Measure ID	Measure name	Parameter	Current PSD Value
PSD2.2.7	Natural Gas Radiant Heaters	EFLH	Varies by building type
PSD2.2.7	Natural Gas Radiant Heaters	EFLH	Varies by building type
PSD2.2.7	Natural Gas Radiant Heaters	OF - oversize factor	1.0 single-heaters, 1.1 multiple-heaters
PSD2.2.7	Natural Gas Radiant Heaters	PD - peak day savings	0.00544 X ACCF
PSD2.2.7	Natural Gas Radiant Heaters	SFR - savings fraction	0.25
PSD2.2.7	Natural Gas Radiant Heaters	nb - base efficiency	0.8 - Reference IECC 2015
PSD2.2.7	Natural Gas Radiant Heaters	nb - base efficiency	0.8 - Reference IECC 2015
PSD2.3.1	Low Voltage Dry Type Distribution Transformers	Sector (C&I, LO)	C&I

PSD2.3.1	Low Voltage Dry Type Distribution Transformers	Sector (C&I, Residential)	C&I
PSD2.6.1	Lean Manufacturing	Algorithm based on usage and site specific inputs	Savings are based on two concepts: 1. Producing more products in the same time period saves on the non-manufacturing consumption (mostly lighting); and 2. Producing more products over the same time period reduces losses in the manufacturing equipment consumption (e.g., such as less idle time and an increase in motor efficiency).

PSD2.6.1	Lean Manufacturing	Algorithm based on usage and site specific inputs	Savings are based on two concepts: 1. Producing more products in the same time period saves on the non-manufacturing consumption (mostly lighting); and 2. Producing more products over the same time period reduces losses in the manufacturing equipment consumption (e.g., such as less idle time and an increase in motor efficiency).

PSD2.6.1	Lean Manufacturing	Algorithm based on usage and site specific inputs	Savings are based on two concepts: 1.Producing more products in the same time period saves on the non-manufacturing consumption (mostly lighting); and 2.Producing more products over the same time period reduces losses in the manufacturing equipment consumption (e.g., such as less idle time and an increase in motor efficiency).
PSD2.6.2	Commercial Kitchen Equipment	Deemed savings values	Varies by equipment type
PSD2.6.2	Commercial Kitchen Equipment	Savings	Varies by equipment type
PSD2.6.2	Commercial Kitchen Equipment	Varies by equipment	Varies by equipment type
PSD2.6.2	Commercial Kitchen Equipment	Varies by equipment	Varies by equipment type

PSD2.6.3	Lost Opportunity Custom	Baseline equipment	Baseline efficiencies for individual measures are based on code or federal standards (One common code used is IECC 2015)
PSD2.6.3	Lost Opportunity Custom	Custom savings algorithms	Savings are calculated as the difference between baseline energy usage/peak demand and the energy use/peak demand after implementation of the custom measure
PSD2.6.3	Lost Opportunity Custom	Demand savings from non temperature dependent measures (SKW + WKW)	0
PSD2.6.3	Lost Opportunity Custom	Demand savings from temperature dependent measures	Summer and winter demand reductions are calculated using either a full load hourly analysis or a temperature bin analysis
PSD2.6.3	Lost Opportunity Custom	Demand savings from computer simulation models	Approved modeling software can be used to calculate summer and winter demand reductions
PSD2.6.3	Lost Opportunity Custom	Demand savings from computer simulation models	Approved modeling software can be used to calculate summer and winter demand reductions

PSD2.7.1	Cool Roof	Sector (C&I, Residential)	C&I
PSD2.7.1	Cool Roof	Sector (C&I, Residential)	C&I
PSD2.7.1	Cool Roof	Measure application type (Lost opportunity, Retrofit, etc.)	Lost opportunity
PSD2.7.1	Cool Roof	Baseline equipment	N/A
PSD2.7.1	Cool Roof	Energy efficient equipment	N/A
PSD3.1.2	Refrigerator LED	ACOP - Average Coefficient of Performance	ACOP = 2.03 for freezers and 2.69 for coolers (used for interactive effects). If existing EERs are available, then ACOP = Average EER/3.413. Where Average EER = Full Load EER/0.85. If unknown, use default values: ACOP = 2.03 for freezers and 2.69 for coolers (used for interactive effects).

PSD3.1.2	Refrigerator LED	ACOP - Average Coefficient of Performance	ACOP = 2.03 for freezers and 2.69 for coolers (used for interactive effects). If existing EERs are available, then ACOP = Average EER/3.413. Where Average EER = Full Load EER/0.85. If unknown, use default values: ACOP = 2.03 for freezers and 2.69 for coolers (used for interactive effects).
PSD3.1.2	Refrigerator LED	COP - Coefficient of Performance	COP = 1.72 for freezers and 2.29 for coolers (used to calculate interactive affects) If existing EERs are available, then COP = EER/3.413. For peak demand savings (kW), COP = 1.72 for freezers and 2.29 for coolers (used to calculate interactive affects).
PSD3.1.2	Refrigerator LED	COP - Coefficient of Performance	COP = 1.72 for freezers and 2.29 for coolers (used to calculate interactive affects) If existing EERs are available, then COP = EER/3.413. For peak demand savings (kW), COP = 1.72 for freezers and 2.29 for coolers (used to calculate interactive affects).
PSD3.1.2	Refrigerator LED	h/H - Lighting Annual Run Hours	H - used in Inputs table 3-D & h - used in Nomenclature table 3-E
PSD3.1.2	Refrigerator LED	AKW - Average Demand Savings for both Summer and Winter	0

PSD3.2.1	Water Saving Measures	Measure application type (Lost opportunity, Retrofit, etc.)	Retrofit
PSD3.2.1	Water Saving Measures	Baseline equipment	Existing pre-rinse spray valves, shower heads, and faucet aerators. Existing conditions are based on the DOE's online savings calculator: https://www.energy.gov/eere/femp/energy-cost-calculator-faucets-and-showerheads-0#output.
PSD3.2.1	Water Saving Measures	Energy efficient equipment	Pre-rinse spray valves, shower heads, and faucet aerators that have an average flow rate of 1.6 gpm (or less), 2.0 gpm, and 1.5 gpm respectively
PSD3.2.1	Water Saving Measures	Federal Energy Management Program: Energy Cost Calculator for Faucets and Showerheads	Federal Energy Management Program: Energy Cost Calculator for Faucets and Showerheads
PSD3.2.1	Water Saving Measures	AKWHw	Spray valves: 126 kWh for grocery and 957 kWh for non-grocery Showerhead: 507 kWh and Aerator: 309 kWh
PSD3.2.1	Water Saving Measures	Peak Savings	0

PSD3.2.1	Water Saving Measures	PDw	0.00321 * ACCFw
PSD3.2.8	Add Speed Control to Rooftop Unit Fan	Baseline equipment	Existing Constant Speed Rooftop Fans
PSD3.2.8	Add Speed Control to Rooftop Unit Fan	Derived via spreadsheet	Derived via spreadsheet
PSD3.2.8	Add Speed Control to Rooftop Unit Fan	Derived via spreadsheet	Derived via spreadsheet
PSD3.2.8	Add Speed Control to Rooftop Unit Fan	Derived via spreadsheet	Derived via spreadsheet

PSD3.2.8	Add Speed Control to Rooftop Unit Fan	LF - Fan Motor Load Factor	0.8
PSD3.2.8	Add Speed Control to Rooftop Unit Fan	H - Fan Run Hours	Table - HVAC Fan Motor Hours - Appendix 5
PSD3.2.8	Add Speed Control to Rooftop Unit Fan	H - Fan Run Hours	Table - HVAC Fan Motor Hours - Appendix 5

PSD3.2.8	Add Speed Control to Rooftop Unit Fan	H1 - Fan Run Hours at Stage 1	H1 = 75% x EFLHc / 50% + 75% x EFLHh / 50%
PSD3.2.8	Add Speed Control to Rooftop Unit Fan	EFLHc - Equivalent full Load Cooling Hours	table - Cooling FLHrs - Appendix 5
PSD3.2.8	Add Speed Control to Rooftop Unit Fan	EFLHh - Equivalent Full Load Heating Hours	table - Heat Pump FLHrs - Appendix 5
PSD3.2.8	Add Speed Control to Rooftop Unit Fan	EUL	15 - 2-Speed Motor Control in Rooftop Unit 10 - Most of the HVAC Control Measures
PSD3.2.8	Add Speed Control to Rooftop Unit Fan	AKWHe - Annual Gross Electric Energy Consumption - Existing System	AKWHe = Kwe x H
PSD3.2.8	Add Speed Control to Rooftop Unit Fan	AKWHr - Annual Gross Electric Energy Consumption - After Retrofit	0

PSD3.2.8	Add Speed Control to Rooftop Unit Fan	AKWH - Annual Gross Electric Energy Savings	AKWH = AKWHe - AKWHr
PSD3.2.8	Add Speed Control to Rooftop Unit Fan	AKW - Annual Summer and Winter Seasonal Peak Demand Savings	0
PSD3.2.8	Add Speed Control to Rooftop Unit Fan	AKW - Annual Summer and Winter Seasonal Peak Demand Savings	0
PSD3.2.9	Commercial Kitchen Hood Controls	Engineering Algorithm	Custom Spreadsheet
PSD3.2.9	Commercial Kitchen Hood Controls	Engineering Algorithm	Custom Spreadsheet
PSD3.2.9	Commercial Kitchen Hood Controls	Engineering Algorithm	Custom Spreadsheet
PSD3.2.9	Commercial Kitchen Hood Controls	Flow Reduction - FR, %	Site Specific Input

PSD3.2.9	Commercial Kitchen Hood Controls	Modified Heating Degree Days - MHDD, Deg. F-Day	Site Specific Input
PSD3.2.9	Commercial Kitchen Hood Controls	Modified Cooling Degree Day - CDD, Deg. F-Day	Site Specific Input
PSD3.3.1	Custom Measures	Sector (C&I, Residential)	C&I
PSD3.4.1	Cooler Night Covers	Measure application type (Lost opportunity, Retrofit, etc.)	Retrofit
PSD3.4.1	Cooler Night Covers	Efficient Equipment	Multi-deck refrigerated coolers with covers
PSD3.4.1	Cooler Night Covers	SF - Savings Factor based on the temperature of the case	0
PSD3.4.2	Evaporator Fan Controls	Sector (C&I, Residential)	C&I
PSD3.4.2	Evaporator Fan Controls	Energy efficient equipment	Control system that either shuts off or reduces the speed of the evaporator fans when thermostat is not calling for cooling.
PSD3.4.2	Evaporator Fan Controls	Reduction in fan hours and power	Reduction in fan hours and power
PSD3.4.2	Evaporator Fan Controls	ACOP coolers	2.69

PSD3.4.2	Evaporator Fan Controls	CF - Summer Peak Coincidence Factor	Assumed 1 - not included in calculation
PSD3.4.2	Evaporator Fan Controls	EUL	10 - Refrigeration Control
PSD3.4.2	Evaporator Fan Controls	EUL	10 - Refrigeration Control
PSD3.4.3	Evaporator Fans Motor Replacement	ACOP - Coolers	2.69
PSD3.4.3	Evaporator Fans Motor Replacement	ACOP - Coolers	2.69
PSD3.4.3	Evaporator Fans Motor Replacement	ACOP - Coolers	2.69

PSD3.4.3	Evaporator Fans Motor Replacement	ACOP - Freezers	2.03
PSD3.4.3	Evaporator Fans Motor Replacement	COP - Coolers	2.29
PSD3.4.3	Evaporator Fans Motor Replacement	COP - Freezers	1.72
PSD3.4.3	Evaporator Fans Motor Replacement	AKWH	0
PSD3.4.3	Evaporator Fans Motor Replacement	AKW	AKW = AKWH / 8760
PSD3.4.3	Evaporator Fans Motor Replacement	AKW	AKW = AKWH / 8760
PSD3.4.3	Evaporator Fans Motor Replacement	DP Factor and Fan Run Hours	[1] DP Factor - Power reduction factors of existing fans are based on correspondence with a National Resource Management (NRM) representative on Mar. 3 and Jun. 6, 2011. [2] Fan Hours - Fan off hours after measure installation (h) is based on correspondence with Nick Gianakos, Nicholas Group, P.C., Jun. 27, 2010. If fan controls are being installed concurrently with this measure, then savings calculation for this measure should be coordinated with 3.4.2 to ensure the ending point of one measure (fan power/hours) is the starting point for the other.

PSD3.4.4	Door Heater Controls	Sector	C&I
PSD3.4.4	Door Heater Controls	Energy efficient equipment	Door Heater Controls
PSD3.4.4	Door Heater Controls	CF - Seasonal Peak demand Coincident Factor for Refrigeration	1

PSD3.4.4	Door Heater Controls	CF - Seasonal Peak demand Coincident Factor for Refrigeration	1
PSD3.4.4	Door Heater Controls	h - Heater Off Hours After Measure Installation - Coolers:	6500
PSD3.4.4	Door Heater Controls	h - Heater Off Hours After Measure Installation - Freezers:	4070
PSD3.4.5	Vending Machine Controls	Sector (C&I, Residential)	C&I
PSD3.4.5	Vending Machine Controls	ESF Refrigerated Beverage Vending Machines	0.44

PSD3.4.5	Vending Machine Controls	ESF Non-Refrigerated Snack Vending Machines	0.52
PSD3.4.5	Vending Machine Controls	ESF Non-Refrigerated Snack Vending Machines	0.52
PSD3.4.5	Vending Machine Controls	ESF Glass Front Refrigerated Coolers	0.44
PSD3.4.5	Vending Machine Controls	SkW - Summer Demand Savings	0
PSD3.4.5	Vending Machine Controls	WkW - Winter Demand Savings	0
PSD3.4.5	Vending Machine Controls	EUL	Not Listed in measure
PSD3.4.5	Vending Machine Controls	Wattage of Vending Machines and Reduced hours	[1] USA Technologies, Energy Savings Calculator Vending Machine USA TECH [Microsoft Excel], Jul. 2017. [2] Cooling Miser has the same ESF and Watts as Vending Misers. Based on correspondence and email from Bunny Proof, USA Technologies, Aug. 2017.
PSD3.4.6	Add Doors to Open Refrigerated Display Cases	Sector (C&I, Residential)	C&I

PSD3.4.6	Add Doors to Open Refrigerated Display Cases	SFakwh - Door Heater	202.7
PSD3.4.6	Add Doors to Open Refrigerated Display Cases	SFakwh - Gap	202.7
PSD3.4.6	Add Doors to Open Refrigerated Display Cases	COPref - Cooler	N/A
PSD3.4.6	Add Doors to Open Refrigerated Display Cases	AKWH - Annual Gross Elecric Savings (kWh/yr)	AKWH = L x SFakwh
PSD3.4.6	Add Doors to Open Refrigerated Display Cases	ACCFh - Annual Gross Natural Elenergy Savings (ccf/yr)	ACCFh = L x SFaccf
PSD3.4.6	Add Doors to Open Refrigerated Display Cases	SKW - Summer Seasonal Peak Demand Savings	SKW = L x SFskw
PSD4.2.10	Boilers	Baseline Equipment	Boilers and Furnaces with lower efficiency
PSD4.2.10	Boilers	ACCFw - Annual Natural Gas Savings - Water Heating ccf/yr	0

PSD4.2.10	Boilers	ADHW - Annual Domestic Water Heating Load Btu/yr	11197132
PSD4.2.10	Boilers	ADHW - Annual Domestic Water Heating Load Btu/yr	11197132
PSD4.2.10	Boilers	ADHW - Annual Domestic Water Heating Load Btu/yr	11197132
PSD4.2.10	Boilers	AFUEi - AFUE, Installed	Varies by equipment
PSD4.2.10	Boilers	HF - Average Heating Factor Based on Home's Heat Load	85200000

PSD4.2.10	Boilers	ACCF - Annual Natural Gas Savings ccf/yr	ACCF = ACCFh + ACCFw
PSD4.2.10	Boilers	ACCF - Annual Natural Gas Savings ccf/yr	ACCF = ACCFh + ACCFw
PSD4.2.10	Boilers	ACCF - Annual Natural Gas Savings ccf/yr	ACCF = ACCFh + ACCFw (Early Retirement)

PSD4.2.10	Boilers	ACCF - Annual Natural Gas Savings ccf/yr	ACCF = ACCFh + ACCFw (Early Retirement)
PSD4.2.10	Boilers	ACCF - Annual Natural Gas Savings ccf/yr	ACCF = ACCFh + ACCFw
PSD4.2.12	Boiler Reset Controls	Deemed Savings	Deemed Savings
PSD4.2.12	Boiler Reset Controls	ACCFh - Annual Natural Gas Savings - Heating ccf/yr	45
PSD4.5.3	Fossil Fuel Water Heaters	Baseline equipment	50 gallon storage or tankless heater with energy factor (EF) of 0.71 based on IECC 2015.

PSD4.5.3	Fossil Fuel Water Heaters	Baseline equipment	50 gallon storage or tankless heater with energy factor (EF) of 0.71 based on IECC 2015.
PSD4.5.3	Fossil Fuel Water Heaters	Baseline equipment	50 gallon storage or tankless heater with energy factor (EF) of 0.71 based on IECC 2015.
PSD4.5.3	Fossil Fuel Water Heaters	Energy efficient equipment	As installed
PSD4.5.3	Fossil Fuel Water Heaters	Energy efficient equipment	As installed
PSD4.5.3	Fossil Fuel Water Heaters	Engineering Algorithm	Uses EF as the efficiency metric

PSD4.5.3	Fossil Fuel Water Heaters	Efi- Energy factor installed	Varies with equipment
PSD4.5.3	Fossil Fuel Water Heaters	ADHW Annual Domestic Hot Water Load, Btu	11197132
PSD4.5.3	Fossil Fuel Water Heaters	ADHW Annual Domestic Hot Water Load, Btu	11197132
PSD4.5.3	Fossil Fuel Water Heaters	EFB Energy Factor - Baseline,	0.71

PSD4.5.3	Fossil Fuel Water Heaters	EFI Energy Factor - Installed,	As installed EF
PSD4.5.3	Fossil Fuel Water Heaters	GPY Annual Domestic Hot Water Usage in Gallons, Gal	19839
PSD4.5.3	Fossil Fuel Water Heaters	GPY Annual Domestic Hot Water Usage in Gallons, Gal	19839
PSD4.5.3	Fossil Fuel Water Heaters	Taiw Average Annual Incoming Water Temperature, ºF	57
PSD4.5.3	Fossil Fuel Water Heaters	Taiw Average Annual Incoming Water Temperature, ºF	57
PSD4.5.3	Fossil Fuel Water Heaters	Tdhw Domestic Hot Water Heater Set Point, ºF	125

PSD4.5.3	Fossil Fuel Water Heaters	ABTUW Annual BTU Savings – Water Heating, Btu	0
PSD4.5.4	Heat Pump Water Heater	Sector (C&I, Residential)	Residential
PSD4.5.4	Heat Pump Water Heater	Measure application type (Lost opportunity, Retrofit, etc.)	Both Retrofit and Lost Opportunity
PSD4.5.4	Heat Pump Water Heater	Baseline equipment	Electric ressistance water heater for Retrofit Lost opportunity is when the baseline equipment is unknown.

PSD4.5.4	Heat Pump Water Heater	AEDHWw- Annual electric energy savings	Retrofit: 1818 kWh for ≤ 55 gallons, 1258 kWh for >55 gallons
PSD4.5.4	Heat Pump Water Heater	AEDHWw- Annual electric energy savings	Retrofit: 1818 kWh for ≤ 55 gallons, 1258 kWh for >55 gallons

PSD4.5.4	Heat Pump Water Heater	AEDHWw- Annual electric energy savings	Lost opportunity: 961 kWh for ≤ 55 gallons, 561 kWh for >55 gallons
PSD4.5.4	Heat Pump Water Heater	AOG - Annual Oil Savings, Lost Opportunity	15.5 gallons

PSD4.5.4	Heat Pump Water Heater	APG- Annual Propane Savings, Lost Opportunity	23.54 gallons
PSD4.6.1	Residential Custom	Measure application type (Lost opportunity, Retrofit, etc.)	Retrofit, Lost Opportunity
PSD4.6.1	Residential Custom	Applicable measures	Project whose scope may be considered custom or comprehensive. Replacement of an inefficient HVAC system (or component) such as a fossil fuel furnace, boiler, heat pump, air conditioner, Home Performance with ENERGY STAR project measures. Project with interactive effects between two or more measures
PSD4.6.1	Residential Custom	Notes [2]	http://www.princeton.edu/~marean/
PSD4.6.1	Residential Custom	Notes [2]	http://www.princeton.edu/~marean/

PSD2.2.1	Chillers	Sector (C&I, Residential)	C&I
PSD2.2.1	Chillers	Baseline equipment	Chillers with baseline efficiency per the 2015 IECC
PSD2.2.1	Chillers	BL100- Baseline efficiency @100% load	Developed using typical chiller part load curves and the baseline efficiencies based on 2015 IECC Table C403.2.3(7).
PSD2.2.1	Chillers	BL75- Baseline efficiency @75% load	Developed using typical chiller part load curves and the baseline efficiencies based on 2015 IECC Table C403.2.3(7).
PSD2.2.1	Chillers	BL50- Baseline efficiency @50% load	Developed using typical chiller part load curves and the baseline efficiencies based on 2015 IECC Table C403.2.3(7).
PSD2.2.1	Chillers	BL25- Baseline efficiency @25% load	Developed using typical chiller part load curves and the baseline efficiencies based on 2015 IECC Table C403.2.3(7).

