all changes made from TRM v.3:

- Iowa\_TRM\_V4\_Vol\_1\_Overview\_and\_User\_Guide\_08092019
- Iowa\_TRM\_V4\_Vol\_2\_Residential\_Measures\_08092019
- Iowa\_TRM\_V4\_Vol\_3\_Nonresidential\_Measures\_08092019

Presented below is a summary table documenting all the measures that have had changed in this version, with a brief description of what has changed. No errata were identified during this update.

Measure # and Name (except where noted)	Change Description
2.1.1 Clothes Washer	Performed reliability review but no changes recommended.
2.1.2 Clothes Dryer	Updated Measure Life, Ncycles, Hours, and %Elec/%Gas assumptions
2.1.5 Refrigerator and Freezer Recycling	Change in measure life and update to deemed savings values based on more recent dataset.
2.2.2 Tier 2 Advanced Power Strips (APS) – Residential Audio Visual	Added description of two distinct control strategies. Added TOS costs. Moved from product specific to control specific savings assumptions.
2.3.4 Low Flow Faucet Aerators	Updated measure life, TOS incremental cost, household size, and deemed savings values. Revised the recovery efficiency of heat pump water heaters from 280% to 200% to align with the Low Flow Showerheads measure.
2.3.5 Low Flow Showerheads	Updated reference (not value) for measure life, household size and deemed savings values.
2.4.1 Central Air Source Heat Pump	Clarified heating capacity input rating conditions. Clarified cooling capacity input rating conditions.
2.4.4 Furnace	Added a separate Definition of Baseline Equipment for early replacement.

Measure # and Name (except where noted)	Change Description
2.4.5 Furnace Blower Motor	Correct Furnace measure number reference in Deemed Measure Cost section. Measure retired.
2.4.6 Ground Source Heat Pump	Incremental cost update.
2.4.7 Ductless Heat Pump	Corrected EERexist table and flagged for potential errata.
2.4.14 Furnace Tune-up	Increased lifetime to 2 years.
2.4.15 Geothermal Source Heat Pump Tune-Up	Measure retired.
2.4.17 Programmable Thermostats	Updated measure life. Added note as to why we continue to use 2009 RECS data due to better specificity than data in 2015. Updated %savings adjustment and resulting values.
2.4.18 Advanced Thermostat	Fixed typo. Adjusted to be consistent with IL TRM cooling savings assumption. Additional discussions and evaluation efforts to further improve this assumption will not be complete until after this IA review cycle.
2.4.19 Duct Insulation	Included 15% reduction in duct efficiency if ducts are not sealed. Also added unknown assumption to be a sealed duct. Edited headers in nHeating table for consistency and carried all nHeat values to two decimal places.
2.4.20 Advanced Thermostat Optimization Services	Adjusted to be consistent with IL TRM cooling savings assumption. Updated Cooling <sup>OptimizedReduction</sup> assumption based on new information specific to cooling savings.
2.5.3 LED Lamp – Standard	Clarified timing of baseline adjustment relating to the EISA Backstop provision to 1/1/2021. Updated ISR assumptions based on additional data from Illinois. Recalc of O&M Costs
2.5.4 LED Lamp - Specialty	Adjusted timing of baseline adjustment relating to the EISA Backstop provision due to uncertainty around final application to 1/1/2025. (Pushed back 1 year from first draft) Updated ISR, hours and CF assumptions based on additional data from Illinois. Recalc of O&M Costs (Recalculated based on 2025 shift)
2.5.6 LED Fixtures	Clarified timing of baseline adjustment relating to the EISA Backstop provision to 1/1/2021. Recalc of O&M Costs
2.6.2 Attic Ceiling Insulation	Included unknown assumption for sealed ducts, which removes a 15% reduction assumption used for unsealed ductwork. TRM now provided both sealed and unsealed ductwork options. Updated the cooling efficiency table to also include unsealed assumptions, which reduces SEER by 15%. Edited headers in nHeating table for consistency and carried all nHeat values to two decimal places.
2.6.3 Rim Band Joist Insulation	Included unknown assumption for sealed ducts, which removes a 15% reduction assumption used for unsealed ductwork. TRM now

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	provided both sealed and unsealed ductwork options. Updated the cooling efficiency table to also include unsealed assumptions, which reduces SEER by 15%. Edited headers in nHeating table for consistency and carried all nHeat values to two decimal places.
2.6.4 Wall Insulation	Included unknown assumption for sealed ducts, which removes a 15% reduction assumption used for unsealed ductwork. TRM now provided both sealed and unsealed ductwork options. Updated the cooling efficiency table to also include unsealed assumptions, which reduces SEER by 15%. Edited headers in nHeating table for consistency and carried all nHeat values to two decimal places.
2.6.5 Insulated Doors	Included unknown assumption for sealed ducts, which removes a 15% reduction assumption used for unsealed ductwork. TRM now provided both sealed and unsealed ductwork options. Updated the cooling efficiency table to also include unsealed assumptions, which reduces SEER by 15%. Edited headers in nHeating table for consistency and carried all nHeat values to two decimal places.
2.6.1 Infiltration Control 2.6.5 Insulated Doors 2.6.6 Floor Insulation Above Crawlspace 2.6.7 Basement Sidewall Insulation 2.6.8 Efficient Windows 2.6.9 Window Insulation Kits 2.6.10 Storm Windows	Added language in description and table headers: If sealing of ducts is unknown, the sealed efficiency should be used. Provided efficiency options for unsealed ducts to be 85% less for heating and cooling. Edited headers in nHeating table for consistency and carried all nHeat values to two decimal places.
2.7.1 Residential Pool Pumps	Revised to recognize ENERGY STAR 2.0 specifications. Removed k prefixes in WEF definitions and added footnote for clarification.
3.1.1 Circulation Fans	Corrected table header type and removed reference to rating conditions, as they are not applicable.
3.1.5 Automatic Milker Take Off	Updated default number of milking cows based on newer 2012 data.
3.1.6 Dairy Scroll Compressor	Updated default number of milking cows based on newer 2012 data.
3.1.10 Grain Dryer	Revision to capacity specifications for program qualifying equipment.
3.1.12 Low Pressure Irrigation	Added definition for <i>Pressure</i> variable in Electric Energy Savings algorithm.
3.1.13 VFD for Dairy Vacuum Pump and Milking Machine	Defined and specified a missing variable to quantify the default number of milkings per day. Updated default number of milking cows based on newer 2012 data.
3.1.14 Dairy Plate Cooler	Updated default number of milking cows based on newer 2012 data.
3.2.1 Low Flow Aerator	Revised the recovery efficiency of heat pump water heaters from 280% to 200% to align with the Low Flow Showerheads measure.
3.2.3 Gas Hot Water Heater	No substantive changes, minor wordsmithing.
EFLH Tables preceding measures in Section 3.3 Heating, Ventilation and Air Conditioning (HVAC)	Updated ELFH values based on available OpenStudio model outputs. Added New Construction values based on available OpenStudio outputs.

