

**MEMORANDUM**

**TO:** IOWA OVERSIGHT COMMITTEE AND TECHNICAL ADVISORY COMMITTEE

**FROM:** BRITTANY DAVIS, PROJECT MANAGER, JAKE AHRENS and SAM DENT, TECHNICAL LEADS - VEIC

**SUBJECT:** IOWA TRM VERSION 8.0 – FINAL DELIVERABLE

**DATE:** 7/31/2023

**Cc:** CHAZ ALLEN - IUA

VEIC has submitted the final version 8.0 Iowa 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 or comments added to all three volumes:

- Iowa\_TRM\_V8\_Vol\_1\_Overview\_and\_User\_Guide\_Draft.docx
- Iowa\_TRM\_V8\_Vol\_2\_Residential\_Measures\_Draft.docx
- Iowa\_TRM\_V8\_Vol\_3\_Nonresidential\_Measures\_Draft.docx

Presented below is a summary table documenting the measures that have been edited during this update cycle, with a brief description of what has changed and whether it is being considered errata.

Measure # and Name		Errata?	Brief description of what changed
<b>Volume 1 Overview and User Guide</b>			
N/A	Throughout	N	Updates to dates, high impact measures, language incorporating 2024-2028 energy efficiency plans, etc. Note the tables detailing v8 updates and measure sunset dates will be completed in the final version (Section 1.2 Summary of Measure Revisions; Section 1.3 Summary of Measure Sunset Dates)
<b>Volume 2 Residential Measures</b>			
N/A	Throughout	N	Non-modeling weather updates. Updated TMY3 weather data to NOAA. Updates made to CDD, HDD, Heat Days, and other variations of weather-specific variables not derived through building energy models. Updates made to the following measures: 2.1.2; 2.1.3; 2.1.4; 2.1.5; 2.3.2; 2.5.3; 2.5.4; 2.5.5; 2.5.6; 2.6.9; 3.1.1; 3.1.2; 3.1.3; 3.1.4; 3.4.12; 3.4.13; 3.4.14
N/A	Throughout	N	Clarification of output/input capacity for HVAC measures. Updates made to the following measures: 2.4.1; 2.4.2; 2.4.6; 2.4.7; 2.4.8; 2.4.11; 2.4.12; 2.4.15; 2.4.16

Measure # and Name		Errata?	Brief description of what changed
N/A	Throughout	N	Alignment of formatting of units for coincidence factors into percentages throughout the TRM.
N/A	Throughout	N	Alignment of annual hours per year throughout the TRM to 8,760 hours.
2.1.1	Clothes Washer	N	Measure was overdue for a reliability review due to measure reactivation in utilities' portfolios. Reliability review performed. Updated QPL (US DOE EERE Compliance Certification Database), which also resulted in an update to the savings. RES NREL ResStock updates to baseline/market data and weightings. Updated coincidence factor as percentage rather than decimal (fixed throughout volumes).
2.1.2	Clothes Dryer	N	Measure was overdue for a reliability review due to measure reactivation in utilities' portfolios. Reliability review performed. RES NREL ResStock updates to baseline/market data and weightings.
2.1.3	Refrigerator	N	RES NREL ResStock updates to baseline/market data and weightings. Weather data updates.
2.1.4	Freezer	N	Measure was overdue for a reliability review due to measure reactivation in utilities' portfolios. Reliability review performed. Updated measure life and incremental costs. Weighted values in TRM were based on efforts done last year for midstream applications so limited effort needed for midstream delivery update. Weather data updates. RES NREL ResStock updates to baseline/market data and weightings.
2.1.5	Refrigerator and Freezer Recycling	N	RES NREL ResStock updates to baseline/market data and weightings. Weather data updates. CDD and HDD values updated.
2.1.9	ENERGY STAR Dehumidifier	N	New measure
2.2.1	Tier 1 Advanced Power Strip (APS)	N	Update to measure lifetime.
2.2.2	Tier 2 Advanced Power Strips (APS) – Residential Audio Visual	N	Reliability review performed. Update to measure cost and lifetime
2.3.1	Gas Water Heater	N	Updated to new ENERGY STAR consumer water heater specifications.