PSD2.2.1	Chillers	Annual electric energy savings	Energy savings are custom calculated for each chiller installation based on the specific equipment,operational staging, operating profile, and load profile. A temperature BIN model is utilized to calculate the energy and demand savings for the chiller projects. Customer-specific information is used to estimatea load profile for the chilled water plant. Based on the loading, the chiller’s actual part load performance is used to calculate the chiller’s demand (kW) and consumption (kWh) for each temperature BIN (Note [1]).A chiller spreadsheet is used to calculate consumption for both the baseline and proposed units. It is also used to calculate the consumption of the auxiliaries (i.e., chilled water pumps, condenser water pumps,and cooling tower fans).
PSD2.2.1	Chillers	Description of Measure	NA
PSD2.2.6	Natural Gas Fired Boilers and Furnaces	Sector (C&I, Residential)	C&I
PSD2.2.6	Natural Gas Fired Boilers and Furnaces	Baseline equipment	Boilers and Furnaces with Federal code compliant minimum efficiency

PSD2.2.6	Natural Gas Fired Boilers and Furnaces	AF -Adjustment factor	1 for non-condensing, 0.97 for condensing
PSD2.2.6	Natural Gas Fired Boilers and Furnaces	EFLH - Equivalent full load hours	Varies based on building type. EFLH is calculated from a 2008 model, which is based on installed custom projects.
PSD2.2.6	Natural Gas Fired Boilers and Furnaces	OF - Oversize factor	1.15
PSD2.2.6	Natural Gas Fired Boilers and Furnaces	ηb - Basecase efficiency	Varies, based on IECC 2015
PSD2.2.6	Natural Gas Fired Boilers and Furnaces	ACCF -Gross annual energy savings	0

PSD2.2.6	Natural Gas Fired Boilers and Furnaces	PD - Gross peak day natural gas savings	0
PSD2.2.6	Natural Gas Fired Boilers and Furnaces	Note 2	2015 IECC
PSD2.2.8	Natural Gas-Fired Domestic Hot Water Heaters	Sector (C&I, Residential)	C&I
PSD2.2.8	Natural Gas-Fired Domestic Hot Water Heaters	Baseline equipment	Code compliant natural gas-fired, storage-type >75,000 Btu/hr
PSD2.2.8	Natural Gas-Fired Domestic Hot Water Heaters	ηb - Baseline efficiency	80%, from IECC 2015
PSD2.2.8	Natural Gas-Fired Domestic Hot Water Heaters	Eb - Annual base case gas usage rage (per square foot)	Annual baseline gas usage is based on the gas usage rate for different building types. Source: US Energy Information Administration, Table E8. Natural gas consumption and conditional energy intensities (cubic feet) by end use, 2012, Rel. May 2016.
PSD2.2.8	Natural Gas-Fired Domestic Hot Water Heaters	1	IECC 2015

PSD2.2.8	Natural Gas-Fired Domestic Hot Water Heaters	Eb	Eb (ccf/ft^2) = 0.258 (lodging)
PSD2.2.8	Natural Gas-Fired Domestic Hot Water Heaters	Reference	US Energy Information Administration, Table E8. Natural gas consumption and conditional energy intensities (cubic feet) by end use, 2012, Rel. May 2016. https://www.eia.gov/consumption/commercial/data/2012/c&e/pdf/e8.pdf
PSD2.4.1	HVAC Variable Frequency Drives	Sector (C&I, Residential)	C&I
PSD2.4.1	HVAC Variable Frequency Drives	ASHRAE performance curves and a BIN analysis	ASHRAE performance curves and a BIN analysis

PSD2.4.1	HVAC Variable Frequency Drives	BHP - Brake Horsepower	Varies by equipment
PSD2.4.1	HVAC Variable Frequency Drives	Baseline Fan Type & Control	Table 2-NN
PSD2.4.1	HVAC Variable Frequency Drives	Proposed Fan Type & Control	VFD
PSD2.4.1	HVAC Variable Frequency Drives	HP - Nominal Horsepower	N/A

PSD2.4.1	HVAC Variable Frequency Drives	LF - Load Factor	N/A

PSD2.4.1	HVAC Variable Frequency Drives	Default Fan Duty Cycle	References ASHRAE 90.1-1989 User's Manual - Note: not clear what section this is referring to. SWH = service water heating

PSD2.4.1	HVAC Variable Frequency Drives	SFkwh - Annual Kilowatt-Hour Savings Factor Based on Typical Load Profile for Application	Table 2-NN
PSD2.4.1	HVAC Variable Frequency Drives	SFkw,s - Summer Seasonal Demand Savings Based on Typical Load Profile for Application	Table 2-NN

PSD2.4.1	HVAC Variable Frequency Drives	SFkw,w - Winter seasonal Demand Savings Based on Typical Load Profile for Application	Table 2-NN
PSD2.4.1	HVAC Variable Frequency Drives	Flow vs. Power Fraction per Control Type	N/A

PSD2.4.1	HVAC Variable Frequency Drives	PLR - Part Load Ratio	N/A
PSD2.4.1	HVAC Variable Frequency Drives	PLR - summer peak	N/A
PSD2.4.1	HVAC Variable Frequency Drives	AKWH	AKWH = [BHP/EFFi] x H x SFkwh
PSD2.4.1	HVAC Variable Frequency Drives	SKW WKW	SKW = [BHP/EFFi] x SFkw,s WKW = [BHP/EFFi] x SFkw,w

PSD3.2.2	Pipe Insulation	Baseline equipment	Bare hydronic supply heating pipes located in unconditioned spaces
PSD3.2.2	Pipe Insulation	Nominal Pipe Size Diameter, Inches	Varies with project. The following pipe sizes are listed: 0.5, 0.75, 1.0, 1.25, 1.5, 2.0.
PSD3.2.2	Pipe Insulation	EFLH- Equivalent Heating Full-Load Hours for the Facility Type	Deemed EFLH values for different facility types.
PSD3.2.2	Pipe Insulation	HL- Heat Loss Savings per Linear Foot of Pipe, Btu/ft/hr	Calculated for different pipe size and insulation thickness combination using 3E Plus.
PSD3.2.2	Pipe Insulation	AFUE - Annual Fuel Utilization Efficiency	0.8
PSD3.2.2	Pipe Insulation	Temperature differential	Savings are calculated assuming a temperature differential of 130 °F (180 °F- 50 °F). If the difference between the actual average ambient temperature and fluid temperature varies significantly from this difference (130°F), the savings should be scaled using linear interpolation. The hourly heat loss (“HL”) savings per linear foot for various pipe and insulation sizes/material are provided in Table 3-L.

PSD3.2.2	Pipe Insulation	Add DHW and Chiller pipe insulation	N/A
PSD3.2.2	Pipe Insulation	MF heating and cooling efficiencies	N/A
PSD3.2.2	Pipe Insulation	MF and cooling hours	N/A
PSD3.2.3	Duct Sealing	0	Refers to the duct sealing measure in the Residential Section of the 2020 PSD manual (Measure 4.2.9)
PSD3.2.6	Steam Trap Replacement	C&I	C&I
PSD3.2.6	Steam Trap Replacement	Repaired or replaced steam trap	Replaced or repaired traps
PSD3.2.6	Steam Trap Replacement	N/A (Deemed Savings)	Thermal efficiency of boiler (Et). No default value provided
PSD3.2.6	Steam Trap Replacement	N/A (Deemed Savings)	Thermodynamic Properties of Steam Including Data for the Liquid and Solid Phases (1936)
PSD3.2.7	Blower Door Test (Small C&I)	Sector (C&I, Residential)	C&I

PSD3.2.7	Blower Door Test (Small C&I)	ACCFH, AOGH, APGH	Not defined in the nomenclature Table 3-Y.
PSD3.2.7	Blower Door Test (Small C&I)	BD savings per measure	The demand savings are from the Residential Measure 4.4.4—Infiltration Reduction Testing (Blower Door Test)
PSD3.2.7	Blower Door Test (Small C&I)	Measure reference	2020 PSD’s Residential Blower Door Measure (Measure 4.4.4)
PSD3.2.7	Blower Door Test (Small C&I)	Description of Measure	NA

PSD4.2.1	Energy-Efficient Central Air Conditioning	EERe - Existing EER of old unit.	AC unit with EER rating of 11 for lost opportunity. Retrofit application uses existing nameplate EER of EER of 8 if unknown.
PSD4.2.1	Energy-Efficient Central Air Conditioning	ASF - Annual savings factor, kWh/ton	362
PSD4.2.1	Energy-Efficient Central Air Conditioning	EERb - Baseline EER, representing baseline new model, Btu/Watt-hr	11
PSD4.2.1	Energy-Efficient Central Air Conditioning	EUL - Effective useful life, years	18
PSD4.2.1	Energy-Efficient Central Air Conditioning	RUL - Remaining useful life, years	5
PSD4.2.1	Energy-Efficient Central Air Conditioning	AKWHc,lost opp - Annual savings, lost opportunity	0
PSD4.2.1	Energy-Efficient Central Air Conditioning	SKWc, Lost Opp- Summer seasonal demand savings, Lost Opportunity	0
PSD4.2.1	Energy-Efficient Central Air Conditioning	Multifamily Adjustment Factor (MAF)	No MAF

PSD4.2.4	Electronically Commutated Motor HVAC Fan	Measure application type (Lost opportunity, Retrofit, etc.)	Lost Opportunity
PSD4.2.4	Electronically Commutated Motor HVAC Fan	Baseline equipment	Standard motor in a new furnace or an existing furnace
PSD4.2.4	Electronically Commutated Motor HVAC Fan	Discontinued	Discontinued
PSD4.2.4	Electronically Commutated Motor HVAC Fan	EUL	18
PSD4.2.5	Duct Sealing	Duct blaster test	CFM (pre & post) measured using duct blaster test. Deemed savings values obtained from the duct blaster energy savings analysis using REM conducted in 2010.

PSD4.2.5	Duct Sealing	Sector (C&I, Residential)	Residential
PSD4.2.5	Duct Sealing	Energy efficient equipment	Air sealed ductwork
PSD4.2.5	Duct Sealing	Duct blaster test	CFM (pre & post) measured using duct blaster test. Deemed savings values obtained from the duct blaster energy savings analysis using REM conducted in 2010.
PSD4.2.5	Duct Sealing	Home with central air conditioning	In the savings algorithm for a home with central air conditioning, the electric savings is listed as AKWHh
PSD4.2.5	Duct Sealing	AKWH - Annual electric energy savings	REM/rate values obtained from duct blaster test analysis study performed in 2010.

PSD4.2.5	Duct Sealing	Annual Natural Gas/Oil/Propane savings	REM/rate values obtained from duct blaster test analysis study performed in 2010.
PSD4.2.5	Duct Sealing	Summer and winter demand savings	REM/rate values obtained from duct blaster test analysis study performed in 2010.
PSD4.2.5	Duct Sealing	Interactivity between concurrently installed measures	Description of measure does not include a discussion of interactivity between measures.

PSD4.2.5	Duct Sealing	Reference [1]	Duct blaster energy savings analysis using REM was performed by C&LM Planning team, Eversource & United Illuminating, Aug. 2010. REM/Rate™ version 12.99 was used for this analysis.
PSD4.2.8	Quality Installation Verification	Energy efficient equipment	Installation consistent with Air Conditioning Contractors of America/ ENERGY STAR specifications
PSD4.2.8	Quality Installation Verification	Energy efficient equipment	Installation consistent with Air Conditioning Contractors of America/ ENERGY STAR specifications
PSD4.2.11	Furnaces	Lost Opportunity Gross Energy Savings, Electric	0
PSD4.2.11	Furnaces	Retrofit (Early Retirement portion) Gross Energy Savings, Electric	0
PSD4.2.11	Furnaces	EUL - Effective Useful Life	20 (CA DEER2008 Reference)
PSD4.2.11	Furnaces	RUL - Remaining Useful Life	6.67
PSD4.2.13	ECM Circulating Pump	Baseline equipment	Existing Circulating Pump
PSD4.4.1	REM Savings	REM simulation file	REM Simulation file submitted by HERS rater

PSD4.4.2	Infiltration Reduction Testing (Blower Door Test)	Blower Door Test	Blower Door Test (change in CFM @50 Pascals pressure difference before and after air leakage sealing)
PSD4.4.2	Infiltration Reduction Testing (Blower Door Test)	Gross Energy Savings (Electric and Fossil Fuel)	Add assumptions for multifamily
PSD4.4.2	Infiltration Reduction Testing (Blower Door Test)	SKW - Summer Demand Savings	SKW , SKWC
PSD4.4.2	Infiltration Reduction Testing (Blower Door Test)	WKW - Winter Demand Savings	WKW, WKWH

PSD4.4.2	Infiltration Reduction Testing (Blower Door Test)	AKWHH - Annual Electric Energy Savings, Heating	Energy savings deemed values obtained from REM/rate simulation performed in 2008.
PSD4.4.2	Infiltration Reduction Testing (Blower Door Test)	Annual Natural Gas/Oil/Propane savings	Energy savings deemed values obtained from REM/rate simulation performed in 2008.
PSD4.4.2	Infiltration Reduction Testing (Blower Door Test)	SkW - Summer Demand Savings (kW), WkW - Winter Demand Savings (kW)	REM/rate simulation values used to estimate demand savings
PSD4.4.2	Infiltration Reduction Testing (Blower Door Test)	PDH - Natural Gas Peak Day Savings, Heating	0

PSD4.4.2	Infiltration Reduction Testing (Blower Door Test)	Interactivity between concurrently installed measures	Interactivity not considered
PSD4.4.2	Infiltration Reduction Testing (Blower Door Test)	Reference [1]	Blower Door energy savings analysis using REM/Rate™ was performed by C&LM Planning team, Eversource, Aug. 2008

PSD4.4.2	Infiltration Reduction Testing (Blower Door Test)	Gross Energy Savings (Electric and Fossil Fuel)	Add assumptions for multifamily
PSD4.4.7	Infiltration Reduction (Prescriptive)	EF - Fossil Fuel System Efficiency, Including Distribution Loss	0.75

PSD4.4.7	Infiltration Reduction (Prescriptive)	EF - Fossil Fuel System Efficiency, Including Distribution Loss	0.75
PSD4.4.7	Infiltration Reduction (Prescriptive)	AKWH	Missing
PSD4.4.7	Infiltration Reduction (Prescriptive)	Interactivity between concurrently installed measures	Interactivity not considered
PSD4.4.7	Infiltration Reduction (Prescriptive)	Blower Door Test Measure reference	Blower door test is referenced in Savings Methodology section as Measure 4.4.4

PSD4.4.8	Wall Insulation	General	Three individual measures with similar savings algorithm for wall, ceiling and floor insulation
PSD4.4.8	Wall Insulation	GF - Ground Factor; Percent of Unconditioned Space Walls Above-Grade (rounded to nearest %)	1 for 100% above grade; 0.75 for 31-99% above grade; 0.6 for 0-30% above grade Values were developed using REM/Rate software
PSD4.4.8	Wall Insulation	General	Three individual measures with similar savings algorithm for wall, ceiling and floor insulation

PSD4.4.8	Wall Insulation	Rpre	Existing Insulation R-value
PSD4.4.8	Wall Insulation	ABTUH	Not described in nomenclature
PSD4.4.8	Wall Insulation	Rexisting	

PSD4.4.8	Wall Insulation	Rnew	
PSD4.4.8	Wall Insulation	Note [2]	http://www.allwallsystem.com/design/RValueTable.html
PSD4.4.8	Wall Insulation	EF - Heating System Efficiency	An estimated 75% efficiency is used

PSD4.4.8	Wall Insulation	HDD - Heating Degree Days	CT State Average of 5885 0F-days is used
PSD4.4.8	Wall Insulation	ΔTBIN	The Sum of the Temperature BIN Hours (based on Hartford) times Delta between Outside Air for each BIN, and Average Indoor Temperature (Ti = 76.5 ºF) = 3888 Residential Central A/C Regional Evaluation, ADM Associates, Inc., Nov. 2009, a) Table B-4 (Hartford) and p. B-9
PSD4.4.8	Wall Insulation	ΔTsummer	20.5°F Temperature Difference (peak Toutside = 97 °F, Tinside = 76.5 °F) Residential Central A/C Regional Evaluation, ADM Associates, Inc., Nov. 2009, a) Table B-4 (Hartford) and p. B-9 and b) Figures 4-1&2 (Hartford) and pp. 4-15.
PSD4.4.8	Wall Insulation	COP - Heat pump	COP of 2 shown above is not included in the nomenclature

PSD4.4.8	Wall Insulation	COP - Heat pump	2
PSD4.4.8	Wall Insulation	Interactivity between concurrently installed measures	Description of measure does not include a discussion of interactivity between measures.
PSD4.4.9	Ceiling Insulation	General	Three individual measures with similar savings algorithm for wall, ceiling and floor insulation

PSD4.4.10	Ceiling Insulation	EER / SEER - Baseline	11.0 EER/ 13.0 SEER
PSD4.4.10	Ceiling Insulation	General	Three individual measures with similar savings algorithm for wall, ceiling and floor insulation
PSD4.4.10	Ceiling Insulation	Baseline equipment	Existing Insulation
PSD4.4.10	Ceiling Insulation	AKWH	Listed twice in the nomenclature
PSD4.4.10	Ceiling Insulation	ABTUH	Not described in nomenclature
PSD4.4.10	Ceiling Insulation	Rexisting	
PSD4.4.10	Ceiling Insulation	Rnew	0

PSD4.4.10	Ceiling Insulation	EF - Heating System Efficiency	An estimated value of 75% heating system efficiency is used
PSD4.4.10	Ceiling Insulation	HDD - Heating Degree Days	CT State Average of 5,885 0F-days is used
PSD4.4.10	Ceiling Insulation	ΔTBIN	The Sum of the Temperature BIN Hours (based on Hartford) times Delta between Outside Air for each BIN, and Average Indoor Temperature (Ti = 76.5 ºF) = 3888 Residential Central A/C Regional Evaluation, ADM Associates, Inc., Nov. 2009, a) Table B-4 (Hartford) and p. B-9

PSD4.4.10	Ceiling Insulation	ΔTsummer	20.5°F Temperature Difference (peak Toutside = 97 °F, Tinside = 76.5 °F) Residential Central A/C Regional Evaluation, ADM Associates, Inc., Nov. 2009, a) Table B-4 (Hartford) and p. B-9 and b) Figures 4-1&2 (Hartford) and pp. 4-15.
PSD4.4.10	Ceiling Insulation	COP - Heat pump	COP of 2 shown above is not included in the nomenclature
PSD4.4.10	Ceiling Insulation	COP - Heat pump	2
PSD4.4.10	Ceiling Insulation	Annual heating savings in BTU/yr	0
PSD4.4.10	Ceiling Insulation	Annual Electric Energy Savings for Central Air Conditioners (Cooling Only)	0
PSD4.4.10	Ceiling Insulation	Interactivity between concurrently installed measures	Description of measure does not include a discussion of interactivity between measures.
PSD4.4.10	Floor Insulation	Rpre	Existing Insulation R-value

PSD4.4.10	Floor Insulation	EF - Heating System Efficiency	An estimated 75% efficiency is used
PSD4.4.10	Floor Insulation	HDD - Heating Degree Days	CT State Average of 5885 0F-days is used

PSD4.4.10	Floor Insulation	Fadj - ASHRAE Adjustment Factor	0.64 ; ASHRAE degree-day correction.
PSD4.4.10	Floor Insulation	COP - Heat pump	2
PSD4.4.10	Floor Insulation	General	Three individual measures with similar savings algorithm for wall, ceiling and floor insulation
PSD4.5.1	Showerheads	Baseline equipment	Federal standard, 2.5 GPM or higher.
PSD4.5.1	Showerheads	Energy efficient equipment	EPA WaterSense Specified showerhead with flowrate of 2.0 GPM

PSD4.5.1	Showerheads	REF - Recovery Efficiency of Fossil Fuel Water Heater	0.78 for SF, 0.67 for MF
PSD4.5.1	Showerheads	na - Average Total No. Showerheads per Household	2.3

PSD4.5.1	Showerheads	Energy efficient equipment	EPA WaterSense Specified showerhead with flowrate of 2.0 GPM
PSD4.5.1	Showerheads	de - Median Duration per Event, mins	8.3
PSD4.5.1	Showerheads	na - Average Total No. Showerheads per Household	2.3
PSD4.5.1	Showerheads	ne - Average No. of Shower Events per Day per Household	1.97
PSD4.5.1	Showerheads	rg - Ratio to Adjust Usage for Cooler Climate	0.9344

PSD4.5.1	Showerheads	Sw - Annual water savings per showerhead	0
PSD4.5.1	Showerheads	Fossil fuel Savings	0
PSD4.5.1	Showerheads	AKWH - Annual electric savings for homes with electric heater	0
PSD4.5.1	Showerheads	ACCF - Annual gas savings	0

PSD4.5.1	Showerheads	AOP - Annual propane savings	0
PSD4.5.1	Showerheads	AOG- Annual oil savings	0
PSD4.5.2	Faucet Aerators	Baseline equipment	Federal standard lavatory faucet aerators with 2.2 GPM flowrate or higher
PSD4.5.2	Faucet Aerators	Energy efficient equipment	EPA specified lavatory faucets with flow rate of 1.5 GPM

PSD4.5.2	Faucet Aerators	REF - Recovery Efficiency of Fossil Fuel Water Heater	0.78 for SF and 0.67 for MF
PSD4.5.2	Faucet Aerators	na - Estimated Average Total No. of Faucets (all types) per Household	5.1

PSD4.5.5	Pipe Insulation	ACCFH - Annual natural gas savings per linear foot, heating, ccf/ft	0
PSD4.5.5	Pipe Insulation	ACCFH - Annual natural gas savings per linear foot, DHW, ccf/ft	0.75 for 0.5" pipe and 1.10 for 0.75" pipe
PSD4.5.5	Pipe Insulation	ACCFH - Annual kWh energy savings coefficient, DHW, kWh/ft	14.1 for 0.5" pipe and 20.5 for 0.75" pipe

PSD4.5.5	Pipe Insulation	Water heater efficiency	90% for electric, 49.5% for oil and 57.5% for gas and propane.
PSD4.5.6	Solar Water Heater	no comments	no comments
PSD4.6.2	Behavioral Change	Sector (C&I, Residential)	Residential

Recommended Value	Recommended action	Justification
Varies by building type	Proposed Further Secondary Research	Aligns with other TRMs
Varies by building type	No change	Aligns with other TRMs
1.0 single-heaters, 1.1 multiple-heaters	Proposed Further Secondary Research	Most instances will use existing furnace size, so adjusting for oversizing is not relevant unless proper sizing is required by the program. Adjusting oversize by 1.1 for multiple systems is reasonable, but could be researched during evaluation to confirm its accurate.
0.00544 X ACCF	No change	Standard algoritms
0.25	Proposed Further Secondary Research	Savings are highly dependent on how the system is used, and the referenced source is 17 years old. The savings percentage is currently consistent with other TRMs, but could be updated with further evaluation.
0.8 - Reference IECC 2018	Updated reference	The value is the same, but the reference should be updated to 2018 IECC Table C403.3.2(4) Warm Air Furnace Minimum Efficiency Requirements. CT adopting IECC 2018.
0.8 - Reference IECC 2018	Updated reference	The value is the same, but the reference should be updated to 2018 IECC Table C403.3.2(4) Warm Air Furnace Minimum Efficiency Requirements. CT adopting IECC 2018.
C&I	Remove from PSD	Savings were based on CEE tier level efficiency reqquirements; CEE initiative has been suspended. Recommend remove from PSD.

