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NRDC Comments on VCHP Compliance Credit 2019-11-08

Additional submitted attachment is included below.

NRDC NATURAL RESOURCES DEFENSE COUNCIL

Comments on Variable Capacity Heat Pump Performance Compliance Option
Docket# 19-BSTD-02
11/8/2019

On behalf of the Natural Resources Defense Council (NRDC) and its more than 450,000 members and activists in California, we appreciate the opportunity to submit the following comments on the California Energy Commission's (CEC) proposed compliance option for variable capacity heat pumps (VCHPs).

VCHP are heat pumps that provide heating and cooling by varying the speed of the compressor and fan to adjust to the heating and cooling demand, avoiding on/off cycling and resulting in energy savings of 20 to 66 percent for the system compared to fixed speed heat pumps.[1] The VCHP equipment covered by this proposal includes systems called "mini-split" and "multi-split" which can be ductless or ducted, typically characterized by having multiple indoor units. By allowing high-efficiency electric heating and cooling, they are an important technology to advance building decarbonization in California and the rest of the country. Currently, VCHP have been treated as minimum efficiency heat pumps due to uncertainties regarding their field performance. Following a project by CEC and the California investor-owned utilities (IOUs) to collect performance data in Central Valley test homes, CEC is proposing an increased performance credit for the 2019 building energy standards. NRDC appreciates CEC's efforts to collect data on the field performance of these systems and to better reflect the performance of these systems in the California building code.

NRDC supports the proposed VCHP credit in the 2019 code, but urges CEC to provide full credit for VCHP as supported by test data as soon as possible

Overall, NRDC supports the VCHP credit as proposed. While the credit is conservative and would not apply to all system types, it is a step in the right direction and would grant compliance credit to ductless and low-static ducted systems. While the CEC found that energy savings did not correlate well to the SEER, EER, and HSPF ratings of the units tested, the test data did show that these systems save significant energy overall compared to a minimum efficiency single speed heat pump. As shown in Figure 1 and Figure *2*, cooling savings ranged from 0 to 31%, with a mean of 18%, and heating savings ranged from 12% to 55% with a mean of 31%. The proposed credits of 5% cooling energy and 12% heating energy are low relative to these test results. They are a welcome improvement compared to the current situation, but they are far from fully valuing the energy efficiency and emissions reduction potential of VCHP products. NRDC urges the CEC to continue to improve the modeling and crediting of these systems as soon as possible.

[1] https://www.bpa.gov/EE/Technology/EE-emerging-technologies/Projects-Reports-Archives/Pages/Variable-Capacity-Heat-Pumps.aspx

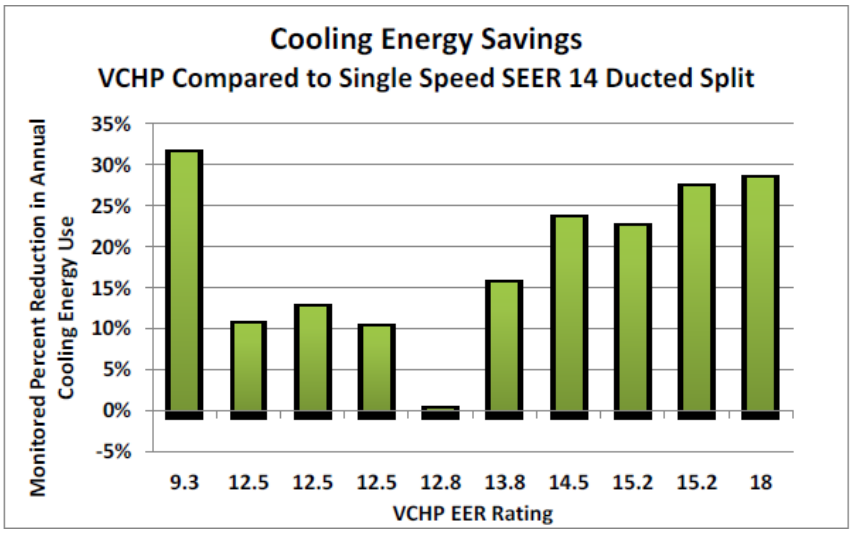

Figure 1: Monitored cooling energy savings reported in 10/16/19 CEC Staff Report on the Variable Capacity Heat Pump Performance Compliance Option