Measure # and Name		Errata?	Brief description of what changed
2.3.2	Heat Pump Water Heater	N	RES NREL ResStock and program data for updates to baseline/market data and weightings.
2.3.4	Low Flow Faucet Aerators	N	RES NREL ResStock updates to baseline/market data and weightings.
2.3.5	Low Flow Showerheads	N	RES NREL ResStock updates to baseline/market data and weightings.
2.4.1	Central Air Source Heat Pump	N	Reliability review performed. Updated federal standards and ENERGY STAR specifications to align to the M1 Testing Method (Federal standards effective 1/1/2023 and adopted by TRM for 1/1/2024). Options were provided for both the old and new testing standards for ease of use. Old standards values are converted from the M1 method values. Cost tiers updated to provide M1 ratings. Per TAC discussion, removed no cooling as a baseline option. Included language in the measure description alerting the user as to which measure applies given the installation configuration. Provided default assumptions for midstream program application.
2.4.2	Central Air Conditioner	N	Reliability review performed. Updated federal standards and ENERGY STAR specifications to align to the M1 Testing Method (Federal standards effective 1/1/2023 and adopted by TRM for 1/1/2024). Options were provided for both the old and new testing standards for ease of use. Old standards values are converted from the M1 method values. Cost tiers updated to provide M1 ratings.
2.4.6	Geothermal Source Heat Pump	N	Reliability review performed. Updated federal standards and ENERGY STAR specifications to align to the M1 Testing Method (Federal standards effective 1/1/2023 and adopted by TRM for 1/1/2024). Options were provided for both the old and new testing standards for ease of use. Old standards values are converted from the M1 method values. Cost tiers updated to provide M1 ratings. Per TAC discussion, removed no cooling as a baseline option. Provided default assumptions for midstream program application.
2.4.7	Ductless Heat Pump	N	Reliability review performed. Updated federal standards and ENERGY STAR specifications to align to the M1 Testing Method (Federal standards effective 1/1/2023 and adopted by TRM for 1/1/2024). Options were provided for both the old and new testing standards for ease

Measure # and Name		Errata?	Brief description of what changed
			of use. Old standards values are converted from the M1 method values. Cost tiers updated to provide M1 ratings. Per TAC discussion, removed no cooling as a baseline option. Included language in the measure description alerting the user as to which measure applies given the installation configuration. Provided default assumptions for midstream program application.
2.4.9	Gas Fireplace	N	Measure was overdue for a reliability review due to measure reactivation in utilities' portfolios. Reliability review performed. Updated baseline efficiency and costs and associated references.
2.4.10	Whole House Fan	N	Due for reliability review, however since measure not currently active in any utilities' 2024-2028 energy efficiency plans, note provided after sunset date that measure needs review before use.
2.4.13	Boiler Tune-Up	N	Measure was overdue for a reliability review due to measure reactivation in utilities' portfolios. Reliability review performed. No changes recommended.
2.4.17	Programmable Thermostats	N	RES NREL ResStock updates to baseline/market data and weightings. All default savings updated. Previous version was not incorporating the % Controlled unknown value of 0.93.
2.4.18	Advanced Thermostats	N	RES NREL ResStock updates to baseline/market data and weightings.
2.5.3	LED Lamp – Standard	N	No changes recommended. Measure likely to retire.
2.5.4	LED Lamp – Specialty	N	No changes recommended. Measure likely to retire.
2.5.5	LED Exit Signs	N	Weather data updates.
2.5.6	LED Fixtures	N	No changes recommended. Measure likely to retire.
2.6.8	Efficient Windows	N	Due for reliability review, however since measure not currently active in any utilities' 2024-2028 energy efficiency plans, note provided after sunset date that measure needs review before use.
2.6.9	Window Insulation Kits	N	Weather data updates. HDD values updated.
2.7.2	Level 2 Electric Vehicle Chargers	N	New measure
<b>Volume 3 Non-Residential Measures</b>			
N/A	Throughout	N	Non-modeling weather updates. Updated TMY3 weather data to NOAA. Updates made to CDD, HDD, Heat Days, and other