C&I	Parameter update	Savings were based on CEE tier level efficiency reqquirements; CEE initiative has been suspended. Recommend remove from PSD.
Savings are based on two concepts: 1. Producing more products in the same time period saves on the non-manufacturing consumption (mostly lighting); and 2. Producing more products over the same time period reduces losses in the manufacturing equipment consumption (e.g., such as less idle time and an increase in motor efficiency). This measure is intended for faciliites who increase the production efficiency (i.e., more widgets per unit time). Facilities where the production efficiency remains constant, such that Na and Ne are equal, should not use this measure. Instead, these should be treated as custom projects.	Parameter update	This measure only works for situations where production efficiency (i.e., the ability of the customer to produce more units per hour) is increased. In some cases, it may be such that PRIME or LEAN practices increase the energy efficiency of the process while keeping the production efficiency the same. The SF algorithm will show zero savings in this scenario. Recommend specify that increased throughput is required for the algorithm to work.

Savings are based on two concepts: 1.Producing more products in the same time period saves on the non-manufacturing consumption (mostly lighting); and 2.Producing more products over the same time period reduces losses in the manufacturing equipment consumption (e.g., such as less idle time and an increase in motor efficiency). This measure is intended for faciliites who increase the production efficiency (i.e., more widgets per unit time). Facilities where the production efficiency remains constant, such that Na and Ne are equal, should not use this measure. Instead, these should be treated as custom projects.	Parameter update	This measure only works for situations where production efficiency (i.e., the ability of the customer to produce more units per hour) is increased. In some cases, it may be such that PRIME or LEAN practices increase the energy efficiency of the process while keeping the production efficiency the same. The SF algorithm will show zero savings in this scenario. Recommend specify that increased throughput is required for the algorithm to work.

Savings are based on two concepts: 1. Producing more products in the same time period saves on the non-manufacturing consumption (mostly lighting); and 2. Producing more products over the same time period reduces losses in the manufacturing equipment consumption (e.g., such as less idle time and an increase in motor efficiency). This measure is intended for faciliites who increase the production efficiency (i.e., more widgets per unit time). Facilities where the production efficiency remains constant, such that Na and Ne are equal, should not use this measure. Instead, these should be treated as custom projects.	Parameter update	This measure only works for situations where production efficiency (i.e., the ability of the customer to produce more units per hour) is increased. In some cases, it may be such that PRIME or LEAN practices increase the energy efficiency of the process while keeping the production efficiency the same. The SF algorithm will show zero savings in this scenario. Recommend specify that increased throughput is required for the algorithm to work.
Varies by equipment type	No change	Savings values align with other TRMs
Varies by equipment type	Parameter update	Savings sourced from ENERGY STAR calculator are not consistent with the version accessed June 12, 2020. See linked table for new values.
Varies by equipment type	Parameter update	Savings sourced from ENERGY STAR calculator are not consistent with the version accessed June 12, 2020. See linked table for new values.
Varies by equipment type	Parameter update	Savings sourced from ENERGY STAR calculator are not consistent with the version accessed June 12, 2020. See linked table for new values.

Baseline efficiencies for individual measures are based on code or federal standards. Update the reference code to 2018 IECC.	Updated reference	The 2018 IECC Table C407.5.1 (1) has not changed from the 2015 IECC. However, update the reference to 2018 IECC Table 407.5.1 (1)
Savings are calculated as the difference between baseline energy usage/peak demand and the energy use/peak demand after implementation of the custom measure	No change	Aligns with other TRMs
0	No change	Standard savings methodologies that are based on custom engineering calculations.
Summer and winter demand reductions are calculated using either a full load hourly analysis or a temperature bin analysis	No change	Standard savings methodologies that are based on custom engineering calculations.
Approved modeling software can be used to calculate summer and winter demand reductions	No change	Standard savings methodologies that are based on custom modeling.
Approved modeling software can be used to calculate summer and winter demand reductions	No change	Standard savings methodologies that are based on custom modeling.

C&I	Parameter update	This measure was discontinued in 2019 due to increase in code for baseline roof thermal emittance is now 0.75 since 2015 IECC. The savings calculations no longer are applicable.
C&I	Remove from PSD	This measure was discontinued in 2019 due to increase in code for baseline roof thermal emittance is now 0.75 since 2015 IECC. The savings calculations no longer are applicable.
Lost opportunity	Parameter update	This measure was discontinued in 2019 due to increase in code for baseline roof thermal emittance is now 0.75 since 2015 IECC. The savings calculations no longer are applicable.
N/A	Parameter update	This measure was discontinued in 2019 due to increase in code for baseline roof thermal emittance is now 0.75 since 2015 IECC. The savings calculations no longer are applicable.
N/A	Parameter update	This measure was discontinued in 2019 due to increase in code for baseline roof thermal emittance is now 0.75 since 2015 IECC. The savings calculations no longer are applicable.
ACOP = 2.03 for freezers and 2.69 for coolers (used for interactive effects). If existing EERs are available, then ACOP = Average EER/3.413. Where Average EER = Full Load EER/0.85. If unknown, use default values: ACOP = 2.03 for freezers and 2.69 for coolers (used for interactive effects).	Proposed Further Secondary Research	CT PSD obtained ACOP values from 2009 ASHRAE handbook. NY TRM uses COP values from more recent evaluation report, however, the review team was unable to locate that study. CT values generally align with other TRMs but we recommend further research for this parameter.

ACOP = 2.03 for freezers and 2.69 for coolers (used for interactive effects). If existing EERs are available, then ACOP = Average EER/3.413. Where Average EER = Full Load EER/0.85. If unknown, use default values: ACOP = 2.03 for freezers and 2.69 for coolers (used for interactive effects).	Proposed Further Secondary Research	CT PSD obtained ACOP values from 2009 ASHRAE handbook. NY TRM uses COP values from more recent evaluation report, however, the review team was unable to locate that study. CT values generally align with other TRMs but we recommend further research for this parameter.
COP = 1.72 for freezers and 2.29 for coolers (used to calculate interactive affects) If existing EERs are available, then COP = EER/3.413. For peak demand savings (kW), COP = 1.72 for freezers and 2.29 for coolers (used to calculate interactive affects).	Proposed Further Secondary Research	CT PSD obtained ACOP values from 2009 ASHRAE handbook. NY TRM uses COP values from more recent evaluation report, however, the review team was unable to locate that study. CT values generally align with other TRMs but we recommend further research for this parameter.
COP = 1.72 for freezers and 2.29 for coolers (used to calculate interactive affects) If existing EERs are available, then COP = EER/3.413. For peak demand savings (kW), COP = 1.72 for freezers and 2.29 for coolers (used to calculate interactive affects).	Proposed Further Secondary Research	CT PSD obtained ACOP values from 2009 ASHRAE handbook. NY TRM uses COP values from more recent evaluation report, however, the review team was unable to locate that study. CT values generally align with other TRMs but we recommend further research for this parameter.
Use either h or H consistently throughout the entire measure	Editorial update	Consistency
0	No change	Other TRMs use similar savings algorithms that are in-line with CT PSD savings approach

Retrofit	No change	Aligns with other TRMs
Existing pre-rinse spray valves, shower heads, and faucet aerators. Existing conditions are based on the DOE's online savings calculator: https://www.energy.gov/eere/femp/energy-cost-calculator-faucets-and-showerheads-0#output.	No change	Aligns with other TRMs
Pre-rinse spray valves, shower heads, and faucet aerators that have an average flow rate of 1.6 gpm (or less), 2.0 gpm, and 1.5 gpm respectively	No change	Aligns with other TRMs
Federal Energy Management Program: Energy Cost Calculator for Faucets and Showerheads	No change	Aligns with other TRMs
Spray valves: 126 kWh for grocery and 957 kWh for non-grocery Showerhead: 507 kWh and Aerator: 309 kWh	No change	Savings verified on: https://www.energy.gov/eere/femp/energy-cost-calculator-faucets-and-showerheads-0#output.
0	No change	Aligns with other TRMs

0.00321 * ACCFw	No change	This is CT specific value.
Existing Constant Speed Rooftop Fans	No change	The current measure description and savings approach does not clearly identify what type of controls are to be installed and what the savings are assuming.
Derived via spreadsheet	Proposed Further Secondary Research	The current approach relies on a spreadsheet which is not available to review. This approach appears to yeld negative savings if the hours are low. The IL TRM addressed this by modeling systems and providing savings per tons.
Derived via spreadsheet	Proposed Further Secondary Research	The current approach relies on a spreadsheet which is not available to review. This approach appears to yeld negative savings if the hours are low. The IL TRM addressed this by modeling systems and providing savings per tons.
Derived via spreadsheet	Proposed Further Secondary Research	The current approach relies on a spreadsheet which is not available to review. This approach appears to yeld negative savings if the hours are low. The IL TRM addressed this by modeling systems and providing savings per tons.

Varies per equipment or 80% or *65%	Parameter update	Allow for custom input and default to current 80%, or update to LF of 65% recommended for HVAC Variable Frequency Drives.
Table - HVAC Fan Motor Hours - Appendix 5	Proposed Further Secondary Research	The current approach relies on a spreadsheet which is not available to review. This approach appears to yeld negative savings if the hours are low. The IL TRM addressed this by modeling systems and providing savings per tons.
Table - HVAC Fan Motor Hours - Appendix 5	Proposed Further Secondary Research	The current approach relies on a spreadsheet which is not available to review. This approach appears to yeld negative savings if the hours are low. The IL TRM addressed this by modeling systems and providing savings per tons.

H1 = 75% x EFLHc / 50% + 75% x EFLHh / 50%	No change	Aligns with IL TRM methodology
table - Cooling FLHrs - Appendix 5	No change	Aligns with IL TRM methodology
table - Heat Pump FLHrs - Appendix 5	No change	Aligns with IL TRM methodology
15	Parameter update	Current value is based on the controller, IL TRM bases their value on life of CO sensor.
AKWHe = Kwe x H	Proposed Further Secondary Research	The current approach relies on a spreadsheet which is not available to review. This approach appears to yeld negative savings if the hours are low. The IL TRM addressed this by modeling systems and providing savings per tons.
0	Proposed Further Secondary Research	The current approach relies on a spreadsheet which is not available to review. This approach appears to yeld negative savings if the hours are low. The IL TRM addressed this by modeling systems and providing savings per tons.

AKWH = AKWHe - AKWHr	Proposed Further Secondary Research	The current approach relies on a spreadsheet which is not available to review. This approach appears to yeld negative savings if the hours are low. The IL TRM addressed this by modeling systems and providing savings per tons.
0	Proposed Further Secondary Research	The current approach relies on a spreadsheet which is not available to review. This approach appears to yeld negative savings if the hours are low. The IL TRM addressed this by modeling systems and providing savings per tons.
0	Proposed Further Secondary Research	The current approach relies on a spreadsheet which is not available to review. This approach appears to yeld negative savings if the hours are low. The IL TRM addressed this by modeling systems and providing savings per tons.
Custom Spreadsheet	Proposed Further Secondary Research	Custom spreadsheet not available for review. Recommend further review of spreadsheet to validate calculations, or to develop a standardized algorithm if spreadsheet is not available for general use.
Custom Spreadsheet	Proposed Further Secondary Research	Custom spreadsheet not available for review. Recommend further review of spreadsheet to validate calculations, or to develop a standardized algorithm if spreadsheet is not available for general use.
Custom Spreadsheet	Proposed Further Secondary Research	Custom spreadsheet not available for review. Recommend further review of spreadsheet to validate calculations, or to develop a standardized algorithm if spreadsheet is not available for general use.
Site Specific Input	No change	Standard input for calculatios

Site Specific Input	No change	Standard input for calculatios
Site Specific Input	No change	Standard input for calculatios
C&I	No change	Aligns with other TRMs
Retrofit	No change	Aligns with other TRMs
Multi-deck refrigerated coolers with covers	No change	Aligns with other TRMs
0	No change	Aligns with other TRMs
C&I	No change	Aligns with other TRMS
Control system that either shuts off or reduces the speed of the evaporator fans when thermostat is not calling for cooling.	No change	Aligns with other TRMS
Reduction in fan hours and power	No change	Aligns with other TRMS
2.69	Proposed Further Secondary Research	CT PSD obtained ACOP values from 2009 ASHRAE handbook and consultant interviews which the review team was unable to verify. NY TRM uses COP values from a more recent evaluation report, however, the review team was unable to locate that study. CT values generally align with other TRMs but we recommend further research for this parameter.

Assumed 1 - not included in calculation	Proposed Primary Research	Currently assumes average kW reduction. It is reasonable to expect that fans operate more during peak periods to handle peak cooling loads reducing the peak savings.
10 - Evaporator Fan Control	New parameter update	Appendix 4 does not currently list evaporator fan controls but only refrigeration controls.
10 - Evaporator Fan Control	New parameter update	Appendix 4 does not currently list evaporator fan controls but only refrigeration controls.
2.69	Proposed Further Secondary Research	CT PSD obtained ACOP values from 2009 ASHRAE handbook and consultant interviews which the review team was unable to verify. NY TRM uses COP values from a more recent evaluation report, however, the review team was unable to locate that study. CT values generally align with other TRMs but we recommend further research for this parameter.
2.69	Proposed Further Secondary Research	CT PSD obtained ACOP values from 2009 ASHRAE handbook and consultant interviews which the review team was unable to verify. NY TRM uses COP values from a more recent evaluation report, however, the review team was unable to locate that study. CT values generally align with other TRMs but we recommend further research for this parameter.
2.69	Proposed Further Secondary Research	CT PSD obtained ACOP values from 2009 ASHRAE handbook and consultant interviews which the review team was unable to verify. NY TRM uses COP values from a more recent evaluation report, however, the review team was unable to locate that study. CT values generally align with other TRMs but we recommend further research for this parameter.

2.03	Proposed Further Secondary Research	CT PSD obtained ACOP values from 2009 ASHRAE handbook and consultant interviews which the review team was unable to verify. NY TRM uses COP values from a more recent evaluation report, however, the review team was unable to locate that study. CT values generally align with other TRMs but we recommend further research for this parameter.
N/A	Parameter update	Remove as it is not used in the analysis
N/A	Parameter update	Remove as it is not used in the analysis
0	No change	Aligns with other TRMS
AKW = AKWH / 8760 x CF	Algorithm update	CF is currently not included in the peak savings calculation. Recommend updating algorithm.
AKW = AKWH / 8760 x CF	Algorithm update	CF is currently not included in the peak savings calculation. Recommend updating algorithm.
Add reference: Becker, B.R, and Fricke B.A., High Efficiency Evaporator Fan Motors for Commercial Refrigeration Applications, Purdue Labs, 2016. https://docs.lib.purdue.edu/cgi/viewcontent.cgi?article=2588&context=iracc	Updated reference	Additional reference.

C&I	No change	Aligns with other TRMs
Door Heater Controls: On/Off Micropulse	Parameter update	Recommend add On/Off and Micropulse to add flexibility to the measure as occurrs with other TRMs.
On/Off SSP 0.315 (41w/130w), WSP 0.3 (39w/130w) Micropulse SSP 0.462 (60w/130w), WSP 0.431 (56w/130w)	Parameter update	MA, NY, MidAtlantic TRMs all reference lower CFs and point out that door heaters must run more in humid conditions which typically align with SSP periods. The reference used in the MidAtlantic TRM provided ISO-NE seasonal peak factors from the study. Recommend update: https://cadmusgroup.com/wp-content/uploads/2016/02/NEEP-CRL_Report_FINAL_clean.pdf?submissionGuid=cb214243-bab8-479a-a4c4-c8e5c64ae7b2

On/Off SSP 0.315 (41w/130w), WSP 0.3 (39w/130w) Micropulse SSP 0.462 (60w/130w), WSP 0.431 (56w/130w)	Parameter update	MA, NY, MidAtlantic TRMs all reference lower CFs and point out that door heaters must run more in humid conditions which typically align with SSP periods. The reference used in the MidAtlantic TRM provided ISO-NE seasonal peak factors from the study. Recommend update: https://cadmusgroup.com/wp-content/uploads/2016/02/NEEP-CRL_Report_FINAL_clean.pdf?submissionGuid=cb214243-bab8-479a-a4c4-c8e5c64ae7b2
On/Off 2786 Micropulse 4196	Proposed Further Secondary Research	MidAtlantic TRM provides different reduced hours for control types. The referenced source for the values was reviewed and inputs adjusted for CT specific conditions. This change removes the cooler/freezer reduced hours and switches to control type. Further research could be completed to provide adjustments for control type and cooler/freezer.
On/Off 2786 Micropulse 4196	Proposed Further Secondary Research	MidAtlantic TRM provides different reduced hours for control types. The referenced source for the values was reviewed and inputs adjusted for CT specific conditions. This change removes the cooler/freezer reduced hours and switches to control type. Further research could be completed to provide adjustments for control type and cooler/freezer.
C&I	No change	Aligns with other TRMs
0.46	Parameter update	Savings based on 2017 study. Recommend update to align with current manufacturer literature. https://www.energymisers.com/#:~:text=VM2iQ,Learn%20More.

0.25	Parameter update	Savings based on 2017 study. Recommend update to align with current manufacturer literature. https://www.energymisers.com/#:~:text=VM2iQ,Learn%20More.
0.25	Parameter update	Savings based on 2017 study. Recommend update to align with current manufacturer literature. https://www.energymisers.com/#:~:text=VM2iQ,Learn%20More.
0.35	Parameter update	Savings based on 2017 study. Recommend update to align with current manufacturer literature. https://www.energymisers.com/#:~:text=VM2iQ,Learn%20More.
0	No change	Aligns with other TRMs
0	No change	Aligns with other TRMs
5 - Appendix 4 - New entry would be needed	New parameter update	Savings based on 2017 study. Recommend update to align with current manufacturer literature. https://www.energymisers.com/#:~:text=VM2iQ,Learn%20More.
Energy Misers calculator: http://www.energymisers.com/calculator.php Energy Misers Savings Factors: https://www.energymisers.com/#:~:text=VM2iQ,Learn%20More	Updated reference	Updated references from Vending Misers.
C&I	No change	Aligns with other TRMs

Coolers - 182.5 Freezers - 375.3	Parameter update	Aligning with NY TRM methodology using same source and correcting an error. 202.7 should have been 182.5. Note: Standard doors have door heaters, high efficiency doors do not have door heaters.
Coolers - 182.5 Freezers - 375.3	Parameter update	Aligning with NY TRM methodology using same source and correcting an error. 202.7 should have been 182.5. Note: Standard doors have door heaters, high efficiency doors do not have door heaters.
ACOP 2.69	Proposed Further Secondary Research	CT PSD obtained ACOP values from 2009 ASHRAE handbook and consultant interviews which the review team was unable to verify. NY TRM uses COP values from a more recent evaluation report, however, the review team was unable to locate that study. CT values generally align with other TRMs but we recommend further research for this parameter.
AKWh = L x SFakwh x [1 - (EFLHcooling/8760) x (COPref / COPhvac)]	Algorithm update	Update existing PSD algorithm for new values
ACCFh = L x [(SFakwh x 3412) / 100,000] x (EFLHheating / 8760) x (1 / EFF)] x 1.029 (CCF to thermss)	Algorithm update	Update existing PSD algorithm for new values
SkW = L x SFakwh/8760 x CF	Algorithm update	Update existing PSD algorithm for new values
Boilers and Furnaces with lower efficiency	No change	Aligns with other TRMs
0	No change	Aligns with other TRMs

9630521	Parameter update	Comments erroneously refer to measure 4.5.7. Change comments text to Measure 4.5.3. Measure 4.5.3 values changed to reflect the recent impact evaluation report.
9630521	Parameter update	Comments erroneously refer to measure 4.5.7. Change comments text to Measure 4.5.3. Measure 4.5.3 values changed to reflect the recent impact evaluation report.
9630521	Parameter update	Comments erroneously refer to measure 4.5.7. Change comments text to Measure 4.5.3. Measure 4.5.3 values changed to reflect the recent impact evaluation report.
Varies by equipment	No change	Aligns with other TRMs
85200000	No change	Reflects most recent CT evaluation

ABTUH = 85,200,000 x ((1/AFUEb)-(1/AFUEix0.98)) ABTUw = 9,630,521 x ((1/AFUEe)-(1/AFUEb)) ACCF = ACCFh + ACCFw	Algorithm update	Update algorithm to reflect updated ADHW
ABTUH = 85,200,000 x ((1/AFUEb)-(1/AFUEix0.98)) ABTUw = 9,630,521 x ((1/AFUEe)-(1/AFUEb)) ACCF = ACCFh + ACCFw	Algorithm update	Update algorithm to reflect updated ADHW
ABTUH = 85,200,000 x ((1/AFUEe)-(1/0.85)) ABTUw = 9,630,521 x ((1/AFUEe)-(1/AFUEb)) ACCF = ACCFh + ACCFw	Algorithm update	Update algorithm to reflect updated ADHW

ABTUH = 85,200,000 x ((1/AFUEe)-(1/0.85)) ABTUw = 9,630,521 x ((1/AFUEe)-(1/AFUEb)) ACCF = ACCFh + ACCFw	Algorithm update	Update algorithm to reflect updated ADHW
ABTUH = 85,200,000 x ((1/AFUEe)-(1/AFUEb)) ABTUw = 9,630,521 x ((1/AFUEe)-(1/AFUEb)) ACCF = ACCFh + ACCFw	Algorithm update	Update algorithm to reflect updated ADHW
Deemed Savings	No change	Aligns with MA TRM. The NY and Mid-Atlantic TRMs use algorithms to calculate savings. Sample calculated savings for a 5 ton unit found that the results are similar to the deemed values.
45	No change	Aligns with MA TRM. Sample calculated savings for a 5 ton unit and EFLH 1,418 found that the results are similar.
50 gallon storage or tankless heater with EF of 0.67 based on R1706 evaluation report.	Parameter update	The R1706 evaluation report (page 5) reports baseline EF of 0.67. Recommend update the reference as well as to convert the EF to UEF.

