

DOCKETED

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Decarbonization and the need for WHF Derating corrections

Additional submitted attachment is included below.

California Energy Commission
Docket Unit, MS-4
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Re: Docket 21-BTS TD-01 Decarbonization and Improper Whole House Fan Airflow Software Derating

Submitted by: Andy Llorca / Richard Fayad
QC Manufacturing, Inc.

The following comments are submitted in order to voice our comments and concerns regarding the set of airflow deratings applied in whole house fan models in CBECC res software, some of which has been in effect since before 2019 code, but the cumulative effects created drastic impacts on the whole house measure when 2019 code became effective due to the addition of the WHF HERS verification. These matters must be addressed if Decarbonization efforts are to be taken seriously.

Prior to 2019 code HERS verifications, the following airflow deratings are being applied to the WHF models prior to the cfm/watts being sent to the physics engine:

- Airflow Degraded by +60% based on the assumption that only 1/3 of homeowners will open windows for cooling purposes.

In addition to the above software degradations applied to WHF airflow, the addition of 2019 code HERS resulted in a 3rd degradation of airflow:

- Airflow degraded by 67% if no HERS verification is applied to the performance model.

Using the above computations, a model for a 2000 sq ft home, with a proposed WHF of 3000cfm, will be derated as follows:

$$\begin{aligned} 1^{\text{st}} \text{ derating: } & 3000 * .60 = 990 \text{ CFM} \\ 2^{\text{nd}} \text{ Derating } & 990 * .33 = 327 \text{ CFM} \end{aligned}$$

The resulting airflow CFM of 327 cfm is 5-ton sent to the physics engine for computations to evaluate the cooling AC offsets of the whole house fan. This mathematically implies to the physics engine that if no HERS test is performed, the home will be receiving only 1/10th of the airflow rate and cooling power of the whole house fan, and this is mathematically not correct, resulting in little to no compliance losses/gains for the addition/removal of a whole house fan system.

This is an inordinate and unjustified derating of the WHF, which is causing the following conditions to be in effect for this measure:

1. **Compliance gains for multiple stories are improperly computed**
In 2013 and 2016 code, 3 story > 2 story > 1 story compliance for WHF.
In 2019 Code 1 story > 2 story > 3 story, the computations are erroneous and backwards in relation to cooling savings based on stories.
2. **WHF must now be oversized, and this violates the concepts of right-sized equipment practices of Manual J, D, S.**
2013/2016 sizing was based on lab certified CFM of WHF to sq footage of home.
2019 sizing must now be based on field verified CFM (much lower) of WHF to ratio of home.
This results in larger fans, or multiple fans being required just to get 0.5-2 EDR
This has made the measure cost prohibitive to builders previously very satisfied with the measure costs.
Additional fans are not proven to be more effective, and homeowner simply does not need that much CFM or venting.

3. **More EDR gains are allocated to the WHF, than the prescriptive WHF measure and equipment installation**

0.5 EDR is allocated for a default WHF with no HERS.

Specified WHF + HERS yields 1-3 EDR in climate zones 8/10/12

It is illogical and mathematically incorrect for the software to imply that a verified WHF yields better cooling offsets than the same fan specs, with no HERS test.

It is the only measure where the HERS test is greater than the installation of the measure itself.

4. **Removal of the WHF prescriptive measure, does not result in a proper deficit**

Removal of the WHF prescriptive measure, does not result in an EDR deficit in CZ 9, 11,13-14.

Only removal in CZ 8/10/12 receive a deficit.

If prescriptively required in CZ 8-14, a deficit should be applied in software when it is removed from the model in CZ 8-14.

Decarbonization Considerations:

- Per American Journal of Engineering (AJER) 2013 Study
- The carbon component emitted by the use of a **2-ton A/C** per day emission of carbon is 5344 g.
- For 5 summer months, that totals 800kg for a single home, or 8,000,000kg for 10,000 homes
- Installation of a WHF reduces AC usage by 50-90%. This is the only measure able to claim such vast amounts of cooling offsets.

Estimations of Decarbonization Results

- In 2020 QuietCool was installed in over 20,000 new homes in CA new construction alone
- Reducing the carbon footprint of CA new homes by 8,000,000 kg assuming only 50% of A/C usage was reduced.
- That is very conservative, considering CA homes have a 5-ton system on average, and homeowners experience more than 50% A/C usage reduction.
- That is 8 million metric tons of decarbonization that can be attributed to whole house fans in new homes built to 2016 code.

This measure is being removed from many projects in 2019 code due to the errors listed above, and the result will be increased loads on the grids during peak hours, and an increase in carbon footprint of new homes in CA across the state.

If the Commissioner, the CEC, and the statewide sustainable design agencies truly wish to make significant efforts in the decarbonization of residential new homes, they must start by repairing the improper calculations on whole house fans in CBECC res software, which is allowing this highly beneficial, prescriptive measure to be removed with no consequences to the computations of compliance.

Sincerely,

Andy Llorca

New Construction Sales Manager

QC Manufacturing, Inc.