Measure # and Name		Errata?	Brief description of what changed
			variations of weather-specific variables not derived through building energy models.
N/A	Throughout	N	Clarification of output/input capacity for HVAC measures. Updates made to the following measures: 3.3.4; 3.3.5; 3.3.7; 3.3.8; 3.3.23; 3.3.24
3.1.1	Circulation Fans	N	Reliability review performed. Hours updated based on new climate data.
3.1.2	Ventilation Fans	N	Hours updated based on new climate data. Impacts measure life assumption.
3.1.3	High Volume Low Speed Fans	N	Hours updated based on new climate data.
3.1.4	Temperature Based On/Off Controller	N	Hours updated based on new climate data. Impacts measure life assumption.
3.1.5	Automatic Milker Take Offs	N	Reliability review performed. No changes recommended.
3.1.6	Dairy Scroll Compressor	N	Due for reliability review, however since measure not currently active in any utilities' 2024-2028 energy efficiency plans, note provided after sunset date that measure needs review before use.
3.1.7	Heat Lamp	N	Reliability review performed. No changes recommended.
3.1.8	Heat Reclaimer	N	Reliability review performed. Removed references towards natural gas applications.
3.1.9	Heat Mat	N	Reliability review performed. No changed recommended.
3.1.11	Live Stock Waterer	N	Reliability review performed. Incremental measure costs updated.
3.1.12	Low Pressure Irrigation	N	Reliability review performed. No changed recommended.
3.1.13	Variable Speed Drive for Dairy Vacuum Pump and Milking Machine	Y	Errata. Updated algorithm to correct a sign error.
3.1.15	LED Grow Lights	N	Measure updated to include new DLC Horticultural Specifications v3.0. Incorporated a dimming variable into the savings algorithms for the installed lamps. Update to HeatDays based on new climate data.
3.1.18	ECM Ventilation Fan and Staging Controls	N	Hours updated based on new climate data. Impacts measure life assumption.
3.2.5	Pool Cover	N	Due for reliability review, however since measure not currently active in any utilities' 2024-2028 energy efficiency plans, note

Measure # and Name		Errata?	Brief description of what changed
			provided after sunset date that measure needs review before use.
3.3.1	Boiler	N	Reliability review performed. Incremental measure costs and associated references updated. Adopted federal standards for minimum baseline efficiency requirements.
3.3.4	Heat Pump Systems	N	Updated federal standards to reflect M1 Testing Method (Federal standards effective 1/1/2023 and adopted by TRM for 1/1/2024) for equipment less than or equal to 65,000 Btu/hr. Added a new algorithm to be used with smaller commercial equipment that is using the new federal testing standards.
3.3.5	Geothermal Source Heat Pumps	N	Updated federal standards to reflect M1 Testing Method (Federal standards effective 1/1/2023 and adopted by TRM for 1/1/2024) for equipment less than or equal to 65,000 Btu/hr. Provided default assumptions for midstream program application.
3.3.6	Single-Package and Split System Unitary Air Conditioners	N	Updated federal standards to reflect M1 Testing Method (Federal standards effective 1/1/2023 and adopted by TRM for 1/1/2024) for equipment less than or equal to 65,000 Btu/hr. Added a new algorithm to be used with smaller commercial equipment that is using the new federal testing standards.
3.3.7	Electric Chiller	N	Reliability review performed. Incremental measure costs and associated references updated.
3.3.10	Boiler Tune-Up	N	Measure was overdue for a reliability review due to measure reactivation in utilities' portfolios. Reliability review performed. No changes recommended.
3.3.13	Variable Frequency Drives for HVAC Pumps and Cooling Tower Fans	N	Reliability review performed. Incremental measure costs and associated references updated.
3.3.17	Chiller Pipe Insulation	N	Due for reliability review, however since measure not currently active in any utilities' 2024-2028 energy efficiency plans, note provided after sunset date that measure needs review before use.
3.3.18	Hydronic Heating Pipe Insulation	N	Reliability review performed. Incremental measure costs and associated references updated. Assumed boiler efficiency variable updated.
3.3.19	Shut Off Damper for Space Heating Boilers or Furnaces	N	Due for reliability review, however since measure not currently active in any utilities' 2024-2028 energy efficiency plans, note provided after sunset date that measure needs review before use.
3.3.27	Demand Control Ventilation	N	New measure