50 gallon storage or tankless heater with EF of 0.67 based on R1706 evaluation report.	Parameter update	The R1706 evaluation report (page 5) reports baseline EF of 0.67. Recommend update the reference as well as to convert the EF to UEF.
50 gallon storage or tankless heater with EF of 0.67 based on R1706 evaluation report.	Parameter update	The R1706 evaluation report (page 5) reports baseline EF of 0.67. Recommend update the reference as well as to convert the EF to UEF.
As installed	Parameter update	Update EF to UEF
As installed	Parameter update	Update EF to UEF
Use UEF as the efficiency metric	Algorithm update	The new Federal standard requires water heaters to be rated in terms of UEF for commercial water heaters: https://www.energy.gov/sites/prod/files/2016/08/f33/Water%20Heaters%20Test%20Procedure%20SNOPR.pdf Even though residential water heaters are not required to follow the new Federal regulation, other TRMs are using the UEF as the efficiency metric for residential water heaters. Recommend update savings algorithm to use UEF as the efficiency metric to be consistent.

Update EF to UEF	Parameter update	The new Federal standard requires water heaters to be rated in terms of UEF for commercial water heaters: https://www.energy.gov/sites/prod/files/2016/08/f33/Water%20Heaters%20Test%20Procedure%20SNOPR.pdf Even though residential water heaters are not required to follow the new Federal regulation, other TRMs are using the UEF as the efficiency metric for residential water heaters. Recommend update savings algorithm to use UEF as the efficiency metric to be consistent.
9630521	Parameter update	The R1614-1613 evaluation report recommends annual domestic water usage of 15,415 gallons and temperature differential of 75°F.
9630521	Parameter update	The R1614-1613 evaluation report recommends annual domestic water usage of 15,415 gallons and temperature differential of 75°F.
Update EF to UEF and use UEF of 0.60 as baseline	Parameter update	Other TRMs use UEF as the efficiency metric. UEF od 0.60 seems to be the common baseline UEF

As installed UEF	Parameter update	The new Federal standard requires water heaters to be rated in terms of UEF for commercial water heaters: https://www.energy.gov/sites/prod/files/2016/08/f33/Water%20Heaters%20Test%20Procedure%20SNOPR.pdf Even though residential water heaters are not required to follow the new Federal regulation, other TRMs are using the UEF as the efficiency metric for residential water heaters. It is recommended to change savings algorithm to use UEF as the efficiency metric to be consistent.
15415	Parameter update	Based on the recommendation made by R1614-1613 evaluation report, Table ES-7.
15415	Parameter update	Based on the recommendation made by R1614-1613 evaluation report, Table ES-7.
55	Parameter update	The R1614-1613 evaluation report, Table ES-7 recommends temperature differential of 75°F. Value updated to reflect 75°F temperature differential.
55	Parameter update	The R1614-1613 evaluation report, Table ES-7 recommends temperature differential of 75°F. Value updated to reflect 75°F temperature differential.
130	Parameter update	The R1614-1613 evaluation report, Table ES-7 recommends temperature differential of 75°F. Value updated to reflect 75°F temperature differential.

9,630,521 x (1/0.6 - 1/UEF_ee)	Algorithm update	Recommend savings algorithm update based on updated annual heating load.
Residential	No change	Aligns with other TRMs
Both Retrofit and Lost Opportunity	No change	Correct definition
Electric ressistance water heater for Retrofit Lost opportunity is when the baseline equipment is unknown.	No change	Aligns with other TRMs

Retrofit: 1818 kWh for ≤ 55 gallons, 1258 kWh for >55 gallons	No change	Based on the most recent evaluation report
Retrofit: 1818 kWh for ≤ 55 gallons, 1258 kWh for >55 gallons	No change	Based on the most recent evaluation report

Lost opportunity: 961 kWh for ≤ 55 gallons, 561 kWh for >55 gallons	No change	Based on the most recent evaluation report
15.5 gallons	No change	Based on the most recent evaluation report

23.54 gallons	No change	Based on the most recent evaluation report
Retrofit, Lost Opportunity	No change	Project specific data typical for custom measures. Aligns with other TRMs.
Project whose scope may be considered custom or comprehensive. Replacement of an inefficient HVAC system (or component) such as a fossil fuel furnace, boiler, heat pump, air conditioner, Home Performance with ENERGY STAR project measures. Project with interactive effects between two or more measures	No change	Project specific data typical for custom measures. Aligns with other TRMs.
http://www.marean.mycpanel.princeton.edu/Details.html	Updated reference	PRISM tool link in the references expired. Added latest link available in Princeton University website
http://www.marean.mycpanel.princeton.edu/Details.html	Updated reference	PRISM tool link in the references expired. Added latest link available in Princeton University website

C&I	No change	Aligns with other TRMs
Chillers with baseline efficiency per the 2018 IECC	Updated reference	CT adopted 2018 IECC
Developed using typical chiller part load curves and the baseline efficiencies based on 2018 IECC.	Updated reference	CT adopted 2018 IECC
Developed using typical chiller part load curves and the baseline efficiencies based on 2018 IECC.	Updated reference	CT adopted 2018 IECC
Developed using typical chiller part load curves and the baseline efficiencies based on 2018 IECC.	Updated reference	CT adopted 2018 IECC
Developed using typical chiller part load curves and the baseline efficiencies based on 2018 IECC.	Updated reference	CT adopted 2018 IECC

calculated for each chiller installation based on the specific equipment,operational staging, operating profile, and load profile. A temperature BIN model is utilized to calculate the energy and demand savings for the chiller projects. Customer-specific information is used to estimatea load profile for the chilled water plant. Based on the loading, the chiller’s actual part load performance is used to calculate the chiller’s demand (kW) and consumption (kWh) for each temperature BIN (Note [1]).A chiller spreadsheet is used to calculate consumption for both the baseline and proposed units. It is also used to calculate the consumption of the auxiliaries (i.e., chilled	Further Secondary Research	Site and project specific calculations calculations are done using the chiller analysis spreadsheet. It is recommended to further review the spreadsheet, and possibly standarize the calculations for the PSD.
Specify Multifamily should apply Path B, and include language differentiating Path A and Path B	Parameter update	See Tab in TRC MF Review Table: CA Chiller - LO
C&I	No change	Aligns with other TRMs
Boilers and Furnaces with Federal code compliant minimum efficiency	Awaiting Evaluation Results	Aligns with other TRMs A Massachusetts baseline study is being performed currently, with results expected to come out end of this summer. Planned updates include: baseline efficiency and EUL.

1 for non-condensing, 0.97 for condensing	Updated reference	Other TRMs do not consider the AF in the savings calculation. The PSD does not provide a source and/or explanation on how the AF is calculated. Recommend provide source for AF.
Obtain EFLH information for major cities in CT, Hartford, Bridgeport, Oxford, and Willimantic	Proposed Further Secondary Research	EFLH is a weather dependent parameter. PSD referenced 2008 by Fuss and O'Neil report is not available to review. As such, it is not clear which weather location(s) the study is based on. ASHRAE reports seperate design conditions for Hartford, Bridgeport, Oxford, and Willimantic. Recommend seperate EFLH for these weather stations (at least for Hartford and Bridgeport). R91 recommends including additional weather and location assumptions.
1.15	Proposed Further Secondary Research	Other TRMs do not consider the oversize factor in the savings calculation because the factor is accounted for in the EFLH. Recommend remove if this factor if accounted for in EFLH based on recommended update.
Based on IECC 2018	Updated reference	CT adopting IECC 2018
0	Proposed Further Secondary Research	Other TRMs do not consider the oversize factor in the savings calculation because the factor is accounted for in the EFLH. Recommend remove if this factor if accounted for in EFLH based on recommended update.

Update based on average peak day savings for Hartford and Bridgeport.	Further Secondary Research	The PD savings factor was calculated based on custom projects installed in 2008 report by Fuss and O'Neil report is not available to review. As such, it is not clear which weather location(s) the study is based on. ASHRAE reports seperate design conditions for Hartford, Bridgeport, Oxford, and Willimantic. R91 recommends including additional weather and location assumptions for Hartford and Bridgeport. Recommend separate EFLH and HDD for these weather stations.
2018 IECC	Updated reference	CT adopting IECC 2018
C&I	No change	Aligns with other TRMs
Code compliant natural gas-fired, storage-type with 80% thermal efficiency	Awaiting Evaluation Results	Aligns with other TRMs Massachusetts baseline study is being performed currently, with results expected to come out end of this summer. Planned updates include: baseline efficiency.
80% based on IECC 2018	Updated reference	CT adopting IECC 2018
Annual baseline gas usage is based on the gas usage rate for different building types. Source: US Energy Information Administration, Table E8. Natural gas consumption and conditional energy intensities (cubic feet) by end use, 2012, Rel. May 2016.	Editorial update	Nomenclature table refers to Table 2-GG to look for annual base case energy usage rate. It should refer to Table 3-HH.
IECC 2018	Updated reference	CT adopting IECC 2018

Low-Rise = 0.193 ccf/ft2, High-Rise = 0.176 ccf/ft2	Parameter update	See Tab in TRC MF Review Table: CA Gas DHW Heater - LO
RECS Table CE4.7 Annual household site end-use consumption by fuel in the Northeast—averages, 2015 https://www.eia.gov/consumption/residential/data/2015/c&e/pdf/ce4.7.pdf RECS Table HC10.10 Average square footage of Northeast homes, 2015 https://www.eia.gov/consumption/residential/data/2015/hc/php/hc10.10.php	Updated reference	See Tab in TRC MF Review Table: CA Gas DHW Heater - LO
C&I	No change	Aligns with IL and MidAtlantic TRM
ASHRAE Load Profiles x Flow Fractions x Hours	New methodology update	Update to align with IL and MidAtlantic TRM. Massachusetts baseline study is being performed currently, with results expected to come out end of this summer. Planned updates include: Energy Savings and Demand Savings.

Use equipment specific BHP if available, else BHP = Nominal HP x 65% LF	Parameter update	Update to align with IL and MidAtlantic TRM
Update table with additional fan control types.	Parameter update	Include additional fan control types as shown in the IL and MidAtlantic TRM.
0	Parameter update	The IL and MidAtlantic TRM provides different values for VFDs depending upon their control strategy.
Nominal HP	New parameter update	Aligns with IL and MidAtlantic TRM

0.65	New parameter update	Aligns with IL and MidAtlantic TRM

Default Fan Duty Cycle Based on 2012 ASHRAE Handbook, HVAC Systems and Equipment, page 45.11, Figure 12. Note: this is for VAV systems	Proposed Primary Research	The ASHRAE 90.1-1989 Reference was not verified. The ASHRAE reference provided in the IL and MidAtlantic TRMs is newer but specific to VAV systems which is appropriate. Recommend additional research for this load profile to make it CT specific.

N/A	Proposed Primary Research	For Supply & Return Fans - Recommend change methodology from Savings Factors to a Part Load Ratio for the baseline and proposed system. This allows for different VFD control strategies while not making overly complex savings factor tables. Fundamentally it is the same approach but displayed differently. For Pumps - Consider creating a separate measure to reduce confusion with the supply and return fans. Cooling Tower - Recommend research the additon of cooling tower fans. These fans are fundamentally different from the supply and return fans in both type and operation.
N/A	Proposed Primary Research	For Supply & Return Fans - Recommend change methodology from Savings Factors to a Part Load Ratio for the baseline and proposed system. This allows for different VFD control strategies while not making overly complex savings factor tables. Fundamentally it is the same approach but displayed differently. For Pumps - Consider creating a separate measure to reduce confusion with the supply and return fans. Cooling Tower - Recommend research the additon of cooling tower fans. These fans are fundamentally different from the supply and return fans in both type and operation.

N/A	Proposed Primary Research	For Supply & Return Fans - Recommend change methodology from Savings Factors to a Part Load Ratio for the baseline and proposed system. This allows for different VFD control strategies while not making overly complex savings factor tables. Fundamentally it is the same approach but displayed differently. For Pumps - Consider creating a separate measure to reduce confusion with the supply and return fans. Cooling Tower - Recommend research the additon of cooling tower fans. These fans are fundamentally different from the supply and return fans in both type and operation.
0	New parameter recommended	For Supply & Return Fans - Recommend change methodology from Savings Factors to a Part Load Ratio for the baseline and proposed system. This allows for different VFD control strategies while not making overly complex savings factor tables. Fundamentally it is the same approach but displayed differently. For Pumps - Consider creating a separate measure to reduce confusion with the supply and return fans. Cooling Tower - Recommend research the additon of cooling tower fans. These fans are fundamentally different from the supply and return fans in both type and operation.

Dependent upon the Flow vs. Power Fraction and the Default Fan Duty Cycle	Proposed Further Secondary Research	For Supply & Return Fans - Recommend change methodology from Savings Factors to a Part Load Ratio for the baseline and proposed system. This allows for different VFD control strategies while not making overly complex savings factor tables. Fundamentally it is the same approach but displayed differently. For Pumps - Consider creating a separate measure to reduce confusion with the supply and return fans. Cooling Tower - Recommend research the additon of cooling tower fans. These fans are fundamentally different from the supply and return fans in both type and operation.
Unknown	Proposed Further Secondary Research	Recommend research on ISO-NE specific PLR factors for the summer peak.
Pumps/Cooling Tower	Algorithm update	Aligns with IL and MidAtlantic TRM Recommend additional research to bring the Pumps/Cooling Towers to the same approach as HVAC fans. Interactive effects have been modified to match CT PSD methodology if chosen to be used. If it is not used remove the [1 =+ (1/ACOP)] equation
Pumps/Cooling Tower	Algorithm update	Aligns with IL and MidAtlantic TRM Recommend additional research to bring the Pumps/Cooling Towers to the same approach as HVAC fans. Interactive effects have been modified to match CT PSD methodology if chosen to be used. If it is not used remove the [1 =+ (1/ACOP)] equation

Bare hydronic supply heating and DHW pipes located in unconditioned spaces	New methodology update	Recommend adding DHW pipe insulation to measure to align with NY TRM and residential measures.
Include pipe sizes from 0.5 to 3.0 inches.	Parameter update	MA TRM lists 3 inch as the maximum applicable pipe size and NY TRM lists 8 inch as the maximum pipe size. The PSD is limited to 2 inch pipe diameter. Consider expanding pipe sizes to at least to 3 inches.
Update EFLH based on additional weather stations.	Parameter update	EFLH is a weather dependent parameter. R91 recommends including additional weather and location assumptions, minimally Hartford and Bridgeport.
Expand HL calculations to include up to 3 inches pipe diameter.	Parameter update	The HL calculation in the PSD is limited to 2 inch pipe diameter. Consider expanding pipe sizes to at least to 3 inches.
Use site specific AFUE if available. If unknown, use default 0.8.	Parameter update	Using site specific AFUE gives a more accurate estimation of savings.
Add HL data in table 3-L for temperature differential of 110 and 120 °F. Update methodology to include steam pipes.	Parameter update	The table 3-L has HL values for one temperature differential (130°F) only. As such, linear interpolation cannot be applied. It is recommended to include HL data for temperature differential of 110 and 120 °F so that linear interpolation can be applied for temperatures in between 110 and 130 °F. The measure does not include steam pipes. It is recommended to update the methodology to include steam pipes.

Include DHW and chiller pipe insulation	New parameter update	See Tab in TRC MF Review Table: CA Pipe Insulation - Rx
Efficiencies: DHW: 92% HVAC, cooling: Chiller = 11.4 EER	New parameter update	See Tab in TRC MF Review Table: CA Pipe Insulation - Rx
Hours: DHW = 8760 Chiller = CHWP & Cooling Towers (Appendix Five)	New parameter update	See Tab in TRC MF Review Table: CA Pipe Insulation - Rx
IPSD measure ID of the duct sealing measure in the Residential Section is 4.2.5	Editorial update	N/A
C&I	C&I	See comment in cell G5--there was a recent CT evaluation (C1641) w steam trap recommendaitons. Please ensure consistency with those results, including realization rate applied in appendxi 3 of PSD (see p.300, note 7 of 2020 PSD). -MI
All steam traps functioning properly	Repaired, rebuilt, or replaced steam trap	I think it is ok to add " replace" into the terminology. - JW
N/A	N/A	I agree that we should use site boiler efficiency if backup is available, otherwise use code required or 80%. - JW
The Engineering Toolbox, Properties of Saturated Steam - Imperial Units, https://www.engineeringtoolbox.com/saturated-steam-properties-d_273.html	Heat of vaporization values from Steam Tables, Power Plant Service, Inc.	2021 PSD should include update reference link. - JW
C&I	No change	Aligns with other TRMs

ACCFH - Annual Gross Fossil Fuel Savings (Natural Gas Heating) - CCF AOGH - Annual Gross Fossil Fuel Energy Savings (Oil) - CCF APGH - Annual Gross Fossil Fuel Energy Savings (Propane) - CCF	Parameter update	Add to nomenclature table
The demand savings are from the Residential Measure 4.4.4—Infiltration Reduction Testing (Blower Door Test)	Parameter update	In accordance with Measure 4.4.2, the demand savings are based on a REM/Rate model that was run in 2008. Changes to the model or to the input variables would change the deemed values. Recommend update values with new REM/rate model every three years, analogous to typical codes and standards updates, to ensure that the values reflect changes to the model and input variables.
The correct Measure ID for Residential Blower Door Measure is 4.4.2. Update this PSD ID in the savings methodology section and 'note' below the Table 3-BB	Updated reference	Update reference for accuracy.
Clarify in introductory text: For multifamily buildings, this should only be used for projects that conduct a whole building leakage test. Projects that test individually dwelling units should use the Infiltration Reduction Blower Door measure	Parameter update	See Tab in TRC MF Review Table: Small C&I Blower Door Test & Blower Door - BF estimate

EER to 11.2 (SEER 13) for lost opportunity	Parameter update	Considering updating EER to 11.2 (SEER 13) to be consistent with other TRMs. This measure would result in summer season savings only, thus using SEER would make more sense instead of EER. A Massachusetts baseline study is being performed currently, with results expected to come out end of this summer. Planned updates include: baseline efficiency.
362 - Annual Usage Factor	Parameter update	Based on the latest evaluation report. Consider updating the term to "annual usage factor" as recommended by R8 evaluation report (page VI).
EER to 11.2 (SEER 13) for lost opportunity	Parameter update	Considering updating EER to 11.2 (SEER 13) to be consistent with other TRMs. This measure would result in summer season savings only, thus using SEER would make more sense instead of EER.
11	Parameter update	Update based on R1706 RASS
3.67	Parameter update	RUL is assumed 1/3 of the EUL when equipment specific information is not available.
362 kWh/ton x CAPc,I x (EERi/11.2-1)	Parameter update	Recommend updating EER to 11.2 (SEER 13) to be consistent with other TRMs. This measure would result in summer season savings only, thus using SEER would make more sense instead of EER.
0.45 kWh/ton x CAPc,I x (EERi/11.2 -1)	Parameter update	Recommend updating EER to 11.2 (SEER 13) to be consistent with other TRMs. This measure would result in summer season savings only, thus using SEER would make more sense instead of EER.
MAF = 0.4	New parameter update	See Tab in TRC MF Review Table: DU Air Conditioning

Savings applicable to a replacement of furnace with permanent split capacitor (PSC) motor with furnace with ECM motor for the remaining useful life of the furnace given by the furnace measure (4.2.11)	New methodology update	Increased federal standards make savings unclaimable for lost opportunity but may be claimed for the remaining useful life of old equipment.
Standard motor in an existing furnace	Proposed Further Secondary Research	Furnaces have an EUL of 20 years resulting in many legacy furnaces remaining in service with standard motors well past code changes requiring ECM fan motors. This study provides support for retrofitting ECM motors into existing furnaces, usually when fan motors fail. https://www.nrel.gov/docs/fy14osti/60760.pdf
Continue as Retrofit	Proposed Further Secondary Research	Furnaces have an EUL of 20 years resulting in many legacy furnaces remaining in service with standard motors well past code changes requiring ECM fan motors. This study provides support for retrofitting ECM motors into existing furnaces, usually when fan motors fail. https://www.nrel.gov/docs/fy14osti/60760.pdf
18	No change	Aligns with other TRMs
Update the deemed values by re-running the REM/Rate simulation model every three years.	Parameter update	The deemed values are based on a REM/Rate model that was run in 2010. Changes to the model or to the input variables would change the deemed values. Recommend update values with new REM/rate model every three years, analogous to typical codes and standards updates, to ensure that the deemed values reflect changes to the model and input variables.