Measure # and Name (except where noted)	Change Description
3.3.3 Furnace Blower Motor	Added language to disqualify Residential Product Class equipment from measure to comply with Code of Federal Standards. Revised measure life to equal that of the remaining useful life of the furnace.
3.3.5 Geothermal Source Heat Pump	Updated baseline minimum qualifying criteria and incremental cost.
3.3.7 Electric Chiller	Updated incremental costs to reflect a newer version of NEEP data.
3.3.8 Package Terminal Air Conditioner (PTAC) and Package Terminal Heat Pump (PTHP)	New measure life and costs. New federal standard updates for PTAC cooling NC and PTHP heating NC.
3.3.11 Furnace Tune-Up	Increased lifetime to 2 years.
3.3.12 Small Commercial Programmable Thermostats	Provided examples of applicable small commercial applications.
3.3.13 VFD for HVAC Pumps	Updated incremental costs and qualifying range for motor horsepower. Updated default hours table with OpenStudio model outputs as available.
3.3.14 Variable Frequency Drives for HVAC Supply and Return Fans	Updated incremental costs and qualifying range for motor horsepower. Updated default hours table with OpenStudio model outputs as available.
3.3.15 Duct Insulation	Reworked example to avoid confusion/implications related to distribution efficiency.
3.3.16 Duct Repair and Sealing	Reworked example to avoid confusion/implications related to distribution efficiency.
3.3.19 Shut Off Damper for Space Heating Boilers or Furnaces	Revised measure life and O&M assumptions.
Lighting table preceding measure characterizations in section 3.4	Updated WHFe, WHFd, CF, WHFh, IFTherms and IFKWh values based on available OpenStudio outputs.
3.4.3 LED Standard	Clarified timing of baseline adjustment relating to the EISA Backstop provision to 1/1/2021. Updated ISR assumptions based on additional data from Illinois. Recalc of O&M Costs
3.4.4 LED Lamp Specialty	Adjusted timing of baseline adjustment relating to the EISA Backstop provision due to uncertainty around final application to 1/1/2025. (Pushed back 1 year from first draft) Updated ISR assumption based on additional data from Illinois. Recalc of O&M Costs. (Recalculated based on 2025 shift)
3.4.5 LED Fixtures	Adjusted timing of T12 midlife adjustment to 2022. Allowed for larger lumen applications by opening up highest bin based on review of available product. Added clarification for capturing instances of delamping.
3.4.9 Commercial LED Exit Sign	Revised footnote to remove mention of a superseded blended baseline of incandescent/CFL assumptions.
3.5.1 Variable Frequency Drive for Process	Updated incremental costs and qualifying range for motor horsepower. Added coincident peak demand savings algorithm.

Measure # and Name (except where noted)	Change Description
3.6.3 Pre-Rinse Spray Valve	Updated flow rates based on Federal Standard and a more recent study for DI programs. Added a measure cost for DI. Revised the specific weight of water from 8.2 to 8.33 lb./gal.
Heating and Cooling Load Hour table preceding measure characterizations in section 3.7	Updated Load Hour values based on available OpenStudio outputs.
3.7.1 Infiltration Control	Reworked example to avoid confusion/implications related to distribution efficiency.
3.7.3 Roof Insulation	Removed references to wall assemblies and provided alternative default assumptions for wood-framed Group R (residential) building types. Clarified Code and Area variable definitions. Reworked example to avoid confusion/implications related to distribution efficiency.
3.7.5 Efficient Windows	Reworked example to avoid confusion/implications related to distribution efficiency.
3.7.6 Insulated Doors	Reworked example to avoid confusion/implications related to distribution efficiency.
3.8.5 Refrigerated Beverage Vending Machine	ENERGY STAR did not meet deadline to release new spec for vending machines. Updated measure characterization to reflect the intent to update the federal baseline and efficient condition in next iteration of TRM. Otherwise, the measure is the same.
3.8.6 Refrigerator and Freezer Recycling	Change in measure life and update to deemed savings values based on more recent dataset.
All measures referencing a Summer System Peak Coincidence Factor for Cooling in sections 3.3 and 3.7	Updated Summer System Peak Coincidence Factors for Cooling values based on available OpenStudio outputs.
All measures referencing a Gas Coincidence Factor for Heating in sections 3.3 and 3.7	Updated Gas Coincidence Factors for Heating values based on available OpenStudio outputs.