Measure # and Name		Errata?	Brief description of what changed
3.4.3	LED Lamp Standard	N	No changes recommended. Measure likely to retire. Update to HeatDays based on new climate data.
3.4.4	LED Lamp Specialty	N	No changes recommended. Measure likely to retire. Update to HeatDays based on new climate data.
3.4.5	LED Fixtures	N	No changes recommended. Measure likely to retire. Update to HeatDays based on new climate data.
3.4.6	T5 HO Fixtures and Lamp/Ballast Systems	N	No changes recommended. Measure likely to retire. Update to HeatDays based on new climate data.
3.4.9	Commercial LED Exit Sign	N	Reliability review performed. No changed recommended. Update to HeatDays based on new climate data.
3.4.10	LED Street Lighting	N	Reliability review performed. No changed recommended.
3.4.12	Lighting Controls	N	Update to HeatDays based on new climate data.
3.4.14	Multi-Level Lighting Switch	N	Due for reliability review, however since measure not currently active in any utilities' 2024-2028 energy efficiency plans, note provided after sunset date that measure needs review before use. Update to HeatDays based on new climate data.
3.5.2	Clothes Washer	N	Measure was overdue for a reliability review due to measure reactivation in utilities' portfolios. Reliability review performed. Updated QPL (US DOE EERE Compliance Certification Database), which also resulted in an update to the savings.
3.6.1	Dishwasher	N	Due for reliability review, however since measure not currently active in any utilities' 2024-2028 energy efficiency plans, note provided after sunset date that measure needs review before use.
3.6.3	Pre-Rinse Spray Valve	N	Reliability review performed. Updated measure baseline, incremental measure cost, Flow <sub>base</sub> and Flow <sub>ee</sub> variables.
3.6.4	Infrared Upright Broiler	N	Due for reliability review, however since measure not currently active in any utilities' 2024-2028 energy efficiency plans, note provided after sunset date that measure needs review before use.
3.6.5	Infrared Salamander Broiler	N	Measure was overdue for a reliability review due to measure reactivation in utilities' portfolios. Reliability review performed. Measure lifetime and incremental cost references updated.
3.6.6	Infrared Charbroiler	N	Due for reliability review, however since measure not currently active in any utilities' 2024-2028 energy efficiency plans, note

Measure # and Name		Errata?	Brief description of what changed
			provided after sunset date that measure needs review before use.
3.6.10	Commercial Steam Cooker	N	Updates made to measure to align with the newly released ENERGY STAR Food Service Calculator. Variables in energy savings algorithm were updated, which resulted in updated savings for electric, gas, and water savings. WaterUse variable updated to be based on steam cooker type and unknown.
3.6.11	Fryer	N	Updates made to measure to align with the newly released ENERGY STAR Food Service Calculator. Incremental measure cost updates.
3.6.12	Griddle	N	Updates made to measure to align with the newly released ENERGY STAR Food Service Calculator. Updated measure algorithm to include pre-heat energy savings. Incremental measure cost updates. Included single-sided and double-sided griddle options. Incorporated preheat energy into the energy savings equation.
3.7.2	Foundation Wall Insulation	N	Reliability review performed. Added cost descriptions for new construction applications. Included footnote reference for soil R-values.
3.7.3	Roof Insulation	N	Reliability review performed. No changed recommended.
3.7.4	Wall Insulation	N	Reliability review performed. No changed recommended.
3.7.5	Efficient Windows	N	Due for reliability review, however since measure not currently active in any utilities' 2024-2028 energy efficiency plans, note provided after sunset date that measure needs review before use.
3.7.6	Insulated Doors	N	Reliability review performed. Adjusted unknown baseline R-values from IECC 2012 back to IECC 2006. Updated references and example problems.
3.8.1	LED Refrigerator Case Light Occupancy Sensor	N	Reliability review performed. No changed recommended.
3.8.2	Door Heater Controls for Cooler or Freezer	N	Included unknown cooler type COP.
3.8.3	Efficient Motors for Walk-in Display Case Coolers / Freezers	N	Reliability review performed. Updated incremental measure costs. Changes made to a number of variables in energy savings algorithm, including duty cycle, hours, and unknown cooler type COP. This resulted in updates to the deemed savings.
3.8.4	Night Covers for Open Refrigerated Display Cases	N	Reliability review performed. No changed recommended.
3.8.5	Refrigerated Beverage Vending Machine	N	Due for reliability review, however since measure not currently active in any utilities' 2024-2028 energy efficiency plans, note