Residential	No change	Aligns with other TRMs
Air sealed ductwork	Parameter update	R151 - CT HES Air Sealing, Duct Sealing, and Insulation Practices [2015] - recommendation 3 suggested to use mastic rather than foil tape to seal the leaky duct. The CT PSD does not include this recommendation.
Update the deemed values by re-running the REM/Rate simulation model every three years.	Parameter update	The deemed values are based on a REM/Rate model that was run in 2010. Changes to the model or to the input variables would change the deemed values. Recommend update values with new REM/rate model every three years, analogous to typical codes and standards updates, to ensure that the deemed values reflect changes to the model and input variables.
Update to AKWHC .	Parameter update	Update to match correct nomenclature.
Update the deemed values by re-running the REM/Rate simulation model every three years.	Parameter update	The deemed values are based on a REM/Rate model that was run in 2010. Changes to the model or to the input variables would change the deemed values. Recommend update values with new REM/rate model every three years, analogous to typical codes and standards updates, to ensure that the deemed values reflect changes to the model and input variables.

Update the deemed values by re-running the REM/Rate simulation model every three years.	Parameter update	The deemed values are based on a REM/Rate model that was run in 2008. Changes to the model or to the input variables would change the deemed values. Recommend update values with new REM/rate model every three years, analogous to typical codes and standards updates, to ensure that the deemed values reflect changes to the model and input variables.
Update the demand values by re-running the REM/Rate simulation model every three years.	Parameter update	The demand values are based on a REM/Rate model that was run in 2010. Changes to the model or to the input variables would change the deemed values. Recommend update values with new REM/rate model every three years, analogous to typical codes and standards updates, to ensure that the deemed values reflect changes to the model and input variables.
Account for interactivity between the envelope and other HVAC-related measures.	Algorithm update	Recommend in clude interactvity per R91 - Review of Impact Evaluation Best Practices [2016] - recommendation "Account for interactivity between HVAC and envelope measures" pg 73. Per R1603 HES Impact Evaluation [2018] - duct sealing savings overlaps with the air sealing savings. According to this evaluation study, all participants who installed duct sealing also installed air sealing.

Update the deemed values by re-running the REM/Rate simulation model every three years.	Parameter update	The referenced analysis was performed in 2010. The deemed energy savings in this measure are taken from this reference. Recommend re-run the REM/Rate simulation to ensure that the savings are reflective of changes to the model and input variables.
Installation consistent with Air Conditioning Contractors of America/ ENERGY STAR specifications	No change	Aligns with other TRMs
Installation consistent with Air Conditioning Contractors of America/ ENERGY STAR specifications	No change	Aligns with other TRMs
ABTU_H = 995*CAP_H * (1/.85 - 1/AFUE_I)	Algorithm update	See Tab in TRC MF Review Table: DU Furnace
ABTU_H = 995*CAP_H * (1/AFUE_E- 1/AFUE_B)	Algorithm update	See Tab in TRC MF Review Table: DU Furnace
22	Updated reference	Recommended value from NY TRM. NY TRM Source is US DOE document dated 2016 while CT PSD refers CA DEER 2008 values.
6.67	Parameter update	Current value does not have a reference. Update to 1/3 EUL.
Existing Circulating Pump	No change	Aligns with other TRMs
REM Simulation file submitted by HERS rater	No change	Matches other TRM

Blower Door Test (change in CFM @50 Pascals pressure difference before and after air leakage sealing)	No change	Aligns with other TRMs
BF = 0.67 + DuctLocationTerm - 0.088xDoors - 0.002xD + 0.0012xF DuctLocationTerm = 0.27 for ducts in unconditioned space, and 0.05 for ducts in conditioned space or if no ducts Doors = number of exterior doors D = same as before: Shared Surface Area (ft2) between conditioned spaces. F = same as before: Envelope Perimeter (ft) is used to describe the sum of all the lengths of the edges of the unit, common and exterior surfaces.	New parameter update	See Tab in TRC MF Review Table: Infiltration Reduc-Blower Door
Use either SKW /SKWC consistently throughout the entire measure	Parameter update	This would provide consistency across the measure.
Use either WKW, WKWH consistently throughout the entire measure	Parameter update	This would provide consistency across the measure.

Update the deemed values by re-running the REM/Rate simulation model every three years.	Parameter update	The deemed values are based on a REM/Rate model that was run in 2008. Changes to the model or to the input variables would change the deemed values. Recommend update values with new REM/rate model every three years, analogous to typical codes and standards updates, to ensure that the deemed values reflect changes to the model and input variables.
Update the deemed values by re-running the REM/Rate simulation model every three years.	Parameter update	The deemed values are based on a REM/Rate model that was run in 2008. Changes to the model or to the input variables would change the deemed values. Recommend update values with new REM/rate model every three years, analogous to typical codes and standards updates, to ensure that the deemed values reflect changes to the model and input variables.
Update the demand savings factors by re-running the REM/Rate simulation model every three years.	Parameter update	The demand savings factors are based on a REM/Rate model that was run in 2008. Changes to the model or to the input variables would change the deemed values. Recommend update values with new REM/rate model every three years, analogous to typical codes and standards updates, to ensure that the values reflect changes to the model and input variables.
ACCF value depends on REM/rate value in Table 4-HHH	No change	Other TRMs do not consider NG peak day savings

Account for interactivity between the envelope and other HVAC-related measures.	Algorithm update	Recommend in clude interactvity per R91 - Review of Impact Evaluation Best Practices [2016] - recommendation "Account for interactivity between HVAC and envelope measures" pg 73. Per R1603 HES Impact Evaluation [2018] - duct sealing savings overlaps with the air sealing savings. According to this evaluation study, all participants who installed duct sealing also installed air sealing.
Update the deemed values and demand savings by re-running the REM/Rate simulation model every three years.	Updated reference	The referenced analysis was performed in 2008. The deemed energy savings in this measure are taken from this reference. Recommend re-run the REM/Rate simulation to ensure that the savings are reflective of changes to the model and input variables.

BF = 0.67 + DuctLocationTerm - 0.088xDoors - 0.002xD + 0.0012xF DuctLocationTerm = 0.27 for ducts in unconditioned space, and 0.05 for ducts in conditioned space or if no ducts Doors = number of exterior doors D = same as before: Shared Surface Area (ft2) between conditioned spaces. F = same as before: Envelope Perimeter (ft) is used to describe the sum of all the lengths of the edges of the unit, common and exterior surfaces.	New parameter update	See Tab in TRC MF Review Table: Infiltration Reduc-Blower Door
Use site-specific heating system efficiency if available. If unknown, use default of 80% for boilers, 78% for natural gas and propane furnaces, and 76% for oil furnaces.	Parameter update	No references were provided for the estimated efficiency. The proposed efficiency values are based on an evaluation study conducted by Cadmus in 2015 in MA titled 'High Efficiency Heating Equipment Impact Evaluation Final Report', which are also used for measures 4.2.10 and 4.2.11 in the CT PSD (boilers and furnaces). In addition to being based on evaluations, these values will also help align the existing heating system efficiency values with other TRMs.

Use site-specific heating system efficiency if available. If unknown, use default of 80% for boilers, 78% for natural gas and propane furnaces, and 76% for oil furnaces.	Parameter update	No references were provided for the estimated efficiency. The proposed efficiency values are based on an evaluation study conducted by Cadmus in 2015 in MA titled 'High Efficiency Heating Equipment Impact Evaluation Final Report', which are also used for measures 4.2.10 and 4.2.11 in the CT PSD (boilers and furnaces). In addition to being based on evaluations, these values will also help align the existing heating system efficiency values with other TRMs.
AKWH - Annual electric energy savings	Parameter update	N/A
Account for interactivity between the envelope and other HVAC-related measures.	Algorithm update	Recommend in clude interactvity per R91 - Review of Impact Evaluation Best Practices [2016] - recommendation "Account for interactivity between HVAC and envelope measures" pg 73. Per R1603 HES Impact Evaluation [2018] - duct sealing savings overlaps with the air sealing savings. According to this evaluation study, all participants who installed duct sealing also installed air sealing.
Update the Blower Door Test PSD ID in this measure to 4.4.2. The 4.4.4 is the PSD ID for Thermal Enclosure measure.	Updated reference	Incorrect reference measure number

Consider combining these three measures	Algorithm update	Combining measures would help align with other TRMs and would likely improve user experience because these three meaures are often implemented together.
1 for 100% above grade; 0.75 for 31-99% above grade; 0.6 for 0-30% above grade Values were developed using REM/Rate software	No change	Other TRMs do not use this factor, although the presence of GF increases the accuracy of the CT PSD algorithms. The savings factor values from the REM/Rate software could not be verified. Consider re-running the REM/Rate models to verify/update GF values.
Consider combining these three measures	Algorithm update	Combining measures would help align with other TRMs and would likely improve user experience because these three meaures are often implemented together.

Existing Insulation. Where unknown use code IECC 2003 IECC 2012.	Parameter update	Existing insulation R-value is not always know. Recommend use code where existing is not available.
ABTUH = Annual heating savings in BTU/yr	Parameter update	Add to nomenclature for consistency.
	Proposed Further Secondary Research	The (7/12 x R + 4) factor is accounting for uninsulated wall assembly R -value. R Effective Whole Wall Assembly of 4 is explained in Note [2] but 7/12 factor is not justified/ no reference is provided. The reference added for R-values is not valid This factor involves an assumption that 25% of the wall area is framing, without any reference. Also assumes 2x4 column framing with 4" insulation depth, whereas 2x6 column framing with 6" insulation depth is relatively common in newer construction; A valid reference for R existing equation should be provided. Consider using a table of factors for framing type instead of assuming relative area of framing. We found an ASHRAE reference for framing factors in the Mid Atlantic TRM. No basis was provided for estimating effective R-Value. Further secondary research would be beneficial to identify a defensible method to calculate effective R value.

	Proposed Further Secondary Research	The (7/12 x R + 4) factor is accounting for uninsulated wall assembly R -value. R Effective Whole Wall Assembly of 4 is explained in Note [2] but 7/12 factor is not justified/ no reference is provided. The reference added for R-values is not valid This factor involves an assumption that 25% of the wall area is framing, without any reference. Also assumes 2x4 column framing with 4" insulation depth, whereas 2x6 column framing with 6" insulation depth is relatively common in newer construction; A valid reference for R new equation should be provided. Consider using a table of factors for framing type instead of assuming relative area of framing. We found an ASHRAE reference for framing factors in the Mid Atlantic TRM No basis was provided for estimating effective R-Value. Further secondary research would be beneficial to identify a defensible method to calculate effective R value.
This reference link needs to be updated.	Updated reference	The link listed is expired. Resources for common construction material R values are provided in supporting info.
Use site-specific heating system efficiency if available. If unknown, use default of 80% for boilers, 78% for natural gas and propane furnaces, and 76% for oil furnaces.	Parameter update	No references were provided for the estimated efficiency. The proposed efficiency values are based on an evaluation study conducted by Cadmus in 2015 in MA titled '"High Efficiency Heating Equipment Impact Evaluation Final Report', which is also used for measures 4.2.10 and 4.2.11 in the CT PSD. In addition to being based on evaluations, these values will also help align the existing heating system efficiency values with other TRMs.

Update HDD based on additional weather stations.	Parameter update	Region specific HDD will be more accurate than state average. Additionally, there is an Upcoming MA Baseline Study Evaluation that is slated to wrap up at the end of the 2020 summer season. The results of this study should be incorporated into the PSD if possible. Also, R91 - Review of Impact Evaluation Best Practices (pg 73) included that some areas in the state have notably lower HDDs than reflected by the statewide average or Hartford weather profiles and recommended to consider whether additional weather and location assumptions can improve savings estimates.
Consider using Bridgeport (coastal) and Hartford (non-coastal) bin data, as reference weather information rather than just using Hartford region bin data for the entire state.	Parameter update	Bin data can vary for costal and non-coastal cities in the state. Using bin data from Hartford alone may not be accurate. Recommend update using NOAA
Consider using Bridgeport (coastal) and Hartford (non-coastal) peak outside temperature data, as reference weather information rather than just using Hartford region bin data for the entire state.	Parameter update	Peak temperature data can vary across cities in the state. Using bin data from Hartford alone may not be accurate.
Include COP of heat pump in nomenclature	Parameter update	Add to nomenclature for consistency.

2.4	Parameter update	No reference provided for the assumed COP value of 2 for a heat pump. The federal minimum efficiency standard for heat pumps is HSPF 8.2, as of Jan. 1, 2015, which converts to a COP value of 2.4. The current PSD value of 2 COP is lower than the federal minimum. Consider updating the COP value to federal minimum efficiency standard
Account for interactivity between the envelope and other HVAC-related measures.	Algorithm update	Recommend include interactvity per R91 - Review of Impact Evaluation Best Practices [2016] - recommendation "Account for interactivity between HVAC and envelope measures" pg 73.
Consider combining these three measures	Algorithm update	Combining measures would help align with other TRMs and would likely improve user experience because these three meaures are often implemented together.

11.0 EER/ 13.0 SEER	No change	Central Air Conditioning Impact and Process Evaluation, NMR Group, Inc., May 30, 2017.
Consider combining these three measures	Algorithm update	Combining measures would help align with other TRMs and would likely improve user experience because these three meaures are often implemented together.
Existing Insulation. Where unknown use code IECC 2003 IECC 2012.	Parameter update	Existing insulation R-value is not always know. Recommend use code where existing is not available.
Consider removing one	Editorial update	Remove, if not significant or add differentiating text
ABTUH = Annual heating savings in BTU/yr to Nomenclature table	Parameter update	Add to nomenclature for consistency.
	Proposed Further Secondary Research	No basis was provided for estimating effective R-Value and could not verify algorithm. Further secondary research would be beneficial to identify a defensible method to calculate effective R value.
0	Proposed Further Secondary Research	No basis was provided for estimating effective R-Value and could not verify algorithm.Further secondary research would be beneficial to identify a defensible method to calculate effective R value.

Use site-specific heating system efficiency if available. If unknown, use default of 80% for boilers, 78% for natural gas and propane furnaces, and 76% for oil furnaces.	Parameter update	No references were provided for the estimated efficiency. The proposed efficiency values are based on an evaluation study conducted by Cadmus in 2015 in MA titled '"High Efficiency Heating Equipment Impact Evaluation Final Report', which is also used for measures 4.2.10 and 4.2.11 in the CT PSD. In addition to being based on evaluations, these values will also help align the existing heating system efficiency values with other TRMs.
Update HDD based on additional weather stations.	Parameter update	Region specific HDD will be more accurate than state average. Additionally, there is an Upcoming MA Baseline Study Evaluation that is slated to wrap up at the end of the 2020 summer season. The results of this study should be incorporated into the PSD if possible. Also, R91 - Review of Impact Evaluation Best Practices (pg 73) included that some areas in the state have notably lower HDDs than reflected by the statewide average or Hartford weather profiles and recommended to consider whether additional weather and location assumptions can improve savings estimates.
Consider using Bridgeport (coastal) and Hartford (non-coastal) bin data, as reference weather information rather than just using Hartford region bin data for the entire state.	Algorithm update	Bin data can vary for costal and non-coastal cities in the state. Using bin data from Hartford alone may not be accurate. Additionally, there is an upcoming MA Baseline Study Evaluation that is slated to wrap up at the end of the 2020 summer season. The results of this study should be incorproated into the PSD if possible.

Consider using Bridgeport (coastal) and Hartford (non-coastal) peak outside temperature data, as reference weather information rather than just using Hartford region bin data for the entire state.	Algorithm update	Peak temperature data can vary across cities in the state. Using bin data from Hartford alone may not be accurate.
Include COP of heat pump in nomenclature	Algorithm update	Add to nomenclature for consistency.
2.4	Algorithm update	No reference provided for the assumed COP value of 2 for a heat pump. The federal minimum efficiency standard for heat pumps is HSPF 8.2, as of Jan. 1, 2015, which converts to a COP value of 2.4. The current PSD value of 2 COP is lower than the federal minimum. Consider updating the COP value to federal minimum efficiency standard
0	Algorithm update	Region specific HDD are recommended above.
0	Algorithm update	Region specific CDH can result accurate estimates than using bin data for Hartford region
Account for interactivity between the envelope and other HVAC-related measures.	Algorithm update	Recommend include interactvity per R91 - Review of Impact Evaluation Best Practices [2016] - recommendation "Account for interactivity between HVAC and envelope measures" pg 73.
Existing Insulation. Where unknown use code IECC 2003 IECC 2012.	Parameter update	Existing insulation R-value is not always know. Recommend use code where existing is not available.

Use site-specific heating system efficiency if available. If unknown, use default of 80% for boilers, 78% for natural gas and propane furnaces, and 76% for oil furnaces.	Parameter update	No references were provided for the estimated efficiency. The proposed efficiency values are based on an evaluation study conducted by Cadmus in 2015 in MA titled '"High Efficiency Heating Equipment Impact Evaluation Final Report', which is also used for measures 4.2.10 and 4.2.11 in the CT PSD.
Update HDD based on additional weather stations.	Parameter update	Region specific HDD will be more accurate than state average. R91 - Review of Impact Evaluation Best Practices (pg 73) included that some areas in the state have notably lower HDDs than reflected by the statewide average or Hartford weather profiles and recommended to consider whether additional weather and location assumptions can improve savings estimates. Massachusetts baseline study is being performed currently, with results expected to come out end of this summer. Planned updates include: HDD and CDD.

0.64 ; ASHRAE degree-day correction.	No change	Other TRMs do not account for this factor, although the presence of Fadj improves the accuracy of the PSD algorithms. To account for the effects of solar and internal gains, number of degree days must be adjusted downward by a degree-day correction factor.
2.4	Parameter update	No reference provided for the assumed COP value of 2 for a heat pump. The federal minimum efficiency standard for heat pumps is HSPF 8.2, as of Jan. 1, 2015, which converts to a COP value of 2.4. The current PSD value of 2 COP is lower than the federal minimum. Consider updating the COP value to federal minimum efficiency standard
Consider combining these three measures	Algorithm update	Combining measures would help align with other TRMs and would likely improve user experience because these three meaures are often implemented together.
Federal Standard, 2.5 GPM	No change	Aligns with other TRMs
Make this an input with 2.0 as the default maximum flow rate	Parameter update	Other TRMs use < 2.0 GPM, with 1.5 GPM as the average flow rate for energy efficient showerheads. NY TRM uses 2.0 GPM for the baseline case.

0.78 for SF, 0.67 for MF	No change	Aligns with other TRMs
1.63	Parameter update	PSD currently refers to a single family water use study for California [3] that was done in 2011. The study found 1.4 (not 2.3) showerheads per household for residential homes. Provide reference/explanation on how 2.3 showerheads per household was calculated. The 2014 evaluation report [4] uses the same assumptions (7.8 mins per use and 0.6 showers per person per household based on a 2013 evaluation study [2]) as the mid-Atlantic TRM. CT PSD can update the number of showerheads per household to 2.63.

Make this an input with 2.0 as the default maximum flow rate	Parameter update	Other TRMs use < 2.0 GPM, with 1.5 GPM as the average flow rate for energy efficient showerheads. NY TRM uses 2.0 GPM for the baseline case.
7.8	Parameter update	The 2016 residential end water usage report (reference [1] in the supporting document) found the average duration per shower to be 7.8 minutes. The mid-atlantic TRM also uses 7.8, which is based on a 2013 evaluation study [2].
1.63	Parameter update	PSD currently refers to a single family water use study for California [3] that was done in 2011. The study found 1.4 (not 2.3) showerheads per household for residential homes. Provide reference/explanation on how 2.3 showerheads per household was calculated. The 2014 evaluation report [4] uses the same assumptions (7.8 mins per use and 0.6 showers per person per household based on a 2013 evaluation study [2]) as the mid-Atlantic TRM. CT PSD can update the number of showerheads per household to 2.63.
1.518	Parameter update	Mid-atlantic TRM uses 1.518 events per day, which comes from an assumption of 0.6 showers per day per person and 2.53 persons per househol. The number of persons per household can be updated based on CT specific studies.
Recommend remove	Parameter update	Remove to align with nearby juristictions with similar climate where this value is not used.

1239	Parameter update	Savings updated based on parameter update. Refer to PSD4.5.1 Supporting Info for calculations.
0.51 x sqrt(ni)	Algorithm update	Algorithm will change with change in annual water savings value. Refer to PSD4.5.1 Supporting Info for calculations. Recommend removing the square root on the number of installed aerators to align with MidAtl TRM methodology.
154.29 x sqrt(ni)	Algorithm update	Algorithm will change with change in annual water savings value. Refer to PSD4.5.1 Supporting Info for calculations. Recommend removing the square root on the number of installed aerators to align with MidAtl TRM methodology.
6.42 x sqrt(ni)	Algorithm update	Algorithm will change with change in annual water savings value. Refer to PSD4.5.1 Supporting Info for calculations. Recommend removing the square root on the number of installed aerators to align with MidAtl TRM methodology.

7.22 x sqrt(ni)	Algorithm update	Algorithm will change with change in annual water savings value. Refer to PSD4.5.1 Supporting Info for calculations. Recommend removing the square root on the number of installed aerators to align with MidAtl TRM methodology.
4.75 x sqrt(ni)	Algorithm update	Algorithm will change with change in annual water savings value. Refer to PSD4.5.1 Supporting Info for calculations. Recommend removing the square root on the number of installed aerators to align with MidAtl TRM methodology.
Federal standard lavatory faucet aerators with 2.2 GPM flowrate or higher	No change	Aligns with other TRMs
EPA specified faucets with flow rate of 1.5 GPM	No change	Aligns with other TRMs

REF: 0.78 for SF and 0.67 for MF	Editorial update	Update to REF to align with showerhead nomenclature
2.01	Parameter update	The PSD counts all faucets in a household. Since the measure is for lavatory faucets only, the PSD should count the lavatory faucets only. The CASE report, table 5.2 (see PSD4.5.2 Supporting Info) suggest 2.01 lavatory faucets per household.

