**CPUC Comments**

**SWHC042-02 - Evaporative Pre-Cooler System and Controls for Packaged HVAC Unit**

Lead PA: SCE

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| **CPUC Comment** | **PA Response** |
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| (p. 2 of the workpaper says the study savings were based on a precooler and reducing the compressor speed.  The measure in this workpaper does not mention any compressor speed reduction  The eligibility requirements also do not require a variable speed compressor. | **There are limitations from eQuest for the evaluation of energy efficiency potentials on systems with variable speed compressors – it cannot be done without the development of corresponding performance curves.**  The ET study evaluated the performance of a combined package of VFD and evaporative pre-cooler, however, these are two separate energy-saving measures and are not combined in this workpaper. Single speed compressors were used in the eQUEST simulations to calculate the UES. No additional eligibility requirements were added.  As documented in “DOE-2.3; Building Energy Use and Cost Analysis Program; Volume 6: New Features,” variable and stage compressor are not supported in DOE2-3, e.g., this keyword (feature) is currently not implemented in DOE-2.3. |
| (p. 9) says in reality some manufactures use dry bulb temperature for control and not the wet bulb temperature as stated in the description on page 2. | **There are limitations from the BES software for evaluating this technology based on wet bulb temperature – e.g., EVAP-PCC-SCH which controls when the evaporatively precooled condenser for air cooled units can operate.**  Additional language has been added to the workpaper to clarify that the control strategy may differ by manufacturer. The ET study referenced, uses an activation temp setpoint for the evaporative cooler at 76°F wet bulb. However, for the purposes of modeling this measure, 72°F dry bulb was used as the activation setpoint temperature regardless of climate zone, as it was determined to be the more conservative value and eQUEST does not allow the use of wet bulb temperatures in creating schedules. This approach was also deemed reasonable based on our discussions with manufacturers. |
| (p.10) should reference the most current version of the EE Policy manual which is version 6 | References to the EE Policy Manual are updated to version 6. |
| (p. 12) provides labor costs per ton. I would assume that the labor costs are not linear with the capacity of the HVAC unit. | The labor costs were obtained from a vendor quote and include installation labor costs for the evaporative pre-cooler system, controls installation cost, and water line connection cost. Although there are some costs that are independent of system size, the cost was normalized per ton and the costs provided are typical for 10-30 ton units. This size range is consistent with the average unit capacity for large packaged units (≥240,000 Btuh) installed in the state of California. |

Please note responses to comments in the table below, revise workpaper, and upload the entire package to the WPA. If needed, please reach out to Workpaper Review Team to set up a call to discuss.