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Filing Date - 2024-05-28 08:55:15 AM

Control Number - 56510

Item Number - 6

TETRA TECH

Heat Pump Working Group
Biweekly meeting notes
Date: 05/21/2024 @ 11:00 CDT

Contacts	Mark Bergum: (608) 316-3630 or mark.bergum@tetratech.com Graham Thorbrogger: (608) 316-3623 or graham.thorbrogger@tetratech.com
Meeting Link	
Access	PUC – Interchange Filing: Case 56510 Interchange - Documents (texas.gov) Teams site: https://tetratechinc.sharepoint.com/:f:/r/teams/PUCTHeatPumpWorkinggroup/Shared%20Documents/General?csf=1&web=1&e=mCHkEh Past Meeting recordings: https://vimeo.com/channels/HPWG
Review of Residential Measure Barriers	Residential Measure 2.2.2 (Review) • Load Calculations (Manual J & S) • Consumption hours • Right-sizing calculations (limitations to different capacities) • Winter savings for gas heat replacement – Baseline as std. heat pump • Winter savings for HP replacement – Pre and post are both equal amount of supplemental heat (77%) • Current ID of VSHP is based on SEER being greater than 15.2 • VSHP do not have the mismatched equipment concern seen with units a few years ago. • New Construction baseline = 115% of summer load • Summer and Winter Peak Coincident demand factors need to adjust based on summer peak capacity and winter supplemental heat. • EFLH is multiplied times SEER/HSPF to determine consumption. • EUL is 15 years for heat pumps.
Identification of Commercial Barriers that vary from Residential	Commercial Measure 2.2.2 • Replacement capacity limited to 20% adjustment • New Construction baseline capacity = Installed capacity • Baseline efficiencies per DOE standards or IECC2015
Discussion Schedule	○ May 7: Identification of VSHP, Load Calculation requirements, Consumption calculation (EFLH), EUL ○ **May 21: Summer Peak & Consumption** ○ June 4: Winter Peak & Consumption ○ June 18: Baseline Equipment and Right sizing calculation ○ July 02: Envelope incorporation ○ July 16: Draft measure
Action items from previous meeting	• **Request**: Data set of calculated heating and cooling loads for buildings in Texas? Email Mark and Graham if you have something available. • **Action item:** Identify the expected AHRI categories for variable speed heat pumps for inclusion in the TRM entry. **Open Question:** Is there an opportunity for units that are not AHRI listed for this VSHP measure?

	• **Short Term Goal:** Identify template/average/reasonable performance curves for use in the TRM. **Action Item:** Tetra Tech will follow up with references to present the next steps toward short-term goal at the next meeting. • **Action Item:** Tetra Tech to follow up with PNNL about Manual J light (CoolCalc).
Follow-up notes provided based on conversations completed by Tetra Tech	• Advanced Heat Pump Working Group recommendations: - Specify VSHP at tax credit threshold (2025 will be nationwide criteria) - SEER level may not differentiate level of savings. - Performance should be determined from COP at temperatures - Use the heat capacity ratio between 5/17/47 degrees to determine the opportunity to provide most winter heating. - Set max. electric resistance kW level per HP unit. • NEEP database - NEEP has built a database with COP at 5, 17, 47, 82, and 95 degree F capacity points. (https://ashp.neep.org/) • Illinois TRM - Review in progress from Tetra Tech Follow up from the TDLR staff was that the limitation on electric resistance backup will likely lead to limited participation because HVAC systems need to operate if any component of the heat pump or electronics fails.
Identification of VSHP	The preference of the group was to stay with the AHRI database and ratings to qualify equipment in the short term. • Longer term solution may include other options, such as the NEEP database, or Federal Tax Credit eligibility.
EUL	Not discussed
Load Calculation Requirement	There was general agreement that the load calculations are too much to require for short-term goals. Consider for long-term goal. Although several discussion points were identified that load calculation are required by many building inspectors and completing the work is best practice prior to purchasing HVAC equipment. A utility implementation team expressed concern over review of the Manual J calculations because it is not their expertise and they would not be able to identify improper assumptions. In lieu of load calculations, an idea was provided for a preferred contractor list.
Summer Consumption	Tetra Tech identified that in the absence of load calculations, the equation for savings requires assumptions regarding the oversize factor and efficiency loss operating at partial loads for various equipment. In the current equation, that is all wrapped up into the EFLH. So there may be another factor included or EFLH values will change in the calculation. $Cooling\ Energy\ Savings\ [kWh_C] = \left(\frac{Cap_{C,pre}}{\eta_{baseline,C}} - \frac{Cap_{C,post}}{\eta_{installed,C}}\right) \times EFLH_C \times \frac{1\ kW}{1{,}000\ W}$

	• $Cap_{C,pre}$ = Existing Equip. (ER) or match $Cap_{C,post}$ (ROB/NC) Upsizing/Downsizing rules apply. • $\eta_{baseline/installed,C}$ = SEER • $EFLH_C$ = Effective Consumption Hours at full load

Climate zone	$EFLH_C$
Zone 1: Amarillo	1,142
Zone 2: Dallas	1,926
Zone 3: Houston	2,209
Zone 4: Corpus Christi	2,958
Zone 5: El Paso	1,524

Summer Peak	Tetra Tech provided a background on the coincident factor currently used in the peak demand savings calculation. The current factor incorporates the assumption that the capacity is a 15% oversize. With time available, Tetra Tech provided guidance that the coincident factor is expected to be adjusted in the calculation to manage the capacities to load variation. $Summer\ Peak\ Demand\ Savings\ [\Delta kW] = \left(\frac{Cap_{C,pre}}{\eta_{baseline,C}} - \frac{Cap_{C,post}}{\eta_{installed,C}}\right) \times CF_S \times \frac{1\,k}{1{,}00}$ • Coincident Factor current calc: Air Conditioning Contractors of America (ACCA) Manual S recommends that residential heat pumps be sized at 115 percent of the maximum cooling requirement of the residence (for cooling-dominated climates). Assuming that maximum cooling occurs during the peak period, the guideline leads to a coincidence factor of 1 / 1.15 = 0.87.
Next Meeting	June 4 at 11:00 Topic – Winter Peak and Consumption