Recalculate savings with heater efficiency of 75%. Include savings estimation for 2" diameter pipes.	Parameter update	Other TRMs use efficiency of 98% for electric and 75% for gas. This is based on the 10CFR 430 - Federal energy conservation code. The PSD should recalculated the savings based on these new efficiency values. The PSD lists 2" diameter pipe in the measure description. However, the savings estimation table does not include the 2" pipe. It is recommended to include savings estimation for 2" diameter pipes.
Recalculate savings with heater efficiency of 75%.	Parameter update	The heater efficiency should be 75% per the Federal energy conservation code.
Recalculate savings with heater recovery efficiency of 98%.	Parameter update	The heater efficiency should be 75% per the Federal energy conservation code.

Update to 98% electric and 75% for fossil fuel	Parameter update	Other TRMs use 98% for electric and 75% for gas. This is based on the 10CFR 430 - Federal energy conservation code.
no comments	no comments	no comments
Residential	No change	Aligns with other TRMs

Stakeholder	Comment
PJ	EFLH table in PSD says "Heat Pump FLH" which are likely to be different from a standard furnace or radiant heater EFLH due to variable capacity and efficiency with temperature. Suggest making this a candidate for future primary research. Consider creating heating and cooling FLH for several climate zones - coastal, central and mountains?. CT values are consistently much higher than NYTRM.
Skumatz	No measrue lifetimes?
Eversource (Jim Williamson)	I think the 1.1 is probably just an arbitrary estimate. I'm not sure if we can assume that multi-unit systems will be more oversized than single unit systems. I think we can probably leave at 1.1 for 2021 publication unless we find source that suggests better. - JW
PJ	Since a gas measure, peak may not be relevant
Eversource (Jim Williamson)	This would probably be good to update/investiate further. I think we should try to find some studies to update the 25% SFR value. - JW
Eversource (Jim Williamson)	We will update this refrence in the 2021 publication. -JW
Skumatz	Why wouldn't this be fast fill recommendation?
Eversource (Jim Williamson)	I agree that we can remove this section from PSD. -JW

Skumatz	No comments on this
PJ	Agreed. Note CV-19 may increase the reliance of bottoms-up v. top-down (billing approaches) for SEM projects.

Eversource (Ghani Ramdani)	Accepted recommendation added to Measure document

Skumatz	Not clear if you're saying make up a new algorithm or …? Not clear to me. And I can't find measure life in these… there should be a row for it? And that factor should have a citation and age of that citation.
Skumatz	Where are the measure lifetimes for all these meausres?
Eversource (Ghani Ramdani)	The deemed values are based on calculator defaults that may not apply to the particular project. Treat as custom measure and enter site specific data into the calculator. Did they use the EnergyStar or FEMP foodservice calculator? EnergyStar link is broken.
Reviewer 2 (no name)	Agree with recommendation
Reviewer 2 (no name)	Agree with recommendation

Eversource (Ghani Ramdani)	Agree, will update.
PJ	Some custom measures may be dependent on some other variable rather than temperature. Mention bin methods or regression models using other independent variables.
PJ	Align peak demand savings calculations with ISO NE seasonal peak demand definition: “Demand Resource Seasonal Peak Hours are those hours in which the actual, Real-Time hourly load for Monday through Friday on non-holidays, during the months of June, July, August, December, and January, as determined by the ISO, is equal to or greater than 90% of the most recent 50/50 system peal load forecast, as determined by the ISO, for the applicable summer or winter season." Reference DNV-GL paper that defined the days and hours that conform to this definition.
PJ	Will need to conduct an an hourly analysis to get the peak hour savings required for the ISO NE Seasonal Demand Resource calculation.
PJ	Same comment
Skumatz	Where is the savings calculation and the measure life?

Skumatz	No comment if discontinued
Eversource (Ghani Ramdani)	disountunued due increase efficieny of Cooling system but can be cosnidred under whole building modeling
Eversource (Ghani Ramdani)	disountunued due increase efficieny of Cooling system but can be cosnidred under whole building modeling
Eversource (Ghani Ramdani)	disountunued due increase efficieny of Cooling system but can be cosnidred under whole building modeling
Eversource (Ghani Ramdani)	disountunued due increase efficieny of Cooling system but can be cosnidred under whole building modeling
PJ	Agree more research needed into ACOP values. The freezer COP seems high to me. ALso - what is the source of the 0.85 divisor to get annual average EER from the rated EER? Should also be researched.

Eversource (Ghani Ramdani)	look forward for secondary research and any studies documenting the new parameters
Eversource (Ghani Ramdani)	look forward for secondary research and any studies documenting the new parameters
Skumatz	Where are EUL parameters and citations?
Eversource (Ghani Ramdani)	will update
PJ	Check to see if the coincidence factors line up wit the ISO NE seasonal peak demand resource definition.

Skumatz	No changes /no comments
Reviewer 1 (no name)	Use gpm of removed device, or baseline from DOE calculator if not available. Suggest studying and updating the baseline gpm in a future evaluation study.
Reviewer 1 (no name)	Base savings on actual installed unit gpm. Use program maximum qualifying gpm if actual not available.
Reviewer 1 (no name)	Femp calculator based on min/day of use. May need to supply other equations to calculate this value such as number of occupants, meals served, etc. Equation is fairly straightforward and should be reproduced in the PSD.
Reviewer 1 (no name)	Deemed values based on FEMP tool defaults, which may not be applicable. Use program or project specific data in the calculations. WHat is the embedded assumption for water heater efficiency?
Reviewer 1 (no name)	Could be peak savings depending on the hourly water use demand profile. Compare hourly profile to hours of the day defined in the DNV-GL seasonal peak demand memo to see if the water use is non-zero.

Reviewer 1 (no name)	What is the basis of the peak demand multiplier?
PJ	Identify which fan (supply fan, return fan, relief air fan, or condenser fan) and the baseline control strategy. Is this measure bundled with other control measures? Single zone applications only?
PJ	Will you provide the algorithms used in the spreadsheet?
Eversource (Jim Williamson)	The negative savings error should be corrected for 2021 version. - JW
Skumatz	We asked for this spreadsheet? Where is measure life assumption / citation / year? I would think zero savings if can't review the methodology… have to see the spreadsheet.

Eversource (Jim Williamson)	If we change this, we should reference back to study that shows why 65% is better. -JW
PJ	Make sure algorithm is capable of calculating peak demand savings according to ISO NE seasonal peak demand definition.
Eversource (Jim Williamson)	The negative savings error should be corrected for 2021 version. - JW

PJ	EFLH is not equivalent to fan run hours. Research fan run hours rather than relying on heating and cooling EFLH
PJ	Cooling EFLH values vary from NY TRM for NYC and Poughkeepsie Use separate coastal and inland values?
PJ	Heating EFLH data in Appendix 5 are labeled "heat pump." Not sure how these relate to other heating system types.
Eversource (Jim Williamson)	Value would also be dependent of remaning life of RTU. It may be best to keep at 10 years to be consistant with other HVAC measures
Eversource (Jim Williamson)	The negative savings error should be corrected for 2021 version. - JW
Eversource (Jim Williamson)	The negative savings error should be corrected for 2021 version. - JW

Eversource (Jim Williamson)	The negative savings error should be corrected for 2021 version. - JW
Eversource (Jim Williamson)	The negative savings error should be corrected for 2021 version. - JW
PJ	Make sure algorithm is capable of calculating peak demand savings according to ISO NE seasonal peak demand definition.
PJ	Make algorithm a function of MUA supply air setpoint and whether the MUA unit cools and/or heats the MUA. MUA unit turndown may not follow exhaust fan turndown.
Eversource (Jim Williamson)	I agree that we should have an updated equation in the TRM here based on airflow and proposed runtimes. The proposed method might consider using a derate factor to account for common occurance when MAU is not varied bu the kitchen hood is (minimizing savings). -JW
Skumatz	No spreadsheet - same coments - if can't review how can they claim savings. And where is EUL?
PJ	Flow reduction depends on whether cooking process is "batch" or "order." Also, smoke plus temperature activated systems give different flow reduction response than temperature activated only systems.

PJ	DD base temperature is a function of MUA unit supply air temperature setpoint.
PJ	DD base temperature is a function of MUA unit supply air temperature setpoint.
Skumatz	I don't see an EUL in here anywhere…?
Skumatz	EUL??
PJ	Is this measure still included in programs? Can we eliminate?
PJ	Verify SF if measure is not dropped from PSD.
Skumatz	EULS not shown - lots of other assumptions and parameters…?
PJ	On/off v. multispeed controls will give different savings values. Provide an algorithm for each and indicate where each control strategy is applicable.
PJ	Include interactive effects of fan heat with refrigeration system.
Eversource (Jim Williamson) - Pete Jacobs - Skumatz	Common COP values may be slightly higher now, these can be researched and replaced based on referenced sources. - JW

Eversource (Jim Williamson) - Pete Jacobs - Skumatz	I agree that it makes sense to look at new coincidence factor rather than using average peak kW - JW.
PJ	How does this relate to EUL?
Eversource (Jim Williamson)	ok to add to app 4. -JW
PJ	Coordinate revised ACOP values across all refrigeration measues.
Eversource (Jim Williamson)	Common COP values may be slightly higher now, these can be researched and replaced based on referenced sources. - JW
Skumatz	Good backup research… / tracking down better values. EUL???

Eversource (Jim Williamson) - Pete Jacobs - Skumatz	Common COP values may be slightly higher now, these can be researched and replaced based on referenced sources. - JW
Eversource (Jim Williamson)	agree to remove non used variables - JW
Eversource (Jim Williamson)	agree to remove non used variables - JW
PJ	Add note that fan power (W) can subsitute for V*A*PF
PJ	kW = kWh/8760 works for uncontrolled fans. Check control strategy against ISO NE seasonal peak hours for kW savings on controlled fans.
Eversource (Jim Williamson)	agree to update peak kW to include CF. Evap motors likely not running 8760 - JW
Eversource (Jim Williamson)	I support additional Becker study reference here - JW

Eversource (Tushnik Goswami)	Overall comment: I've not put any comments in the sheet as the ERS note is specific and echoes our findings for 3.4.4 Door Heater Controls as per other TRM's and studies. In our PSD currently the heater control considers only one control type i.e. measuring the store relative humidity and turning the heater on or off based on that, we can include another control type which operates on door conductivity and there are also studies which indicate an interactive refrigerator savings multiplier that can be used(see Pg. 78 (Footnote)/Pg. 91 (PDF Reader) of the NEEP report, Commercial Refrigeration Loadshape Project October 2015, https://neep.org/commercial-refrigeration-loadshape-report-10-2015-0
Skumatz	Was looking for source of micropulse approach? Cadmus? Citation only at bottom?
PJ	Make sure CFs are consistent with ISO NE Seasonal Peak Demand Resource definition

Skumatz	again EUL?
PJ	Control hours should vary by case type and temperature
PJ	Control hours should vary by case type and temperature
Eversource (Tushnik Goswami)	OVERALL comment: Agreed w updates, requires updated values for ESF, requires EUL study and can also include the Hours of operation based on location of the vending machine, existing table in NY TRM.
Eversource (Tushnik Goswami)	Unable to confirm values in manufacturer website

Eversource (Tushnik Goswami)	Study referenced is not accessible by the link
Skumatz	and EULs?
Eversource (Tushnik Goswami)	Unable to confirm these values from NY TRM
PJ	Will likely be some peak demand impacts. Ignore for now?
PJ	Will likely be some peak demand impacts. Ignore for now?
Eversource (Tushnik Goswami)	Study referenced is not accessible by the link
Eversource (Tushnik Goswami)	Study referenced is not accessible by the link
Eversource (Tushnik Goswami)	Overall comment: Agreed. that we should update algorithm required as per NY TRM

Skumatz	Looking for age of the work & sources from the other states, CT year, and source - sources not in last line?
Skumatz	And EULs ?
PJ	Coordinate with other refrigeration measures
PJ	Review EFLH cooling values
PJ	Review EFLH heating values. Table in Appendix says "heat pump heating;" may not apply to constant capacity/constant efficiency equipment.
PJ	Check CF for compliance with ISO NE seasonal peak definition
PJ	Rename tab boilers and furnaces
Skumatz	Looking for source yearsa t the bottom of the OTHER TRM study columns? And the CT one?

PJ	Deemed HW load misses important differences based on number of people and building type.
Eversource (Ghani Ramdani)	Would like to know how the new paramter 9630521 was derived . The R1614-1613 evaluation report recommends annual domestic hot water load of 11.2 MMBtu in table 4-14. This was basis for our current assumption.
Skumatz	Good catch; again, EUL
PJ	Based on side arm or instantaneous water heating? How are water heater tank standby losses computed?
PJ	Base savings on boiler input capacity. Deemed load misses important differences in load met by boiler.

PJ	What is the source of the 0.98 multiplier for condensing boilers. How many buildings won't allow condensing operation based on hydronic system design? Perhaps include a derating chart or table based on return water temperature.
Eversource (Ghani Ramdani)	Would like to know how the new paramter 9630521 was drived .
PJ	Does house load vary based on retrofit v. new construction?

Eversource (Ghani Ramdani)	Would like to know how the new paramter 9630521 was drived .
Eversource (Ghani Ramdani)	Would like to know how the new paramter 9630521 was drived .
Skumatz	EUL?
Reviewer 1 (no name)	Value should be scaled to size of boiler. Limit the reset to avoid condensing flue gas in non-condensing boiler.
PJ	Use separate EF values for tank type v. instantaneous water heater.

UI (Glen Eigo)	We can make the recommended update for 2021. This will require changes to tracking systems and spreadsheets.
Skumatz	In several of these I don't see the source feo rhe other TRM data listed / the study. Also EUL
PJ	Should we provide a default value for program planning?
UI (Glen Eigo)	This recommendation seems to not require any changes except to recorded as installed value. May require updates to calculations in Tracking systems and spreadsheets.
UI (Glen Eigo)	This seems to only be a efficiency metric change. This may require updates to tracking systems and spreadsheets.

UI (Glen Eigo)	We can make the recommended update for 2021. This will require changes to tracking systems and spreadsheets.
UI (Glen Eigo)	We can make the recommended update for 2021. This will require changes to tracking systems and spreadsheets.
Eversource (Miles Ingram)	The R1614-1613 evaluation report recommends annual domestic hot water load of 11.2 MMBtu in table 4-14. This was basis for our current assumption. Please reconcile and determine which is the better number ,since both from from the same report (11.2 MMBtu vs. 15,415 gal & 75 degree temp diff)
UI (Glen Eigo)	Recommendation seems less conservative.

UI (Glen Eigo)	This seems to only be a efficiency metric change. This may require updates to tracking systems and spreadsheets.
PJ	Service hot water usage varies across commercial building types. Use of a single deemed value misses the variability across building types.
UI (Glen Eigo)	Parameter update from evaluation is less than Mid atlantic and NY TRM.
PJ	Incoming water temperature depends on cold water source - surface water v. groundwater.
UI (Glen Eigo)	This temperature recommendation seems to be less conservative and will require tracking system and spreadsheet updates.
UI (Glen Eigo)	This temperature recommendation seems to be less conservative and will require tracking system and spreadsheet updates. Current value is also midpoint of NY and Midatlantic TRMs.

UI (Glen Eigo)	This temperature recommendation seems to be less conservative and will require tracking system and spreadsheet updates.
Skumatz	I don't see citations in other TRMS so we know age, when updated, etc.
Skumatz	EULs
Glenn Reed	For tanks > than 55 gallons, the baseline should be minimally compliant HPWH.

Glenn Reed	Are savings deemed? If so, do they refelct the availability of units with UEFs of 3.5 and higher? What is average UEF of participating units? Note also the very much smaller MA savings for tanks >55 gallons. Do the deemed savings include any interactive space conditioning impacts?
PJ	Deemed savings values miss important savings variations based on building type, conditioned v. unconditioned space with water heater, water heater environmental temperature, system efficiency and baseline water heater fuel/efficiency.

Glenn Reed	Are savings deemed? If so, do they refelct the availability of units with UEFs of 3.5 and higher? What is average UEF of participating units? Note also the very much smaller MA savings for tanks >55 gallons. Do the deemed savings include any interactive space conditioning impacts?
Glenn Reed	The small fossil fuel savings reflect low levels of fuel switch applications (which, I believe, are actually not allowed by the program). Do we have any evidence that the rate of fuel switch has changed? Should we also characterize this measure as a full fuel switch measure?

Glenn Reed	The small fossil fuel savings reflect low levels of fuel switch applications (which, I believe, are actually not allowed by the program). Do we have any evidence that the rate of fuel switch has changed? Should we also characterize this measure as a full fuel switch measure?
Skumatz	Good catch on the expired reference…
PJ	Comprehensive projects with multiple measure interactions.
PJ	Consider other calculation techniques besides PRISM. Will need to get hourly results to calculate ISO NE seasonal peak demand savings. Provide a list of qualified modeling tools.
Eversource (Ghani Ramdani)	Ok, agree

Utilities (Jim Williamson)	OVERALL Comment- We need to ensure changes here are consistent with recommendations from the ECB and EO and MF Impact evaluations. -MI
Utilities (Jim Williamson)	2021 PSD will reference 2018 IECC - JW
Utilities (Jim Williamson)	2021 PSD will reference 2018 IECC - JW
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Utilities (Jim Williamson)	2021 PSD will reference 2018 IECC - JW
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Utilities (Jim Williamson)	I agree that it is generally a good practice to have the internal spreadsheets follow equations published in the PSD. I believe that the current method uses IPLV part load values and calculates consumption under each loading based on Chiller size relative to building load - so the method is slightly different from what is proposed is columns G through I. Dave Bebrin put together a thorough spreadsheet that we used for chiller calcs, we may want to start off by talking with him on potential adapations of PSD or internal chiller calc sheets.-JW
Utilities (Jim Williamson)	I do not understand this comment - JW.
Utilities (Jim Williamson)	OVERALL Comment- We need to ensure changes here are consistent with recommendations from the ECB and EO and MF Impact evaluations. -MI
Utilities (Jim Williamson)	we can update baselines when evaluation results come in - JW

Utilities (Jim Williamson)	I agree that we should provide source or remove from equation - JW.
Utilities (Jim Williamson)	To keep calculation simple, it may be best to just use one weather station. If there is a large enough difference in HDD (>5%) it may make sense to use two stations - htfd and bpt - JW
Utilities (Jim Williamson)	I agree that OF should be removed if it is already counted for in EFLH. - JW
Utilities (Jim Williamson)	PSD will reflect IECC 2018 changes.
Utilities (Jim Williamson)	I agree that OF should be removed if it is already counted for in EFLH. We will need to confirm how EFLHs were determined first - JW

Utilities (Jim Williamson)	To keep calculation simple, it may be best to just use one weather station. If there is a large enough difference in HDD (>5%) it may make sense to use two stations - htfd and bpt - JW
Utilities (Jim Williamson)	PSD will reflect IECC 2018 changes.
Utilities (Jim Williamson)	OVERALL Comment- We need to ensure changes here are consistent with recommendations from the ECB and EO and MF Impact evaluations. -MI
Utilities (Jim Williamson)	I think we will probably want to leave this as code compliant HWH efficiency unless evaluation suggests otherwise. -JW
Utilities (Jim Williamson)	2021 PSD will be update with IECC 2018 values. -JW
Utilities (Jim Williamson)	2021 PSD will update table name. - JW
Utilities (Jim Williamson)	2021 PSD will be update with IECC 2018 values. -JW

Utilities (Jim Williamson)	I don't have access to the TRC MF report, but I agree that we should update PSD if report provides justification. - JW
Utilities (Jim Williamson)	I don't have access to the TRC MF report, but I agree that we should update PSD if report provides justification. - JW
Utilities (Jim Williamson)	OVERALL Comment- We need to ensure changes here are consistent with recommendations from the ECB and EO and MF Impact evaluations. -MI
Utilities (Jim Williamson)	need some more information to comment here. We will need buy in from ES and UI engineering group because this will require changing all internal spreadsheets. will should also waiti on results from MA study before making a decision on this. - JW

Utilities (Jim Williamson)	can we trace the 65% back to a reference? -JW
Utilities (Jim Williamson)	need some more information to comment here. will wait on results from MA study before making a decision on this. - JW
Utilities (Jim Williamson)	need some more information to comment here. will wait on results from MA study before making a decision on this. - JW
Utilities (Jim Williamson)	need some more information to comment here. We will need buy in from ES and UI engineering group because this will require changing all internal spreadsheets. will should also waiti on results from MA study before making a decision on this. - JW

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Utilities (Ghani Ramdani)	we can add also DHW Would ERS be able to provid DHW values
Utilities (Ghani Ramdani)	will ERS be providing savinsg for sized 2+ to 3 in
Utilities (Ghani Ramdani)	EFLH were developed as state wide Values to be used by ALL PAs in state , consistent with the approach we use for impact factors that are state wide values trying to use have gerographic specific EFLH makes it very complex from implementation and lead to customer confusion , R91 was specific to HES and HES IE and was more about HDD
Utilities (Ghani Ramdani)	the table was just a to reflect most common cases , all other cases wether if it is bigger diameter , or diffrent temp cases the savinsg would be run through using 3E software , we can add language in PSD fo rbigger diameter or diffent temp to use the 3E software
Utilities (Ghani Ramdani)	No comment
Utilities (Ghani Ramdani)	the table was just a representation of most common cases , all other cases wether if it is bigger diameter , or diffrent temp cases the savinsg would be run through using 3E software , we can add language in PSD fo rbigger diamter or diffent temp to use the 3E software

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Utilities (Ghani Ramdani)	the R 1705 /1609 uses basline eff for gas Table 4-35 Eletric uses .92
Utilities (Ghani Ramdani)	No comment
Utilities	will update
Utilities (Jim Williamson)	See comment in cell G5--there was a recent CT evaluation (C1641) w steam trap recommendaitons. Please ensure consistency with those results, including realization rate applied in appendxi 3 of PSD (see p.300, note 7 of 2020 PSD). -MI
Utilities (Jim Williamson)	I think it is ok to add " replace" into the terminology. - JW
Utilities (Jim Williamson)	I agree that we should use site boiler efficiency if backup is available, otherwise use code required or 80%. - JW
Utilities (Jim Williamson)	2021 PSD should include update reference link. - JW
Reviewer 1 Comments - Utilities (Tushnik)	Parameter updates with newer values if any current study is available. EUL can be done and included in Appendix, similar to NY TRM.

