

**DOCKETED**

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**Comments of Harvest Thermal, Inc on the Building for Low-Emissions Development (BUILD) Program's Preliminary Program Design**

*Additional submitted attachment is included below.*

September 30, 2021

## Comments of Harvest Thermal, Inc. on the Building for Low-Emissions Development (BUILD) Program's Preliminary Program Design document issued on September 14, 2021.

Harvest Thermal, Inc. (Harvest Thermal) appreciates the opportunity to provide the following comments on Building for Low-Emissions Development (BUILD) Program's Preliminary Program Design document issued on September 14, 2021. The BUILD program is critical to encourage the development of all-electric residential new construction in alignment with California's climate, clean energy, energy affordability, and grid reliability goals. However, we believe the proposed program design needs to be improved to achieve all these goals more efficiently. Harvest Thermal's key concerns are highlighted here and discussed further below:

1. The proposed process for evaluating new technologies hinders the ability of new technologies like Harvest to participate in the BUILD program;
2. The preliminary program design does not explicitly list split system heat pump water heaters as an eligible technology for low-rise residential projects.

### Background on Harvest Thermal

Harvest Thermal has developed a smart controller and mechanical pod that integrates with Eco2 Systems' SanCO2 split system heat pump water heater (HPWH) provides residential properties with space heating, domestic water heating, and thermal energy storage in one system. This combination ("combi") system pairs the industry leading efficiency and low-global warming potential (GWP) refrigerant (R-744) of SanCO2 HPWH with cutting-edge thermodynamic fluid controls to achieve the lowest greenhouse gas (GHG) emissions, lowest operating costs, and most "grid-friendly" space and water heating technology available in California.

Harvest Thermal currently has over 30 pre-commercial systems either in operation or under deployment in Northern California with support from the National Science Foundation Small Business Innovation Research program, the CEC's Electric Program Investment Charge (EPIC) program, and a grant from Peninsula Clean Energy. The company has a significant deployment waitlist for 2022 for retrofits and new construction. The operating pre-commercial installations have demonstrated and measured GHG

emission reductions of 80 to 90 percent compared to conventional natural gas systems, and approximately 50 percent reductions compared to conventional heat pump space and water heating systems.

Harvest Thermal achieves these dramatic GHG reductions by utilizing CO<sub>2</sub>-refrigerant heat pump technology, thermal storage, and advanced controls that optimize its operating efficiency and shift load from peak times when electricity is most expensive and dirtiest to off-peak times when it is cheapest and cleanest.

In 2022 Harvest Thermal's first commercially available product will be available on the market and will meet all of the CEC's Joint Appendix 13 (JA-13) requirements.

## The Process for Evaluating New Technologies Unduly Restricts Program Participation

In "Section E Process for Evaluating New Technologies" CEC proposes processes for evaluating new technologies, the standard three-year Energy Code update process, or the compliance option. These two processes are not unique to the BUILD program but instead mirror the existing processes utilized by the CEC for incorporating new technologies into CBECC-Res for Energy Code compliance.

Both pathways require field validation for at least 12 months, then incorporation into the software, testing, approval, and release. This process from start to finish will realistically take at least two years, by which time BUILD funding will most likely be exhausted. In addition to the length of time each pathway could take, the proposed reliance on existing performance evaluation processes and sources of information to determine eligible technologies creates an additional barrier for Harvest Thermal. As an innovative combination system that provides both space and water heating services through the use of a split system HPWH and storage water tank functioning as thermal energy storage, Harvest Thermal does not fit in standard industry practices and cannot demonstrate performance via existing performance evaluation processes and sources of information. Harvest Thermal and other new technologies shouldn't be limited by industry-standard practices in new construction or existing methodologies for approving new technologies for Energy Code compliance. Instead, the BUILD program should meet the program's statutory requirements to provide incentives for exceeding industry-standard practice and utilizing technologies that achieve the greatest amount of GHG emission reductions by introducing an additional pathway.

