December 6th 2024

Ms. Laura Thomas

NWPCC Regional Technical Forum Manager

851 SW 6th Ave, Portland, OR

Re: Centrally Ducted Cold Climate Heat Pump Measure

Dear Ms. Thomas,

Northwest Energy Efficiency Alliance (NEEA), Bonneville Power Administration (BPA) and Puget Sound Energy (PSE) staff submit the following proposed measure to the Regional Technical Forum (RTF) for a **centrally ducted cold climate heat pump specification** that includes **minimization of supplemental heat**. The proposed measure builds upon current market momentum, is consistent with national definitions and tax credit criteria, and adds additional criteria to improve grid flexibility and resilience.

The proposed measure only applies to centrally ducted systems primarily because minimizing supplemental heat with ductless systems requires a different set of criteria. While “integrated controls” that allow the ductless systems to control the existing electric baseboard heaters or electric furnaces exists, these have not been proven to be well used by contractors.

The proposed measure is divided into two sets of criteria: the first set is based on the heat pump’s performance ratings; the second set defines one of 3 approaches to minimize the use of supplemental electric resistance (ER) heating.

# Equipment Requirements

The base equipment criteria should require the heat pump to qualify for a federal tax credit defined by the Consortium for Energy Efficiency (CEE) for residential heat pumps. The CEE has defined two paths for the tax credit in 2025. Path 1A is heating focused and Path 1B is cooling focused (table below). The specification increases slightly in 2026 by including slightly higher capacity ratios at 5°F and inclusion of load management criteria defined by AHRI 1380.

A screenshot of a computer screen

Description automatically generated

NEEA recommends that the Northwest base the region’s cold climate heat pump measure on the **Tier 1 Path A of 2026 CEE Split System ASHP specification** with one exception. The exception is that the load management requirement is not required until 1/1/2026 to ensure adequate availability of products that meet this criteria are in the marketplace. These criteria apply to both ducted and ductless systems (but not packaged systems). As of this letter it is likely that these criteria will be equivalent to the EPA’s ENERGY STAR Most Efficient (ESME) criteria.

By setting our NW cold climate heat pump measure to meet ESME, it will allow easy identification within the AHRI and NEEP databases and allow utilities to communicate that they offer incentives for cold climate heat pumps that meet “ENERGY STAR Most Efficient” specifications. All systems that meet these criteria would be eligible for a $2000 tax credit that can be claimed by completing a single line in the IRS form 5695. The IRA funding for states under HOMES and HEAR programs have set equipment performance specification less stringent than ESME and therefore any units that meet this measure’s requirements could be used within the IRA-funded programs.

# Supplemental Heat Requirements

The overall goal of this measure is to include criteria that minimize the use of supplemental heat for defrost, setback recovery, and use when the heat pump is capable of meeting 100% of the space heating needs of a home. NEEA proposes three different approaches to achieve this:

1. Sizing and QA Checklist
2. Supplemental Heat Limit
3. Connected Commissioning

The approaches assume programs ask contractors to provide information and training about cold climate heat pumps that help ensure the heat pumps systems are fully utilized. This will need to be in some form of trade ally agreement with the utility and include such things as:

1. Night setbacks no more than 2-4°F to minimize heat pump ramping or risk that supplemental heat comes on during setback recovery.
2. Do not change the ER strip heat lock out. The heat pump is capable of meeting over 100% of the load at 25°F.
3. Set the indoor thermostat settings for other heat sources (e.g. baseboard, furnace or boiler) 2-4 degrees cooler than the heat pump setpoint, to include heat pump night setback temperature.

The following sections describe the three supplemental heat minimization approach criteria and some discussion questions and thoughts. We ask that the RTF explore all three and generate kWh and kWh savings estimates for each (segmented by housing types and heating climates). Note that while approach C is still formative, having the RTF develop this as an option will help NEEA influence manufacturers to bring products to market capable of generating commissioning reports that confirm supplemental heat minimization.

## APPROACH A - Sizing and QA Checklist

This is a traditional utility measure where the contractor would need to submit an application with documentation of the system that confirms criteria. Utility programs would provide design review and random inspection of systems to ensure contractor compliance.

### Criteria

1. Heat pump is sized to provide approximately 100% of the heating capacity at these outdoor temperatures:
   1. Heating Zone 1 17°F
   2. Heating Zone 2 17°F
   3. Heating Zone 3 17°F
2. Ducting is fixed if conditioned air does not come out of every register
3. Heat pump compressor is not locked out. Heat pump will run across its full operating range.
4. Supplemental electric resistance (ER) heat is locked out above 25°F (except for defrost cycles)

### Thoughts & Questions

1. Is 25°F the right supplemental ER lock out temperature?
2. It would be wise for utilities to support contractor training about what 100% design load means and how to generate it accurately and easily. (e.g. include duct losses, infiltration, not add multiple additional oversize factors)
3. This approach is not worthwhile without meaningful and robust QC
4. This option requires thermostat control to know outdoor temperature --- Thermostat model needs to be reported?
5. Does this assume there is a utility maintaining a list of trade allies?
6. Would BPA be willing to provide the QA for this?
7. Should additional criteria like airflow, static pressure and refrigerant decay testing be added?

## APPROACH B - Supplemental Heat Limit

Qualifying systems shall have a limited capacity of ER strip heat, described below. The contractor would submit documentation of the qualifying equipment and confirmation that supplemental heating system size was limited. This limitation of supplemental heat will mean the contractor needs to ensure the system has adequate capacity without relying largely on supplemental heat. This puts the burden of correctly sizing for a home’s full heating load on the contractor. Contractors will need to do a load calculation, and be concerned about duct leakage, insulation, infiltration and distribution capacity. It is simple to understand and potentially verifiable by spot checking utility meter data to see if large step function changes in power consumption occur.

### Criteria

The following are supplemental heat limits by heating climate:

* 1. Heating Zone 1 (IECC zone 4B) up to 5 kW per house
  2. Heating Zone 2 (IECC zone 5) up to 10 kW per house
  3. Heating Zone 3 (IECC zone 6) up to 20 kW per house

### Thoughts & Questions

1. This would require the utility have defined trade allies.
2. 3kW ER strip needs a 20A 240V circuit. (3000W/240/0.8 = 15.65A)
3. The incentive would be more effective if provided to the trade ally, rather than the customer.
4. It may lead to systems to be oversized, which can increase annual kWh, however competing bids for smaller sizes will likely limit oversizing.
5. Should electric resistance capacity limits be lifted for very large homes?

## APPROACH C – Connected Commissioning Verified

The heat pump controls **settings** are electronically verified by the heat pump’s embedded sensors, logic board and commissioning app or tool (Note - this is an approach based on emerging technology. We seek savings estimates based on the description so that NEEA can influence OEMs to develop products that provide this level of verification).

### Criteria

1. Setback recovery must use heat pump for first hour before engaging any supplemental electric resistance heat
2. Heat pump compressor is not locked out. Heat pump will run across its full operating range.

ER strip heat is locked out above 25°F (except for defrost cycles)

### Thoughts & Questions

1. How long will it take to get products that meet this?
2. How many would be un-done by homeowner purchase of a Nest or Ecobee?
3. This could be verified for a normal thermostat with connected commissioning

Thank you for considering our request.

Sincerely,

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