Reviewer 1 Comments - Utilities (Tushnik)	Parameter update, values refered to in Appendix are based on 2012 study by Eversource on 7 old residential types of construction, updated values if newer studies are avaiable.
Reviewer 1 Comments - Utilities (Tushnik)	Values based on older REM simulations, updated values to be used if more recent Simulation performed
Reviewer 1 Comments - Utilities (Tushnik)	OK
Reviewer 1 Comments - Utilities (Tushnik)	OK

Utilities (Glen Eigo)	Agreed to make recommended changes This will require edits to Tracking systems and spread sheets.
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Utilities (Glen Eigo)	Agreed to make recommended changes This will require edits to Tracking systems and spread sheets.
Reviewer 1 (no name)	Hmm...But if the algorithm has capacity, does the MAF potentially overcorrect for diffferences in conditioned sq. footage

Utilities (Glen Eigo)	More research is needed. Suggest Mid-Atlantic TRM as basis for new savings.
Utilities (Glen Eigo)	Can update to just retrofit savings.
Utilities (Glen Eigo)	More research is needed. Suggest Mid Atlantic TRM savings algorithm with CT EFLH.
Glen Reed	Will need to develop an RUL estimate if this measure is to be continued as a retrofit measure.
Glen Reed	Does there need to be any discussion/consideration as to leakage to conditioned vs. unconditioned spaces, i.e., duct location?

Utilities (Ghani Ramdani)	Overall comment: these changes should be consistent with impact results (realization rates) from HES/HES-IE study
Utilities (Ghani Ramdani)	Can include recommendation for mastic. The PSD may not be the place to outline implementation practices.
Utilities (Ghani Ramdani)	Original REMRate model may not be available since responsible engineer has left the industry. May need to re-create work. May require outside consultant.
Utilities (Ghani Ramdani)	WIll correct typo.
Utilities (Ghani Ramdani)	Suggest using other state TRM for savings if original REMRate model cannot be recreated.

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Utilities (Ghani Ramdani)	Suggest using other state TRM for savings if original REMRate model cannot be recreated.
Utilities (Ghani Ramdani)	May need to review other TRM information to include interactivity effects.

Utilities (Ghani Ramdani)	Original REMRate model may not be available since responsible engineer has left the industry. May need to re-create work. May require outside consultant.
Glen Reed	Do ACCA QIV specs address charge and equipment sizing? How captured below? Savings appear to be expressed on a per CFLM basis and supporting info is only about duct blasters. What about for gas boilers? Not currently offered?
Utilities (Ghani Ramdani)	Do ACCA QIV specs address charge and equipment sizing? How captured below? Savings appear to be expressed on a per CFLM basis and supporting info is only about duct blasters. What about for gas boilers? Not currently offered?
Glen Reed	Is this the right algorithm and units for electric savings?
Glen Reed	Is this the right algorithm and units for electric savings?
Utilities (Glen Eigo)	Agreed to make recommended changes This will require edits to Tracking systems and spread sheets.
Utilities (Glen Eigo)	Agreed to make recommended changes This will require edits to Tracking systems and spread sheets.
Glen Reed	Is it the existing pump, or what would have gone in absent the program? This is an ROF measure. Maybe the two baselines are effectively the same.
Glen Reed	If and when Passive House gains traction in CT, will that need a different modeling approach and PSD characterization?

Glen Reed	For MF buildings, blower door test results need to account for inter-unit leakage. A guarded blower door test can be used in some cases. The Companies also worked with SWA to develop an approach that had a back end savings (billing?) analysis component. The vendors were not happy with this methodology, though I haven't heard concerns raised recently.
Glen Reed	See above re: challenges to accurately measure air leakage in MF buildings.
Utilities (Glen Eigo)	will update
Utilities (Glen Eigo)	will update

Utilities (Glen Eigo)	this measure was addresed extensively in HES /HES IE Impact study study and any changes to parmeters will through the study results off
Utilities (Glen Eigo)	this measure was addresed extensively in HES /HES IE Impact study study and any changes to parmeters will through the study results off
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Utilities (Glen Eigo)	this Measure is being revied under the MF Impact study which will shade more light about the paramter or Impact factors (using billing data,engineering algorithm .. Etc)
Glen Reed	Make certain that proposed efficiencues reflect system and not equipment efficiencies

Utilities (Glen Eigo)	May need to update references to show evaluation study conducted by Cadmus in 2015 in MA
Utilities (Glen Eigo)	Will add to parameter table.
Utilities (Glen Eigo)	May need research on how to update savings based on interactivity.
Utilities (Glen Eigo)	Will update measure references.

Glen Reed	See comments in Ceiling and Floor Insulation measure tabs. If measures merged, might need a different HDD adjustment factor for floor insulation.
Glen Reed	Make certain that these REM dervied factors are separate and distinct from the ASHRAE adjustment factors
Utilities (Glen Eigo)	WIll consider single measure savings based on recommendation from study.

Utilities (Glen Eigo)	Consider using earlier code based on average home age in CT. IECC 2012 is relatively new.
Utilities (Glen Eigo)	Will add to nomenclature
Utilities (Glen Eigo)	Will review Mid-atlantic TRM and ASHRAE reference for applicability. May need an update to current reference.

Utilities (Glen Eigo)	Will review Mid-atlantic TRM and ASHRAE reference for applicability. May need an update to current reference.
Utilities (Glen Eigo)	Will update reference or remove link as necessary.
Utilities (Glen Eigo)	Will update references as necessary to include Cadmus study

Utilities (Glen Eigo)	May update HDDs with new Bridgeport and Hartford values. Other custom projects have used separate HDDs and CDDs referencing BDL and BDR weather stations.
Utilities (Glen Eigo)	May separate into Bridgeport and Hartford as necessary. Other option is to use similar algorithm as other TRMs
Utilities (Glen Eigo)	May separate into Bridgeport and Hartford as necessary. Other option is to use similar algorithm as other TRMs
Utilities (Glen Eigo)	Will update nomenclature.

Utilities (Glen Eigo)	Will consider update to COP value. May require updating calculation material and tracking systems.
Utilities (Glen Eigo)	Further research may be needed on how to account for interactivity effects. Any additional reference or guidance is appreciated.
Glen Reed	See also Floor Insulation measure comments not repeated here

Glen Reed	Do these efficiencies consider duct losses to derive a system, not equipment, efficiency. And DHP values would likely be higher
Utilities (Glen Eigo)	Will consider combining into single measure to match best practices of other states.
Utilities (Glen Eigo)	Is the IECC 2003 an option or a recommendation or are you suggesting differnt code baselines depending upon building age?
Utilities (Glen Eigo)	Will remove as necessary
Utilities (Glen Eigo)	Will add as necessary.
Utilities (Glen Eigo)	Suggest using a fixed baseline established by using code as mentioned above.
Utilities (Glen Eigo)	Any suggested sources for a new or adjusted algorithm.

Utilities (Glen Eigo)	Please provide suggested values based on Cadmus study. We can update and use this as a reference.
Utilities (Glen Eigo)	We are having internal discussion about updating HDDs and CDDs with a split based on Hartford and Bridgeport based on Company.
Utilities (Glen Eigo)	Similar to HDDs and CDDs we are investigating updating BIN tables and temeratures with newer data and including a Hartford/Bridgeport split based on company or town.

Utilities (Glen Eigo)	Similar to HDDs and CDDs we are investigating updating BIN tables and temeratures with newer data and including a Hartford/Bridgeport split based on company or town.
Utilities (Glen Eigo)	Will update nomencalture.
Utilities (Glen Eigo)	Need to review current federal standards an will consider updating values as appropriate.
Utilities (Glen Eigo)	We are having internal discussion about updating HDDs and CDDs with a split based on Hartford and Bridgeport based on Company.
Utilities (Glen Eigo)	We are having internal discussion about updating HDDs and CDDs with a split based on Hartford and Bridgeport based on Company.
Utilities (Glen Eigo)	Please provide recommendation no how to apply interactivity effects.
Reviewer 1 (no name)	Though for wall and basement, if there is an insulation opportunity, there is often nothing there to begin with. But maybe that's typically known

Reviewer 1 (no name)	On one hand, the number of above federal minimum heating systems, particularly for gas and propane, has likely continued to grow, Conversely, duct leakage and pipe losses need to be considered in developing a system, equipment, efficiency values. These may need some further consideration.
Reviewer 1 (no name)	But what HHD base? Is the typical default to Base 65 the correct one?

Reviewer 1 (no name)	Though to the point above, this correction factor probably suffices, though please review/confirm this value. It has a large impact on all of the insulation savings. Finally, is this adjustment as appropriate for floor insulation vs. wall/ceiling where solar and internal gains will have a greater impact
Reviewer 1 (no name)	On one hand the federal HP std has only been in place for a few years. Conversely, DHP HSPFs track way above the federal std. While there are not a lot of existing HPs in CT, this might need some further consideration. For ducted systems, need to consider duct loss impact on system (not equipment) efficiency.
Utilities (Glen Eigo)	See comments on ceiling insulatoin. Also, note comment on evaluatoin source for realization rates in appendix 3, (2018 CT HES impact evaluatoin) in all insulatoin chapters .-MI
Glenn Reed	Has Fed std been in place long enough that we should consider it the baseline?
Glenn Reed	So, will the acutal gpm reflect what is being installed?

Glenn Reed	Note there is no SF vs. MF difference for pipe insulation measure. And we probably need a different (lower?) oil value
Glenn Reed	Why aren't we doing this measure per showerhead, and not per HH?

Utilities (Ghani Ramdani)	the 2.0 was used for calc as conservative value
Utilities (Ghani Ramdani)	please provide the study and section with shower duartion per day
Utilities (Ghani Ramdani)	will provide the basis for using 2.3
Utilities (Ghani Ramdani)	mid atlantic TRM uses set values of 1.3 shower per homes and number of people in house 2.53 and does not tie to the number of shower head being replaced during the visit as in CT TRM
Utilities (Ghani Ramdani)	no comment

Utilities (Ghani Ramdani)	mid atlantic TRM uses set values of 1.3 shower per homes and number of people in house 2.53 and does not tie to the number of shower head being replaced during the visit as in CT TRM wich uses the square root of Nbr of shower head being replaced
Utilities (Ghani Ramdani)	mid atlantic TRM uses set values of 1.3 shower per homes and number of people in house 2.53 and does not tie to the number of shower head being replaced during the visit as in CT TRM wich uses the square root of Nbr of shower head being replaced
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Utilities (Ghani Ramdani)	mid atlantic TRM uses set values of 1.3 shower per homes and number of people in house 2.53 and does not tie to the number of shower head being replaced during the visit as in CT TRM wich uses the square root of Nbr of shower head being replaced
Glenn Reed	Though this is direct install measure. Might not baseline be less efficient then Fed standard? Though maybe Fed std has been in place long enough to be considered baseline
Glenn Reed	Check with HES/HES-IE program managers to confirm 1.5 gpm measure assumption

Glenn Reed	Different MF and SF values. But this is not the case for pipe insulation. And oil value should be lower than gas.
Glenn Reed	Why aren't we doing this measure per aerator and not per HH?

Glenn Reed	Why a one-size-fits all assumption? Maybe better to have an algorithm that accounts for the considerable variation in boiler efficiency: from 78-95%.
Glenn Reed	I believe that minimum UEF for a gas water heater is below 75%, or does this only consider the conversion efficiency and not stand by losses? And probably still need a separate, and lower, value for oil.
Glenn Reed	See comments above re: these values. Are these UEFs or recovery efficiencies? If the former, they are too high. And probably still need a separate, and lower, value for oil.

Glenn Reed	See comments above re: these values. Are these UEFs or recovery efficiencies? If the former, they are too high. And probably still need a separate, and lower, value for oil.
no comments	no comments
Glen Eigo	UI may be near the end of the HER five year cycle. We will need to verify if the program can continue past five years.

ERS Response	ERS Response Category
ERS to discuss recommendation at 7/10/2020 call with stakeholders	Further Discussion
No further action - Lifetimes reviewed in separate Appendix	No further action
No further action	No further action
Remove peak savings	Action required/Resolved
Proposed secondary research	Action required/Resolved
No further action	No further action
No further action	No further action
No further action	No further action

No further action	No further action
No further action	No further action

No further action	No further action

No further action - Lifetimes reviewed in separate Appendix	No further action
No further action - Lifetimes reviewed in separate Appendix	No further action
FEMP Calculator used - link broken but can include file with measure review	Action required/Resolved
No further action	No further action
No further action	No further action

No further action	No further action
ERS will add clarifying text to the measure recommendation	Action required/Resolved
ERS will add clarifying text to the measure recommendation	Action required/Resolved
ERS will add clarifying text to the measure recommendation	Action required/Resolved
ERS will add clarifying text to the measure recommendation	Action required/Resolved
No further action - Lifetimes reviewed in separate Appendix	No further action

No further action	No further action
Per Eversource: Consider measure under whole building modeling	Action required/Resolved
Per Eversource: Consider measure under whole building modeling	Action required/Resolved
Per Eversource: Consider measure under whole building modeling	Action required/Resolved
Per Eversource: Consider measure under whole building modeling	Action required/Resolved
Proposed secondary research	Action required/Resolved

Proposed secondary research	Action required/Resolved
Proposed secondary research	Action required/Resolved
No further action - Lifetimes reviewed in separate Appendix	No further action
No further action	No further action
ERS will review coincidence factors	Action required/Under Review

No further action	No further action
Proposed secondary research	Action required/Resolved
Agree with both statements, though we expect actual installed gpm to be tracked and used by programs. Will add text to measure review to clarify.	Action required/Resolved
Other parameters such as occupants and meals served are not likely to be tracked by programs, therefore the FEMP min/day is most accurate option.	Action required/Resolved
Site-specific kWh values are unlikely to be calculated per install, we therefore will rely on industry averages provided by FEMP.	Action required/Resolved
Possible to investigate if existing commercial DHW profiles are available for comparison; however, relative impacts are likely minimal compared with other candidates for follow-up research	Action required/Under Review

Since the same peak factor value is used to estimate peak day savings for all gas savings measures, the value needs to be scrutinized. The peak day factor might need to be updated depending on how it is calculated. No clear reference to the Pdfactor in the PSD.	Action required/Under Review
Parameters will vary by fan type. Bundles with other control measures are likely to be handled custom	Action required/Resolved
We will investigate spreadsheet further once acquired	Action required/Under Review
No further action	No further action
Request spreadsheet	Action required/Under Review

Here is the study referenced in the other TRMs. Lawrence Berkeley National Laboratory, and Resource Dynamics Corporation. (2008). “Improving Motor and Drive System Performance; A Sourcebook for Industry”. U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy. Golden, CO: National Renewable Energy Laboratory, or https://www.energy.gov/sites/prod/files/2014/04/f15/amo_motors_sourcebook_web.pdf	Action required/Resolved
We will investigate spreadsheet further once acquired	Action required/Under Review
No further action	No further action

The IL TRM povides savings values for additional controler operation beyond what the CT PSD calcualtes. It however uses the same study as its source and the equations from the study that breaks down fan speed based on the stage of heating and cooling. The IL TRM does simplify the measure by modeling multiple situations and providing a kWh/ton savings variable however this value is based on this equation and operating hours specific to IL.	Action required/Resolved
ERS to discuss recommendation at 7/10/2020 call with stakeholders	Further Discussion
ERS to discuss recommendation at 7/10/2020 call with stakeholders	Further Discussion
15-year for two-speed acknowledges that fewer sensors might fail than for variable-speed	Action required/Resolved
No further action	No further action
No further action	No further action

No further action	No further action
No further action	No further action
We will investigate spreadsheet further once acquired	Action required/Under Review
We will investigate spreadsheet further once acquired	Action required/Under Review
We will investigate spreadsheet further once acquired	Action required/Under Review
Request spreadsheet	Action required/Under Review
We will investigate spreadsheet further once acquired	Action required/Under Review

ERS recommend that this is explicitly stated in the parameter definition	Action required/Resolved
ERS will recommend that this is explicitly stated in the parameter definition	Action required/Resolved
No further action - Lifetimes reviewed in separate Appendix	No further action
No further action - Lifetimes reviewed in separate Appendix	No further action
No further action	No further action
SF of 0.03 kW/ft for Low Temp, 0.02 kW/ft for Med Temp and 0.01 kW/ft for High Temp is being used by the CT PSD.	Action required/Resolved
No further action - Lifetimes reviewed in separate Appendix	No further action
The difference in savings between on/off and multipseed fan control is accounted for with the existing r factor. 1 for on/off and 0.86 for multi-speed	Action required/Resolved
Interactive effects are included in the analysis and the Savings Methodology description in the PSD already.	Action required/Resolved
Proposed secondary research	Action required/Resolved

Proposed secondary research	Action required/Resolved
ERS will recommend add evaporator fan controls specifically	Action required/Resolved
Proposed secondary research	Action required/Resolved
Proposed secondary research	Action required/Resolved
Proposed secondary research	Action required/Resolved
No further action - Lifetimes reviewed in separate Appendix	No further action

Proposed secondary research	Action required/Resolved
No further action	No further action
No further action	No further action
ERS will recommend that this is explicitly stated in the parameter definition	Action required/Resolved
ERS will confirm ISO-NE peak CF for this measure	Action required/Under Review
No further action	No further action
No further action	No further action

Additional research into the difference between conductivity/dewpoint controls and humidity controls can be added to the currently suggested research for on/off versus micropulse controls. For the interactive effects the values are recongnized to be reasonable as the provided study suggests, however the current listed source isn't reproducable with publically available data. The current values are consistent within the region and an updated based on a survey of CT grocery refrigeration systems would be the prefered update to be specific to CT.	Action required/Under Review
https://cadmusgroup.com/wp-content/uploads/2016/02/NEEP-CRL_Report_FINAL_clean.pdf?submissionGuid=cb214243-bab8-479a-a4c4-c8e5c64ae7b2	Action required/Resolved
Mid-Atlantic values used consider ISO-NE Seasonal Peak definition	Action required/Under Review

No further action - Lifetimes reviewed in separate Appendix	No further action
Proposed secondary research	Action required/Resolved
Proposed secondary research	Action required/Resolved
No further action	No further action
The original studies referenced in the CT PSD are no longer available from energymiser. The current values listed by energymiser are found here. https://www.energymisers.com/	Action required/Resolved

The original studies referenced in the CT PSD are no longer available from energymiser. The current values listed by energymiser are found here. https://www.energymisers.com/	Action required/Resolved
No further action - Lifetimes reviewed in separate Appendix	No further action
The original studies referenced in the CT PSD are no longer available from energymiser. The current values listed by energymiser are found here. https://www.energymisers.com/	Action required/Resolved
We recommend ignoring peak demand	Action required/Resolved
We recommend ignoring peak demand	Action required/Resolved
The original studies referenced in the CT PSD are no longer available from energymiser. The current values listed by energymiser are found here. https://www.energymisers.com/	Action required/Resolved
The original studies referenced in the CT PSD are no longer available from energymiser. The current values listed by energymiser are found here. https://www.energymisers.com/	Action required/Resolved
No further action	No further action

The source data is from 2009 and is the same as the NY TRM. This is not a very common measure in TRMs and quality research is limited. California has some research on this in the DEER database but it provides savings by location making it difficult to adjust savings for CT climate.	Action required/Resolved
No further action - Lifetimes reviewed in separate Appendix	No further action
Proposed secondary research	Action required/Resolved
No further action - EFLH reviewed as separate appendix	No further action
No further action - EFLH reviewed as separate appendix	No further action
ERS will confirm ISO-NE peak CF for this measure	Action required/Under Review
ERS will rename tab boilers and furnaces	Action required/Resolved
Added years for sources in TRMs	Action required/Resolved

We have prioritized a CT-specific value over others that might consider number people and building type	Action required/Under Review
Review CT PSD 4.5.3 for calculation and justification. Calculation shown in PSD4.5.3 Supporting Info Tab.	Action required/Under Review
No further action - Lifetimes reviewed in separate Appendix	No further action
Based on nameplate rating. Standby losses not explicitly mentioned in the PSD. Maybe lower already implemented adjustment factor of 98%. Will need further study.	Action required/Under Review
Deemed annual heating load assumes typical boiler capacity for residential (2000 sq ft house). 85.2 MMBtu/yr value was derived from a normalized billing analysis of 1,686 sample res spaces.	Action required/Under Review

states: "The program savings used the manufacturer specified AFUE as the installed efficiency. High efficiency boilers achieve their rated efficiencies when the flue gas temperature is lowered in the heat exchanger to the point where condensate forms. Depending on the setup or location, condensing may occur less often than expected. A recent study (by Cadmus in 2015) in Massachusetts indicated that the actual installed efficiency achieved tended to be lower on average than the rated efficiency.". A 2% downward adjustment was implemented to installed AFUE values. The Evaluation team found that 90% of the sites visited had boiler integrated HW system. The integrated hot water portion of the boiler savings were multiplied by a factor of	Action required/Under Review
Review CT PSD 4.5.3 for calculation and justification. Calculation shown in PSD4.5.3 Supporting Info Tab.	Action required/Under Review
No, rather the baseline AFUE is the key difference	Action required/Under Review

Review CT PSD 4.5.3 for calculation and justification. Calculation shown in PSD4.5.3 Supporting Info Tab.	Action required/Under Review
Review CT PSD 4.5.3 for calculation and justification. Calculation shown in PSD4.5.3 Supporting Info Tab.	Action required/Under Review
No further action - Lifetimes reviewed in separate Appendix	No further action
Can scale savings linearly between boiler sizes of 30,000 Btu/hr and 225,000 Btu/hr (upper limit for eligibility in most Res TRMs).	Action required/Under Review
Yes, we had recommended to use different baseline efficiency values depending on the heater type (tank or tankless). If EF is changed to UEF, the baseline UEF can be calculated based on 10 CFR 430.32(d). Assuming 50 gallons as average tank size and medium draw pattern, baseline UEF would be 0.563 for storage water heaters. For tankless, use baseline UEF of 0.63 as used in the MA TRM.	Action required/Under Review