Measure # and Name		Errata?	Brief description of what changed
			provided after sunset date that measure needs review before use.
3.8.6	Refrigerator & Freezer Recycling	N	Update to heating and cooling degree days, HF and CoolF based on new climate data.
3.8.7	Scroll Refrigeration Compressor	N	Due for reliability review, however since measure not currently active in any utilities' 2024-2028 energy efficiency plans, note provided after sunset date that measure needs review before use.
3.8.8	Strip Curtain for Walk-in Coolers and Freezers	N	Due for reliability review, however since measure not currently active in any utilities' 2024-2028 energy efficiency plans, note provided after sunset date that measure needs review before use.
3.8.9	Ice Maker	N	Reliability review performed. Updated measure costs and lifetimes.
3.8.10	Efficient Motor Controls for Walk-In Display Case Coolers / Freezers	N	Reliability review performed. Updated measure costs and lifetimes.
3.8.12	Refrigeration Economizers	N	Due for reliability review, however since measure not currently active in any utilities' 2024-2028 energy efficiency plans, note provided after sunset date that measure needs review before use.

The following Tracker Items have not resulted in any changes to the TRM volumes at this time. They are listed together with the status of or outcome of TAC discussions.

Tracker Item	Provided by:	Status
Possible new measure idea?	VEIC	ENERGY STAR Dehumidifier, Level 2 Electric Vehicle Chargers, and Demand Control Ventilation measures were characterized and added to the TRM. No other proposed measures were developed due to limited stakeholder interest.
EER review between non-res / Res baseline	IPL	As discussed at the TAC on 3/29, no changes are required as these measures are shifting back to a federal standards baseline with the adoption of the new heat pump metrics.
Update all CBECs references to NREL Comstock	VEIC	VEIC prioritized the residential NREL ResStock updates for the first draft deliverable. In preparation for the second draft update, VEIC thoroughly analyzed the available ComStock data set and deemed it was not sufficient enough at the building characteristic level to provide meaningful measure updates. At this time, the market data in the TRM was updated to align with ResStock only.

Tracker Item	Provided by:	Status
Demand – Room AC	IPL	As discussed at the TAC on 3/29, it was agreed that VEIC would discontinue developing demand shift measures from inclusion into the TRM. Kurt Sempf, IPL, confirmed energy savings portion could be removed from the development list as well.
Demand – Electric Vehicle Telematics	IPL	As discussed at the TAC on 3/29, it was agreed that VEIC would discontinue developing demand shift measures from inclusion into the TRM.
Demand – Water Heater Controller	IPL	As discussed at the TAC on 3/29, it was agreed that VEIC would discontinue developing demand shift measures from inclusion into the TRM.
New Measure – Trees	VEIC	MidAmerican is not planning on claiming savings for this measure. No need to develop a prescriptive characterization. Will plan to not move forward with this new measure.
Variable Refrigerant Flow Baseline Review	VEIC	No changes recommended at this time. This measure is based on a whole building VRF measure solution. The new heat pump federal standards only effect units < 65,000 Btu/h. Because of the larger system implications, it was deemed appropriate for the baseline to continue using the current version of the state energy code, IECC 2012.
ECM Ventilation Fan and Staging Controls	VEIC	VEIC received Alliant program data on 7 ECM Ventilation Fan and Staging Controls measures, however VEIC suggest that additional data should be collected before TRM updates are proposed.
HVAC Economizers	VEIC	As discussed at TAC on 3/15, this measure is currently custom implemented and there has not been enough of an uptick in measure installations to warrant a prescriptive characterization.
Measure Review for Mid-Stream Program Compatibility	IPL	In order to align with the midstream delivery option, the following measures were updated: Non-Residential Boiler; Non-Residential Geothermal Heat Pump; Residential Central Air Source Heat Pump; Residential Geothermal Heat Pump; Residential Ductless Heat Pump
Expansion of Energy Efficiency Kit Measure Options	VEIC	As discussed at TAC on 3/15, no changes recommended at this time. There are no utilities planning to pursue additional kit measures at this time.
Data File Correction – 3.4.5 LED Fixtures	MidAmerican	A number of data file corrections were recommended by MidAmerican. These files have been updated accordingly.
Data File Correction – 2.4.2 Central Air Conditioner		
Data File Correction – 2.4.4 Furnace		
Data File Correction – 2.3.4 Low Flow Faucet Aerators		