

DOCKETED

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Harvest Thermal comments on the EBD Direct Install and IRA Rebate Programs

Additional submitted attachment is included below.

Harvest Thermal
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To: California Energy Commission

June 20, 2023

Re.: Harvest Thermal Response to CEC: Docket #: 22-DECARB-03; TN Number: 250196

Harvest Thermal (“Harvest”) is a California-based manufacturer of smart heating, cooling, and hot water technology using thermal energy storage and heat pump technologies to reduce the climate impacts and energy costs of residential space and water heating. We appreciate the opportunity to submit comments on the implementation of the Equitable Building Decarbonization Program.

We recommend that California Energy Commission (CEC) programs be implemented in a way that is inclusive of new technologies, so they encourage innovation and pave the way for more cost-effective solutions that will help scale equitable building decarbonization. We present Harvest Thermal technology as an example of an innovation that has the potential to help decarbonize buildings and leverage a cleaner electric grid and should be able to compete on a level playing field with conventional heat pump technologies. We then provide feedback on incorporating these innovations into program design.

Summary Comments on Program Eligible Measures

1. Harvest recommends the inclusion of an alternate performance criterion for eligible measures, to support emerging technologies:

CEE Highest Efficiency Tier (not Advanced Tier) or qualified for ENERGY STAR (for water heaters) / ENERGY STAR Emerging Tech Award (for air-to-water heat pumps)
2. Combination heating and hot water systems that provide both heating and hot water services and meet eligibility criteria proposed in our detailed comments should be an eligible measure and be eligible for both heat pump space heating and heat pump water heating rebates.
3. In support of incentive layering, Harvest recommends *explicit* support for layering with all available programs.

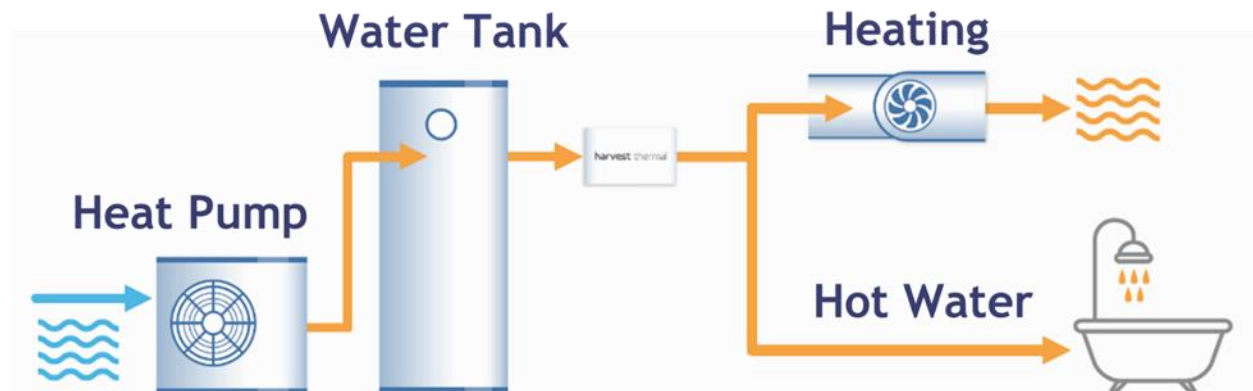
harvest thermal

Background on the Harvest Thermal Combined Space Conditioning and Hot Water System

The Harvest Thermal system is a combined space conditioning and water heating system using a single high-efficiency air-to-water heat pump to deliver heating and hot water, and a separate air-to-air heat pump to deliver cooling and supplementary heat. The Harvest system is deployed in residential homes and consists of the following components:

1. A hot water storage tank such as a 119-gallon tank to store 150°F water for use for home heating and hot water use.
2. A heat pump that heats water in the storage tank.
3. A heat distributor which can be either a water-to-air or water-to-water heat exchanger, for heating delivery as forced air, or to radiant floors or radiators.
4. The Harvest Pod, a smart controller that includes both mechanical controls (sensors, valves, circulator pump) and a smart, grid-connected electronic controller that operates all components in the system. The controller charges the storage tank when electricity is cheapest and cleanest and delivers heat per home heating needs by managing the water flow rate and return temperature to the heat distributor and back to the storage tank.

The system provides both heating, cooling, and hot water services to residential buildings as a single system.



By using thermal energy storage to shift load from peak times when electricity is most expensive and highest carbon to off-peak times when it is cheapest and cleanest (more solar on the grid), the Harvest system reduces energy costs for consumers and the grid and reduces greenhouse gas emissions and air pollution over 90%.