No further action	No further action
References added in the chapter review tab.	Action required/Resolved
MA TRM uses default UEF of ≥0.8 for condensing storage water heaters and ≥0.87 for tankless water heaters. The PSD can use this as the default UEF_installed value.	Action required/Under Review
No further action	No further action
No further action	No further action

No further action	No further action
No further action	No further action
Table 4-14 in the R1614-1613 says that the 11.2 MMBtu annual domestic hot water load was verified based on the metering of heat pump water heaters. However, the metering study of heat pump water heaters (Table 4-29) found gallons per year of 15,415 and delta T of 75, which results in approximately 9.63 MMBtu. Also, the annual hot water consumption of 15,415 gallons is closer to the annual hot water consumption value used by Mid-Atlantic and NY TRM - both use ~16,500 GPY. See calculation in PSD4.5.3 Supporting Info Tab.	Action required/Under Review
No further action	No further action

No further action	No further action
The measure is residential fossil fuel water heaters only, and the residential water heating load is fairly constant. There is a separate measure for commercial DHW (2.2.87 NG fired DHW heaters), which calculates annual gas usage based on EIA's table of base case gas usage rate for different facility types.	Action required/Under Review
We have prioritized a CT-specific value rather than other states' secondary values	Action required/Under Review
While 55 might not correspond to the true CT-specific cold water value, it leads to a 75-degree delta-T as recommended by CT-specific research	Action required/Under Review
No further action	No further action
No further action	No further action

No further action	No further action
Citations added in the measure tab.	Action required/Resolved
No further action - Lifetimes reviewed in separate Appendix	No further action
Yes, we agree. It seems the evaluation study scaled up the evaluated savings for sizes < 55 gallons based on the tank size. ERS will recommend to use MA TRM savings value for >55 gallon sizes. https://etrm.anbetrack.com/#/workarea/trm/MADPU/RES-WH-HPWH/2019-2021%20Plan%20TRM/version/1?measureName=Hot%20Water%20-%20Heat%20Pump%20Water%20Heater	Action required/Under Review

Yes, the savings are deemed. Please refer to R1614-1613 evaluation study, Table 4-29. The evaluation study found an average installed EF of 2.46. The deemed savings in the study were estimated directly from the metering of 41 homes. It is not explained what size HPWHs were installed, but we agree that savings for >55 gallons should be lower. Regarding the interactive effects, the report also found that out of 41 metered home, 33 homes installed HPWHs in unconditiones spaces, and over 75% of the surveys identified an unheated basement as the location of the heat pump water heater. The interactive effects are less likely to occur when the heat pump water heater is located in an unheated basement.	Action required/Under Review
Using actual parameters and engineering algorithms would capture all the variations. However, the evaluation results were estimated directly from metering, which means all the on site variations have been captured and the savings value are more accurate.	Action required/Under Review

Yes, the savings are deemed. Please refer to R1614-1613 evaluation study, Table 4-29. The evaluation study found an average installed EF of 2.46. The deemed savings in the study were estimated directly from the metering of 41 homes. It is not explained what size HPWHs were installed, but we agree that savings for >55 gallons should be lower. Regarding the interactive effects, the report also found that out of 41 metered home, 33 homes installed HPWHs in unconditiones spaces, and over 75% of the surveys identified an unheated basement as the location of the heat pump water heater. The interactive effects are less likely to occur when the heat pump water heater is located in an unheated basement.	Action required/Under Review
The R1614-1613 evaluation study found that out that 26% of the surveyed customers had fossil fuel water heater as the baseline in 2018. So, it would make sense to offer the measure as a full fuel switch measure. SCE in California recently drafted a fuel switch work paper for HPWHs and SMUD (a public utility in Sacramento) has an electrification program for switching ffrom fossil fuel WHs to HPWHs.	Action required/Under Review

The R1614-1613 evaluation study found that out that 26% of the surveyed customers had fossil fuel water heater as the baseline in 2018. So, it would make sense to offer the measure as a full fuel switch measure. SCE in California recently drafted a fuel switch work paper for HPWHs and SMUD (a public utility in Sacramento) has an electrification program for switching ffrom fossil fuel WHs to HPWHs.	Action required/Under Review
No further action	No further action
No further action	No further action
We will propose this secondary research, though we anticipate limited use of the residential custom measure from the PSD	Action required/Under Review
No further action	No further action

Agreed. ERS has checked previous evaluations and will review recommendations of forthcoming evaluations	Action required/Under Review
No further action	No further action
No further action	No further action
No further action	No further action
No further action	No further action
No further action	No further action

ERS to review spreadsheet	Action required/Under Review
Addressed by TRC x1941 multifamily study	Action required/Resolved
Agreed. ERS has checked previous evaluations and will review recommendations of forthcoming evaluations	Action required/Under Review
Awaiting evaluation results	Action required/Under Review

No further action	No further action
ERS to discuss recommendation at 7/10/2020 call with stakeholders	Further Discussion
No further action	No further action
No further action	No further action
No further action	No further action

ERS to discuss recommendation at 7/10/2020 call with stakeholders	Further Discussion
No further action	No further action
Agreed. ERS has checked previous evaluations and will review recommendations of forthcoming evaluations	Action required/Under Review
ERS will examine MA baseline results and assess applicability to CT PSD	Action required/Resolved
No further action	No further action
No further action	No further action
No further action	No further action

Addressed by TRC x1941 multifamily study	Action required/Resolved
Addressed by TRC x1941 multifamily study	Action required/Resolved
Agreed. ERS has checked previous evaluations and will review recommendations of forthcoming evaluations	Action required/Under Review
While this recommended approach is not different from the existing approach it will take significant work updating the workbooks. The proposed changes in this review could be adjusted to be incorporated within the existing method if desired, however the recommended approach separates out many of the variables within this analysis making future measure updates easier and more transparent and also allows this measure to assist in custom VFD analysis that may not have all of the variables needed to complete the analysis.	Action required/Under Review

Under review	Action required/Under Review
Under review	Action required/Under Review
Under review	Action required/Under Review
The current methodology is to use the BHP of the fan which is the preferred method. However, the BHP is not known until after the equipment is installed and running and the power is recorded at 100% speed. If this data is not available it would be beneficial to have a consistent approach to estimate the BHP based on the nominal HP of the motor controlled by the VFD. For this the 65% load factor was recommended. This could be incorporated into the worksheets or as just added text on how to estimate the BHP if the actual load factor is unknown.	Action required/Under Review

The source is from the IL TRM [Lawrence Berkeley National Laboratory, and Resource Dynamics Corporation. (2008). “Improving Motor and Drive System Performance; A Sourcebook for Industry”. U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy. Golden, CO: National Renewable Energy Laboratory.] https://www.energy.gov/sites/prod/files/2014/04/f15/amo_motors_sourcebook_web.pdf It is an estimate however. This is a value that could be updated with little effort with collected metered data from evaluations.	Action required/Under Review

unknown in this analysis that has not been research extensively anywhere. TRMS all reference ASHRAE VAV fan load profiles. This is the component that determines what percent fo the time the VFD is operating at reduced speed and at what speed so it determines the energy savings. An important component of any additional research around the fan duty cycle will also be looking at the time of day for this duty cycle to assist in the determinization of the ISO-NE seasonal peak savings. HVAC VFD operation is highly variable and depends on cooling loads (outdoor air temperature) and occupancy/building schedules making it difficult to estimate the seasonal peaks accurately. The trend of the ISO-NE seasonal peak being pushed later to the later afternoon and into the early evening makes	Action required/Under Review

Under review	Action required/Under Review
Under review	Action required/Under Review

Under review	Action required/Under Review
Under review	Action required/Under Review

Under review	Action required/Under Review
Under review	Action required/Under Review
The pumps/cooling tower energy equation doesn't change at this time. The change occurred with the HVAC VFD fans to allow for two different VFD post conditions. That being said there is a benefit to separate out the pumps and if cooling tower fans are added from HVAC VFDs to avoid confusion	Action required/Under Review
Same comment as the energy equation	Action required/Under Review

ERS will examine calculations	Action required/Under Review
ERS will examine calculations	Action required/Under Review
ERS to discuss recommendation at 7/10/2020 call with stakeholders	Further Discussion
The PSD actually says to use linear interpolation among the common case values, so we believe adding a 3in will be helpful	Action required/Under Review
No further action	No further action
We recommend to change the language in the PSD to say something like" savings are custom calculated using 3E Plus for bigger pipe diameters and for different delta T values".	Action required/Resolved

Addressed by TRC x1941 multifamily study	Action required/Resolved
Addressed by TRC x1941 multifamily study	Action required/Resolved
Addressed by TRC x1941 multifamily study	Action required/Resolved
No further action	No further action
We confirmed that the steam trap related recommendations (both algorithm & RR) in C1648 were incorporated in this measure in the 2020 CT PSD.	Action required/Resolved
No further action	No further action
No further action	No further action
No further action	No further action
Proposed secondary research	Action required/Resolved

These parameters were not defined in the nomenclature table. This is an editorial update to add these parameters to this measure nomenclature table.	Action required/Resolved
No further action	No further action
No further action	No further action
Addressed by TRC x1941 multifamily study	Action required/Resolved

No further action	No further action
No further action	No further action
No further action	No further action
No further action	No further action
No further action	No further action
No further action	No further action
No further action	No further action
Addressed by TRC x1941 multifamily study	Action required/Resolved

Proposed secondary research	Action required/Resolved
No further action	No further action
Proposed secondary research	Action required/Resolved
No further action	No further action
Agreed. The savings from this measure are realized from sealing a leaky duct in unconditioned spaces. This measure did not explicitly define duct leaks in conditioned/unconditioned spaces. ERS will recommend measure description should define the fact that the measure is based on sealing ducts in unconditioned spaces.	Action required/Resolved

No further action	No further action
No further action	No further action
Agreed that an alternative savings approach can be employed if updated REM/Rate models cannot be run.	Action required/Under Review
No further action	No further action
Agreed that an alternative savings approach can be employed if updated REM/Rate models cannot be run. The Mid Atlantic TRM Version 9, October 2019 has a reasonable methodology that can be used to estimate savings for this measure. Specifically, metholdogy 3 in the Mid Atlantic TRM would be most appropriate since it follows the same concept as the CT PSD. It is transparent and uses inputs that are typically easily available.	Action required/Under Review

Agreed that an alternative savings approach can be employed if updated REM/Rate models cannot be run. The Mid Atlantic TRM Version 9, October 2019 has a reasonable methodology that can be used to estimate savings for this measure. Specifically, metholdogy 3 in the Mid Atlantic TRM would be most appropriate since it follows the same concept as the CT PSD. It is transparent and uses inputs that are typically easily available.	Action required/Under Review
Agreed that an alternative savings approach can be employed if updated REM/Rate models cannot be run. The Mid Atlantic TRM Version 9, October 2019 has a reasonable methodology that can be used to estimate savings for this measure. Specifically, metholdogy 3 in the Mid Atlantic TRM would be most appropriate since it follows the same concept as the CT PSD. It is transparent and uses inputs that are typically easily available.	Action required/Under Review
Proposed secondary research	Action required/Resolved

Agreed that an alternative savings approach can be employed if updated REM/Rate models cannot be run.	Action required/Under Review
QIV standards do address proper charging and right-sizing. Savings in the PSD address these components and also offer savings for fossil fuel-fired systems	Action required/Resolved
QIV standards do address proper charging and right-sizing. Savings in the PSD address these components and also offer savings for fossil fuel-fired systems	Action required/Resolved
Addressed by TRC x1941 multifamily study	Action required/Resolved
Addressed by TRC x1941 multifamily study	Action required/Resolved
No further action	No further action
No further action	No further action
Agreed, it would effectively be the same baseline, assuming the customer had a circulating pump beforehand	Action required/Resolved
Perhaps, we will investigate that measure more deeply when it emerges for inclusion in the PSD	Action required/Under Review

Addressed by TRC x1941 multifamily study	Further Discussion
Addressed by TRC x1941 multifamily study	Further Discussion
No further action	No further action
No further action	No further action

Good point that will affect multiple measures. This will be discussed at the 7/10/20 meeting with the stakeholders	Further Discussion
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Good point that will affect multiple measures. This will be discussed at the 7/10/20 meeting with the stakeholders	Further Discussion

Addressed by TRC x1941 multifamily study	Further Discussion
No further action - agreement	No further action

ERS will include Cadmus reference	Action required/Resolved
No further action	No further action
Proposed secondary research	Action required/Resolved
Proposed secondary research	Action required/Resolved

We checked the adjustment factor using this link and confirmed that the value is appropriate. As for a different factor being used for floors versus ceiling/wall insulation, we didn't find that distinction in the source. Further secondary resreach could be conducted to determine that change. https://books.google.com/books?id=guzOLFhjPygC&pg=PA20&lpg=PA20&dq=ASHRAE+degree-day+correction.+1989+ASHRAE+Handbook+%E2%80%93+Fundamentals&source=bl&ots=onTU52PtEd&sig=ACfU3U1iQd89_agoKFpf3AcaWvglSD39fQ&hl=en&sa=X&ved=2ahUKEwimzaGSv7vqAhWzkHIEHaiZBAMQ6AEwAXoECA0QAQ#v=onepage&q=ASHRAE%20degree-day%20correction.%201989%20ASHRAE%20Handbook%20%E2%80%93%20Fundamentals&f=false	Action required/Resolved
Confirmed that the ASHRAE adjustments are not accounted for in the REM/Rate factors.	Action required/Resolved
No further action	No further action

We agree that IECC 2003 should be used as the reference code for this measure. The median age of the home in Connecticut was built in 1964 according to Connecticut Housing finance authority (https://www.chfa.org/assets/1/6/Connecticut_Housing_Market_Snapshot.pdf).	Action required/Resolved
No further action	No further action
No further action	No further action

No further action	No further action
No further action	No further action
No further action	No further action

ERS to discuss recommendation at 7/10/2020 call with stakeholders	Further Discussion
ERS to discuss recommendation at 7/10/2020 call with stakeholders	Further Discussion
ERS to discuss recommendation at 7/10/2020 call with stakeholders	Further Discussion
No further action	No further action

No further action	No further action
Proposed secondary research	Action required/Resolved
We checked the adjustment factor using this link and confirmed that the value is appropriate. As for a different factor being used for floors versus ceiling/wall insulation, we didn't find that distinction in the source. Further secondary resreach could be conducted to determine that change. https://books.google.com/books?id=guzOLFhjPygC&pg=PA20&lpg=PA20&dq=ASHRAE+degree-day+correction.+1989+ASHRAE+Handbook+%E2%80%93+Fundamentals&source=bl&ots=onTU52PtEd&sig=ACfU3U1iQd89_agoKFpf3AcaWvglSD39fQ&hl=en&sa=X&ved=2ahUKEwimzaGSv7vqAhWzkHIEHaiZBAMQ6AEwAXoECA0QAQ#v=onepage&q=ASHRAE%20degree-day%20correction.%201989%20ASHRAE%20Handbook%20%E2%80%93%20Fundamentals&f=false	Action required/Resolved

These values are based on the referenced 2017 NMR evaluation study. Since the ceiling insulation measure would impact the cooling system, but not the duct losses, using these values seems appropriate. Agreed that DHP baseline should be looked into and included if different.	Action required/Resolved
No further action	No further action
We agree that IECC 2003 should be used as the reference code for this measure. The median age of the home in Connecticut was built in 1964 according to Connecticut Housing finance authority (https://www.chfa.org/assets/1/6/Connecticut_Housing_Market_Snapshot.pdf).	Action required/Resolved
No further action	No further action
No further action	No further action
We recommend using the existing R value if known, and using IECC 2003 code value if unknown.	Action required/Resolved
Proposed secondary research	Action required/Resolved

We have provided the values in the recommended value column.	Action required/Resolved
ERS to discuss recommendation at 7/10/2020 call with stakeholders	Further Discussion
ERS to discuss recommendation at 7/10/2020 call with stakeholders	Further Discussion

ERS to discuss recommendation at 7/10/2020 call with stakeholders	Further Discussion
No further action	No further action
No further action	No further action
ERS to discuss recommendation at 7/10/2020 call with stakeholders	Further Discussion
ERS to discuss recommendation at 7/10/2020 call with stakeholders	Further Discussion
Proposed secondary research	Action required/Resolved
We recommend using the existing R value if known, and using IECC 2003 code value if unknown. Agreed that the existing insulation is either poor or non-existent.	Action required/Resolved

The referenced MA study from 2015 was determined to be the most appropriate source for these baseline efficiency values, and found that the study did consider system efficiencies and not just unit efficiencies. However, we agree that updated CT-specific values would be most appropriate to use if available.	Action required/Resolved
Based on other TRMs, prior experience, and our engineering judgement, a base of 65F for residential applications is appropriate.	Action required/Under Review

We checked this value based on the link below and found that the adjustment factor is appropriate. https://books.google.com/books?id=guzOLFhjPygC&pg=PA20&lpg=PA20&dq=ASHRAE+degree-day+correction.+1989+ASHRAE+Handbook+%E2%80%93+Fundamentals&source=bl&ots=onTU52PtEd&sig=ACfU3U1iQd89_agoKFpf3AcaWvglSD39fQ&hl=en&sa=X&ved=2ahUKEwimzaGSv7vqAhWzkHIEHaiZBAMQ6AEwAXoECA0QAQ#v=onepage&q=ASHRAE%20degree-day%20correction.%201989%20ASHRAE%20Handbook%20%E2%80%93%20Fundamentals&f=false	Action required/Resolved
Agreed that further research would be beneficial for the heat pump baseline efficiency value.	Action required/Under Review
ERS will note evaluation source for all insulation chapters as CT 2018 HES Impact Evaluation.	Action required/Resolved
Yes, we are recommending fed standard as baseline	Action required/Under Review
Yes gpm will align	Action required/Under Review

evaluation report recommends to use recovery efficiency for faucet aerator and showerhead measure instead of energy factor (because these measures should not consider water heater standby losses). The PSD borrows recovery efficiency values from Illinois TRM. https://www.ilsag.info/technical-reference-manual/il-trm-version-9/ Here's what the Illinois TRM says: DOE's Final Rule discusses recovery rfficiency with an average around 0.76 for gas fired storage water Heaters, 0.78 for standard efficiency gas fired tankless water heaters, and up to 0.95 for the highest efficiency gas fired condensing tankless water heaters. Review of AHRI Directory suggests range of recovery efficiency ratings for new Gas DHW units of 70-87%.	Action required/Under Review
Utilities can confirm, but per HH is seemingly for ease of implementer tracking	Action required/Under Review

We believe the install-specific gpm will generally be known and used, therefore we agree with 2.0 as conservative alternative	Action required/Under Review
We provided reference in the supporting info tab. There was a note in the measure tab that says to refer to the references in the PSD 4.5.1 supporting Info tab.	Action required/Under Review
ERS will review additional data when provided	Action required/Under Review
The parameter values in the PSD come from a 2011 study in California. Were similar values observed during site visits in CT? We recommended Mid-Atlantic values because the mid-atlantic's values are based on a more (2014) recent evaluation study.	Action required/Under Review
No further action	No further action

The parameter values in the PSD come from a 2011 study in California. Were similar values observed during site visits in CT? We recommended Mid-Atlantic values because the mid-atlantic's values are based on a more (2014) recent evaluation study.	Action required/Under Review
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The parameter values in the PSD come from a 2011 study in California. Were similar values observed during site visits in CT? We recommended Mid-Atlantic values because the mid-atlantic's values are based on a more (2014) recent evaluation study.	Action required/Under Review
Federal standards have been around since 1998, much longer than the EUL of faucet aerators. As such, GPMs > Fed standards are not expected. Baseline for some other TRMs (NY) are more stringent than the Fed Standards.	Action required/Under Review
1.5 GPM is the minimum EPA specified flow rate. Actual installed flow rates might be lower. We recommend to use actual installed flow rate or 1.5 GPM as default.	Action required/Under Review

evaluation report recommends to use recovery efficiency for faucet aerator and showerhead measure instead of energy factor (because these measures should not consider water heater standby losses). The PSD borrows recovery efficiency values from Illinois TRM. https://www.ilsag.info/technical-reference-manual/il-trm-version-9/ Here's what the Illinois TRM says: DOE's Final Rule discusses recovery rfficiency with an average around 0.76 for gas fired storage water Heaters, 0.78 for standard efficiency gas fired tankless water heaters, and up to 0.95 for the highest efficiency gas fired condensing tankless water heaters. Review of AHRI Directory suggests range of recovery efficiency ratings for new Gas DHW units of 70-87%.	Action required/Under Review
Utilities can confirm, but per HH is seemingly for ease of implementer tracking	Action required/Under Review

Due to the measure's use of third-party software, 3E Plus, it is not possible to include an efficiency parameter in an algorithm like we can for other measures	Action required/Under Review
Other TRMs use recovery efficiency instead of UEF/EF. A recovery efficiency of 0.78 for gas and 0.98 for electric should be used. The PSD should use the same recovery efficiency value for pipe insulation, faucets, and showerheads measure.	Action required/Under Review
These are recovery efficiencies. Our comment here was for electric water heaters. The R16 HES-IE report also recommends to use 98% as recovery efficiency for electric water heaters Other TRMs all use recovey efficiency for pipe insulation. We recommend to use recovery efficiency of 0.98 for electric and 0.78 for gas heaters in all three measures: faucet aerators, showerheads, and pipe insulation.	Action required/Under Review

These are UEFs and without recent CT-specific information, we feel are the best values available. Oil savings are calculated and recommended separately, seemingly reflecting an oil-specific UEF	Action required/Under Review
No further action	No further action
No further action	No further action