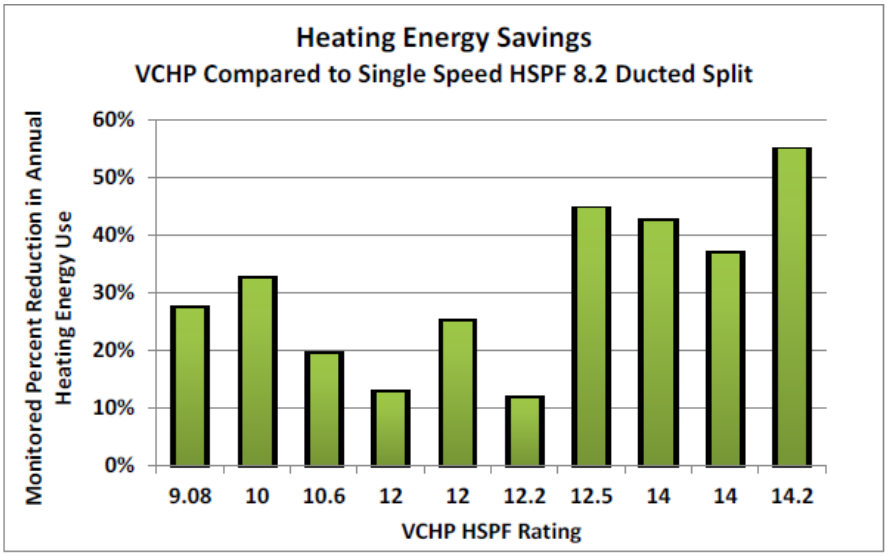

Figure 2: Monitored heating energy savings reported in 10/16/19 CEC Staff Report on the Variable Capacity Heat Pump Performance Compliance Option

NRDC urges continued work to develop a compliance credit for mid-static multisplit systems and packaged terminal heat pumps

Our understanding is that the scope of this effort to date has been on ductless mini- and multisplit units as well as ducted "low-static" multisplit units (e.g. ducted split systems with multiple indoor units). Low-static units have a maximum static pressure of 0.35 inches of water column, which combined with a requirement for high efficiency MERV 13 air filters, may severely limit the number of ducted systems that qualify for the credit, according to manufacturers.

Our understanding of how the different variable capacity heat pumps are currently treated under the software is as follows:

- *Conventional split and packaged heat pumps* (comprised of a single indoor and outdoor unit or single packaged unit serving a duct system): AHRI rating applies in software, regardless of whether the equipment is single, two-stage, or variable capacity. Rating must be field verified by HERS rater.
- *Ductless mini/multi split systems* (ductless split system, with one or more indoor units): Covered by proposed VCHP compliance credit.
- *Ducted mini/multi split systems* (Ducted split system with multiple indoor units)[2]: Low-static systems are covered by proposed VCHP compliance option. Mid and high-static units are not covered and are treated as minimum efficiency units in the software.
- *Packaged/vertical terminal heat pumps*[3] (PTACs): It appears that PTACs may also be treated as minimum efficiency, pending confirmation.

We request that the CEC develops a compliance credit for mid-static ducted multi-split systems, PTACs, and any other variable capacity systems currently being treated as minimum efficiency equipment in compliance software, as soon as possible.

While we support the CEC's efforts to not allow excessive credits that would allow unwarranted tradeoffs in building envelope efficiency measures such as attics, walls, and windows, it is also not desirable to spend years field testing every new system type or piece of equipment – this is both costly and limits the ability of design engineers and manufacturers to innovate high performance systems, in a time where the urgency and severity of the climate crisis requires rapid innovation. From the perspective of the state's clean energy and climate goals, we stand to lose more from delaying the adoption of innovative systems that have the potential to dramatically reduce building energy use and emissions, than from slightly over-estimating the performance of such technologies.

We therefore recommend that the CEC proceed expeditiously on additional credits for other variable capacity system types using engineering principle-based modeling where test data isn't available.

Supporting innovation and rapid market adoption while avoiding unwarranted tradeoffs

More generally, and moving forward on this and other issues, we recommend that the CEC pursue a balanced approached between allowing for innovation in the marketplace and protecting against excessive compliance credits that could lead to unwarranted envelope efficiency tradeoffs. We understand CEC's desire to not allow unwarranted tradeoffs of the envelope and other long-life efficiency measures with unvalidated savings from new equipment technologies. However, this needs to be balanced with allowing for critical innovation to occur and new products to enter the marketplace at the pace and scale needed to address the climate crisis.

[2] Not specified in 2019 Residential ACM
[3] Not specified in 2019 Residential ACM

While we appreciate the CEC's efforts to accurately capture system performance, lab and field testing all new equipment for multiple years before allowing it to comply with the code, let alone receive compliance credit, shouldn't be allowed to slow down innovation and market adoption.

We therefore recommend the following principles and approach to support new technologies in California's building code:

- Allow innovative new equipment types to be installed soon after market introduction (but not necessarily given compliance credit) under the prescriptive and performance path.
- Continue to conduct lab and field-testing to assess appropriate design configurations, test procedures, and compliance credits for new system types, but not let that data be a pre-requisite for allowing new technology to be deployed in the market.
- Use physics-based modeling and/or manufacturer self-reported and self-certified performance data until lab and field test data is available.
- Limit tradeoffs to be amongst like systems by setting a separate envelope compliance requirement under the performance path so that long-lived and high-certainty envelope measures can only be traded with other envelope measures. Separating envelope from equipment compliance would reduce the risk of over-crediting new system types.

Thank you for your consideration of these comments.

Respectfully,

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