Using thermal energy storage in this manner is equivalent to pairing a heat pump with electrochemical battery energy storage. However, for thermal applications like heating, cooling, and hot water, thermal energy storage can be more cost-effective than electrochemical battery storage and therefore has the potential to scale and to play a key role in the decarbonization of homes and other buildings.

Answer to “Questions for the Public Eligible Measures, Cost Caps

8. Would you suggest changes or additions to the lists of required, eligible, and ineligible measures?”

The eligibility criteria as proposed would create barriers to innovation by setting prescriptive requirements that restrict program access to conventional solutions and exclude some innovative technologies such as air-to-water heat pump and combination heating and hot water systems.

For example, the Harvest Thermal battery system for combined heating and hot water differs from mainstream heating, ventilation and air-conditioning (HVAC) technology in two significant ways:

1. **Air-to-water heat pump:** most conventional HVAC heat pumps are designed to condition air and are known as “air-to-air” heat pumps. Some technologies like SANCO2, Chiltrix, and SpacePak heat and/or cool water rather than air and are known as “air-to-water” heat pumps (AWHP). AWHP are not covered by the federal Test Procedure for Central Air Conditioners and Heat Pumps which defines the SEER2 and HSPF2 performance metrics, and the Consortium for Energy Efficiency (CEE) does not have a performance specification for them. *Therefore, programs that set performance criteria using only SEER2 and HSPF2 metrics or referring to CEE specifications de facto exclude air-to-water heat pumps from program eligibility.*
2. **Combination heating and hot water (“combi”) system:** there is no test procedure for heat pump-powered combi systems, and no CEE specification for them. However, these systems that use a single heat pump to provide both heating and hot water have the potential to be a more cost-effective and more efficient solution than most conventional HVAC and heat pump water heater (HPWH) systems in certain applications. They may cost more upfront than a standalone HVAC or HPWH system but can cost less than two separate HVAC and HPWH systems.

In addition, programs that set incentive amounts by measure should make combis eligible for both HVAC and HPWH incentives, given that they provide both heating and hot water services. Limiting rebate eligibility to only one of the two services they provide would place combis at a disadvantage relative to standalone HVAC and HPWH solutions, which would tilt the scale toward these separate solutions, instead of *setting a technology-neutral level-playing field that incentivizes solutions based on the services they provide, not how they provide it.*

Technology-Neutral, Innovation-Friendly Approach to Program Design

Program design should set technology-neutral, performance-based eligibility criteria. It can do so in the following manner:

Heat Pump Energy Efficiency Criteria

In addition to referring to the CEE specification for air-to-air heat pumps, programs should set alternative requirements for air-to-water heat pumps:

- Air-to-water heat pumps that are water heaters (e.g. SANCO2 and Nyle) must qualify for ENERGY STAR for water heaters.
- Air-to-water heat pumps that are HVAC systems (e.g. Chiltrix and SpacePak) must meet the requirements of the ENERGY STAR Emerging Tech Award for air-to-water heat pumps.
- Combination systems whose heat generator is a water heater must qualify for ENERGY STAR for water heaters.
- Combination systems whose heat generator is a space heater must meet the requirements of the ENERGY STAR Emerging Tech Award for air-to-water heat pumps.

The program can be made more inclusive by the addition of the following requirement for Measure: Water Heating (additions in **bold**)

Detail:

Eligible as a replacement for gas-fired water heater

NEAA Tier 3 or higher

JA13 compliant

CEE Highest Efficiency Tier (not Advanced Tier) **or qualified for ENERGY STAR for water heaters or ENERGY STAR Emerging Tech Award**

Combination Heating and Hot Water Systems

Combination systems that provide both heating and hot water services and meet program eligibility criteria are eligible for both heat pump space heating and heat pump water heating rebates.

Answer to “Questions for the Public Incentive Layering, Metrics

10. Do you have input on the proposed approach to program coordination and incentive layering?”

In the course of pursuing a number of overlapping incentives, Harvest has encountered delays or challenges in the absence of explicit support for incentive stacking/layering. The end result of this has often been delay, which is costly in terms of our ability to invest in program participation and scale.

In support of the desired “Encouraged coordination with relevant federal, state, utility, regional, and/or local programs,” the Equitable Building Decarbonization Program should *explicitly* specify that incentive layering is allowed and supported, with all existing programs, except where explicitly prohibited.

Please let us know if you have any clarifying questions/concerns. Thank you for this opportunity to comment and for considering our input.

Sincerely,

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