Finally, it should be noted that the CBECC-Res software does not currently support the modeling of high-performance heat pump water systems suited for use in combination systems, such as the SanCO<sub>2</sub> heat pump with the 119-gallon tank.

We request the CEC include a “Third-Party Verified Field Performance Data Pathway” for new technologies to receive eligibility for BUILD incentives. This new pathway would allow new commercially available technologies that have 1) started the compliance pathway and 2) have a minimum of one winter month of third party-verified field data to demonstrate that their technology meets or exceeds the prescriptive requirements of the Energy Code. Upon demonstration and approval by CEC staff, new technologies would be listed as an eligible technology in their respective residential building type (low-, mid-, high-rise residential property), be approved to comply prescriptively, and be modeled as a system already integrated in the compliance software that has equivalent performance to the field performance data. Alternatively, and at a minimum, new technologies could be modeled as a minimum efficiency system for the services that cannot be modeled, i.e. space heating for Harvest Thermal, and be given full credit for the services that can be modeled, e.g. water heating (once SanCO2’s 119-gallon tank is included in the software). Approved technologies would also be eligible for applicable BUILD Kicker Incentives. This third pathway would provide CEC staff with the ability to vet new technologies and allow those that are not yet fully integrated into the compliance software to participate in the BUILD program. We have provided an example of how the “Third-Party Verified Field Performance Data Pathway” could work for Harvest Thermal below.

1. Harvest Thermal submits an application for inclusion in BUILD incentives that includes one winter month of third party-measured and verified field data from its 5 Peninsula Clean Energy grant-funded project installations demonstrating the technology meets or exceeds the prescriptive energy requirements for space and water heating.
2. CEC staff reviews the application and either requests additional data from Harvest Thermal or approves the technology for BUILD base and kicker incentives within 60 days.
3. Harvest Thermal is included as eligible Space and Water Heating Energy End-Use in Table 5.1, ideally at the demonstrated field performance level, or at a minimum as a federally compliant heat pump space heating system, and a SanCO2 water heating system.

The “Third-Party Field Performance Data Pathway” balances the need to appropriately vet new technologies for incorporation into CBECC-Res for Energy Code compliance with the statutory goals of the BUILD program to maximize GHG reductions.

## Harvest Thermal Eligibility from Program Launch

Until our proposed “Third-Party Field Performance Data pathway” is approved by the CEC we respectfully request that Harvest Thermal be eligible for split system HPWH base incentive and applicable kicker incentives upon formal program launch in 2022. This would significantly discount the

GHG emission reductions and grid reliability benefits the technology provides, but at least allow it to participate in the program.

## Split System Heat Pump Water Heaters should be an eligible technology for low-rise residential projects.

Table 5.1: Technologies for BUILD Base Incentives - Low-Rise Residential split system HPWHs like the SanCo2 ECO2 system utilized by Harvest Thermal are not explicitly listed as a core technology and thus may not be eligible for an incentive.

Split system HPWHs are the most energy efficient HPWHs available on the market today with a Uniform Energy Factor (UEF) > 3.0 and a COP >4.0. They are also currently the only HPWHs that utilize a low-GWP refrigerant (R-744), and are capable of generating hot water at 150°F. In addition to all the energy and environmental benefits of split system HPWHs, the technology is already included in the CBECC-Res software as a modelable DHW system with 43- and 83-gallon tanks. Thus, we request that split systems be included as a core water heating technology for low-rise residential buildings and recommend NEEA Tier 3 as the minimum performance requirement.

## Conclusion

New and emerging technologies like Harvest Thermal are essential to achieving California's climate, clean energy, and affordability goals. The BUILD program must be designed to encourage new technology innovation and deployment in the construction marketplace, not erect barriers to its participation.

Please do not hesitate to contact me at [jane@harvest-thermal.com](mailto:jane@harvest-thermal.com) should you have any questions regarding these comments.

Sincerely,

/s/

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