



375 Alabama St UNIT 220,
San Francisco, CA 94110

646.814.4281

February 3rd, 2025

Holly Tapani
U.S. Environmental Protection Agency
ENERGY STAR HVAC Program

Dear Ms. Tapani,

Room heat pumps represent the kind of bold, market-driven innovation that strengthens our energy economy and puts consumers first. By eliminating the need for costly and unnecessary building modifications, these advanced systems expand access to efficient heating and cooling.

Treau Inc. (DBA Gradient) respectfully submits the following additional comments to ENERGY STAR regarding its Version 6.0 and 7.0 Room Air Conditioner Draft 1 Comment Extension – January 14, 2025.

Version 7.0 Criteria

Very few comments addressed the proposed criteria for Version 7.0. The EPA is requesting feedback on the proposed CEER, HEER, COP, and heating capacity ratio requirements proposed in the Draft 1 release. This includes non-reverse cycle RACs and their proposed cooling efficiency requirements.

Recommendation: Align with CEE Tier 2 to ensure consistency across rating platforms and simplify regulatory burden. Historically, CEE Tier 2 has aligned with ENERGY STAR, while CEE's Advanced Tier typically corresponds to ENERGY STAR Most Efficient. It is essential to maintain this relationship to ensure consistency within the industry and to alleviate regulatory burdens.

375 Alabama St UNIT 220, San Francisco, CA 94110 • hello@gradientcomfort.com



Version 6.0 & 7.0 Cost and Payback

The EPA notes that for Type 4 RHPs in particular, these baseline technologies would not be an appropriate point of comparison for consumers considering a RHP in place of more expensive centralized heating equipment. The EPA is therefore taking comment on what a more appropriate baseline technology comparison would be for Type 4 RHPs, in consideration of the large variety of technologies these products are capable of replacing.

Recommendation: Type 4 room heat pumps are considered an alternative solution to conventional heat pumps, such as ductless mini-splits and variable refrigerant flow (VRF) systems when the cost of installing those conventional systems is too high. However, a challenge with performing an apples-to-apples energy usage comparison of room heat pumps against mini-splits or VRFs is that all three product types have different seasonal efficiency metrics and different usage patterns.

Urban Green's Going Electric report¹ is frequently cited as being a source of reliable data for the cost of heat pump installations in large old multifamily buildings, and provides the following averages²:

- VRF - \$20.60/ft² (\$27.81/ft² when inflation-adjusted)
- Mini-splits - \$13.60/ft² (\$18.36/ft² when inflation-adjusted)

We can use DOE's representative capacity of 12,000 BTU/hr and the common 20 BTU/hr/ft² heat pump sizing guidance³ to calculate the per-window-heat-pump cost associated with each product type:

- VRF - \$16,686 inflation-adjusted per window heat pump

¹<https://www.urbangreencouncil.org/wp-content/uploads/2022/11/2020.04.22-Going-Electric-v2.pdf>

² Costs from Urban Green were collected from 2010-2020, so 2015 is used as a baseline for inflation-adjustment.

³ Such as from <https://www.energymaine.com/docs/Residential-Heat-Pump-Claim-Form.pdf>



- Mini-splits - \$8,160 inflation-adjusted per window heat pump

Based on the challenges associated with comparing energy usage, our proposal is to leave the Cost and Payback tables in the Specification Data Packages unchanged. However, we suggest making some additions to the note accompanying the table, as indicated by the underlined sections below:

- Version 6: To conservatively calculate the payback for ENERGY STAR V6.0 room heat pumps, the installed cost of a 2014 DOE minimum CEER, product class 11, reverse-cycle room air conditioner was used as the baseline. The EPA typically looks at current products on the market to determine the installed cost of ENERGY STAR models. However, given that there are currently no ENERGY STAR V6.0 qualifying room heat pumps available for purchase, a combination of the DOE analysis in the 2023 TSD and preliminary data provided by manufacturers have been used to estimate the installed ENERGY STAR costs for each type of room heat pump. The cost differential between this baseline and an ENERGY STAR room heat pump was divided by the sum of the annual cooling and heating savings to obtain the payback. The EPA anticipates consumers will often purchase an ENERGY STAR room heat pump in place of a combination of products, such as a room air conditioner and a space heater or other electric resistance heating.-In circumstances where the installed cost of baseline equipment is greater, the average payback for a consumer will be even faster than the estimates in this analysis. In addition, Type 4 room heat pumps are a comparable alternative to mini-split and VRF systems that replace a wide variety of central and noncentral heating and cooling systems. In large old multifamily buildings, for example, the installed cost of Type 4 window heat pumps is predicted to be 69% lower than the cost of mini-splits and 85% lower than the cost of VRFs (source: inflation-adjusted and floor-area-normalized analysis of Urban Green's 2020 Going Electric report).



- Version 7: To conservatively calculate the payback for ENERGY STAR V7.0 room heat pumps (reverse cycle room air conditioners), the installed cost of a 2026 DOE minimum CEER, product class 11, reverse-cycle room air conditioner was used as the baseline. The EPA typically looks at current products on the market to determine the installed cost of ENERGY STAR models. However, given that there are currently no ENERGY STAR V7.0 qualifying room heat pumps available for purchase, a combination of the DOE analysis in the 2023 TSD and preliminary data provided by manufacturers have been used to estimate the installed ENERGY STAR costs for each type of room heat pump. The cost differential between this baseline and an ENERGY STAR V7.0 room heat pump was divided by the sum of the annual cooling and heating savings to obtain the payback. The EPA anticipates consumers will often purchase an ENERGY STAR room heat pump in place of a combination of products, such as a room air conditioner and a space heater or other electric resistance heating. In circumstances where the installed cost of baseline equipment is greater, the average payback for a consumer will be even faster than the estimates in this analysis. In addition, Type 4 room heat pumps are a comparable alternative to mini-split and VRF systems that replace a wide variety of central and noncentral heating and cooling systems. In large old multifamily buildings, for example, the installed cost of Type 4 window heat pumps is predicted to be 60% lower than the cost of mini-splits and 81% lower than the cost of VRFs (source: inflation-adjusted and floor-area-normalized analysis of Urban Green's 2020 Going Electric report).



Test Methods for ENERGY STAR Certification

HEER, Cut-in Temperature, Cut-out Temperature

Question: Could you clarify that room heat pumps are exempt from testing by the NRTL during certification testing, while still being subject to verification testing, in alignment with ENERGY STAR's original intent?

Other

Tested Basic Connected Model (TBCM): A basic model that has been tested to validate it meets Demand Response criteria in section 4.G.

Comment: Tested Basic Connected Model (TBCM) is referenced in the Definition section but is not referenced in the remainder of the specification. We recommend removing it if it is no longer relevant.

We appreciate the opportunity to provide additional comments on ENERGY STAR's proposed specifications for Version 7 and look forward to the finalization of the room heat pump specification for both Version 6 and Version 7. If you have any questions about our comments in this letter, please feel free to reach out to us.

Best regards,

Sam Lamos

Public Policy Manager