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Abigail Daken  
ENERGY STAR Program  
U.S. Environmental Protection Agency  
1200 Pennsylvania Ave. NW  
MC 6202A  
Washington, DC 20460

December 10, 2020

Re : Energy Star 4.0 Proposal for Heat Pump Water Heaters

Dear Miss Daken

Eco2 Systems LLC are the suppliers of the SANCO<sub>2</sub>, Split system, CO<sub>2</sub> refrigerant, 4.5kw capacity Heat Pump Water Heater. Eco2 Systems LLC would like to provide these comments on the proposed increase in the UEF requirement for the Heat Pump Water Heater (HPWH) Energy Star certification.

Eco2 is essentially in support of the increase in the UEF values, however would ask that the EPA understand that while efficiency is an important factor in selecting a Heat Pump Water Heater, consideration should also be given to the product's refrigerant Global Warming potential (GWP).

With the upcoming administration change in the United States, the US will soon ratify the Kigali amendment, committing the industry to phase down the high GWP refrigerants to minimize climate change.

The SANCO<sub>2</sub> unit is unique in the market as it uses CO<sub>2</sub> as the refrigerant which has a GWP of 1. The majority of other HPWH's in the market use R134a as a refrigerant which has a GWP of 1430, a level that is subject to phase down from the Kigali amendment and other pending requirements from individual states.

CO<sub>2</sub> Refrigerant HPWH's can also provide significant benefit as thermal batteries as the thermodynamics of the system allow hotter water to be produced at extremely low ambient temperatures without the need for any back up electric resistance heating. This feature, when tied to a grid responsive product, will allow utilities to take full advantage of periods of power over production and store that energy in the form of hot water.

This higher performance can be translated into higher UFHR values requiring the units to be tested at the Medium or High Draw patterns for UEF.





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Cont

CO<sub>2</sub> refrigerant HPWH's in the market, both in the US and Globally, are designed as a split type system, where the Heat Pump is located outside of the home and takes energy from the atmosphere in order to heat the water which is then stored for use in the home.

This contrasts with the Hybrid type of HPWH where the energy required for heating the water is taken from the interior of the home in most installations. With reference to the Hybrid units, the energy taken from the space is not factored into the efficiency ratings.

The Capacity of a CO<sub>2</sub> Split System HPWH is 4.5kw or 15,400 Btu/h, approximately 3 times that of a Hybrid HPWH.

The CO<sub>2</sub> refrigerant used in the Split System will allow these units to produce both 4.5kw capacity and 150°F water down to 5°F, and continue to produce 150°F water at ambient temperatures below -25°F.

This feature allows these Split System units to be designed without any Electric Heater backup. An Electric Heater backup is required with the Hybrid HPWH to boost low ambient or high draw performance.

All Heat Pump Water Heaters, both CO<sub>2</sub> refrigerant Split Systems and R134a Hybrid type will provide higher efficiencies when installed in the larger tank sizes. With the smaller tank volumes these units are less efficient due to the increased frequency of compressor cycling.

Because of the larger compressor capacity, the CO<sub>2</sub> refrigerant Split System HPWH's exhibit's a reduction in efficiency to a greater degree when paired with the smaller tank volumes.

We would therefore petition the EPA to consider either a separate classification for CO<sub>2</sub> Refrigerant Split System HPWH's with a slightly lower minimum UEF value in order to acknowledge the lower GWP, Thermal Storage benefits and the energy source being outside the home or failing that to consider that the UEF value for all the below 55 Gallon level should be set at 3.0 instead of the proposed 3.3 level.

We thank you for your consideration and we would be happy to provide data and further clarification on the technology and operation of the SANCO<sub>2</sub> Split System Heat Pump Water Heater.

Yours

A handwritten signature in blue ink, appearing to read "John Miles".

John Miles  
Managing Director





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