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2025 ACM Workshop Comment - QuietCool

Additional submitted attachment is included below.

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Dec 13, 2024

California Energy Commission
Docket Unit, MS-4
1516 Ninth Street
Sacramento, CA 95814-5512

Docket 24-BSTD-03

Subject: 2025 ACM Reference Manuals and 2025 Compliance Manuals Workshop

2025 Single-Family Residential ACM Reference Manual

Submitted by: Andy Llora / Dane Stevenson

QC Manufacturing, Inc.

To the Energy Commission,

QC Manufacturing has been producing whole house fans, attic fans, and garage fans in the state of CA for over 15 years, and would like to submit our comments below regarding the state of the ACM reference language that we feel is in dire need of being amended to ensure the whole house fan measure remains both viable, and useful to homeowners, builders, and public utility grids, and the people of California. We are submitting this comment as an addendum to the original comment from docket 21-BSTD-01, specifically comments #TN238372 and #TN238387.

Introduction

We are submitting this comment to bring to your attention a matter that we have been working to address since 2019 code cycle, which saw a variety of changes such as % cooling changing to EDR points, TDV value changes, and application of HERS verifications simultaneously, which caused the following issues to occur in a single code cycle:

- WHF measure only yield 0.5 EDR points in CZ 8, 10, and 12
- The measure yields little benefit, or even initiates a penalty in CA 9,11,13,14 where it is prescriptively required.
- 2 and 3 story structures no longer see more gains than a single story home.
- In addition to 2019 code changes, an old derating from 2013 still exists in the measure algorithm that should be addressed, which is critical for the new 2025 peak cooling to be properly computed, which we refer to as the primary derating of 67%, builders only get credit for 33% of the fan CFM installed currently.

- The application of an additional HERS derating of 33% will also be addressed in this comment.

Specific Language to be Changed

Page 71 of the ACM, Table 23 Language:

Whole house fans are assumed to be operated between dawn and 11 p.m. only at 33 percent of rated CFM to reflect manual operation of fan and windows by occupant.

Page 70 of the 2025 SIngle Family ACM, Section 2.4.11, 2nd paragraph:

the fan capacity is reduced by a factor of .67 (33% reduction)

Proposed Changes

We are recommending that language be changed as follows:

Page 71 of the ACM, Table 23 Language:

Whole house fans are assumed to be operated between dawn and **7 a.m.** only at **90 percent of rated CFM** to reflect manual operation of fan and windows by occupant.

Page 70 of the 2025 SIngle Family ACM, Section 2.4.11, 2nd paragraph:

the fan capacity is reduced by a factor of **.85 (15% reduction)**

Rationale for Changes

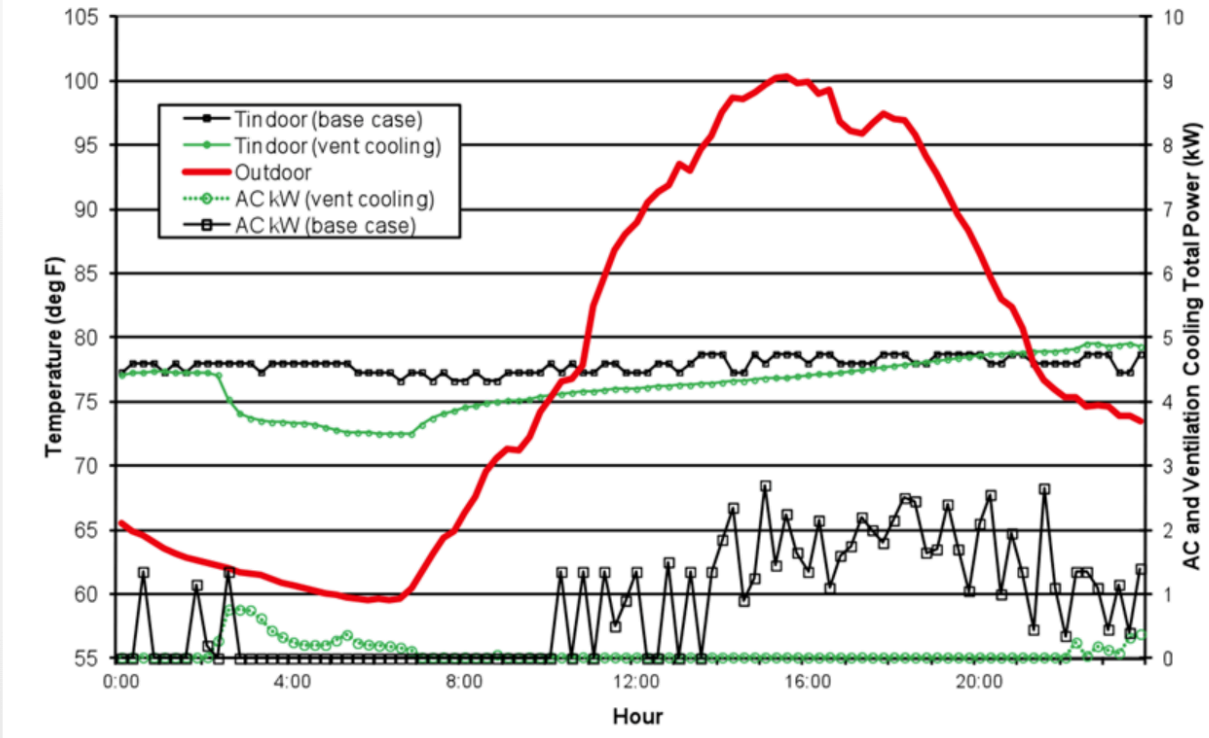
QC Manufacturing has been working with the CEC since 2018 to provide clearer data which should be used to update the derating values listed above. At the request and guidance of the CEC, we have provided:

- Current WHF algorithm is requiring builders to install double the quantity of fans, and implementation costs, which is not advisable for any measure and a violation of right-sizing.
- Updated homeowner operational usage survey, that is more valid than the LBNL report which was originally used. At the time, the LBNL report was the only data available, so the 33% usage metric was applied as a 66% derating. We now know homeowners who purchase a home with a whole house fan are 90% likely to use the fans for cooling purposes to offset AC consumption.
- Updated HERS verified data from the registry, showing that whole house fans do not lose 33% of HVI916 rated CFM, the figure is closer to 15%, when the whole house fan is installed in a properly vented attic, which is the purpose of the HERS verification.
- Included in this comment, is a summary of the data provided to the CEC, as reviewed by 3rd party Consol, as requested by the CEC. Consol has determined the data we provided is more viable than 2013 assumptions which were based on homes with a very low percentage of owners having a whole house fan.

Whole house fans have extensive public benefits including:

- Reduction of homeowner true cost of ownership, especially in CZ 8-14 hot dry zones.
- Excellent desirability and marketability by builders of new homes.
- Extends the life of HVAC systems by reducing usage.
- Improves solar benefits, by reducing peak cooling loads.
- Improves peak grid consumption for cooling at scale.
- LIHEAP already offers WHF for free because of the impacts to the grid and low income benefits.
- DEER study and CPUC workpapers have deemed WHF extremely beneficial already.
- CBECC functionality and the ACM should be amended to reflect the savings shown in the chart below:

Figure 4–36: Diurnal Temperature Variation and Ventilation Cooling



The CEC's own table 4-36 above is evidence of 50-90% kw reduction during WHF operation compared vs the identical home with no WHF.

When considering the watt reduction during peak cooling, carbon footprint reduction, and reduction of embodied carbon applied at scale to thousands of homes across the state of CA, the measure is the most undervalued and improperly applied measure in the CBECC software as of this date.

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Conclusion

QC Manufacturing, Inc. would like to reiterate that the primary derating of 66% should be reduced to a 10% deratings, and the 33% derating for no HERS verifications should be modified to 15% to reflect actual losses. In addition the operational runtimes of the WHF in the model should be addressed as well to include longer run times in the model, to reflect the actual savings that occur.

We would like to thank the CEC for the ongoing assistance during the last 6 years as we have tried to bring the accuracy of the whole house fan to an acceptable level of functionality that is beneficial to everyone in the state.

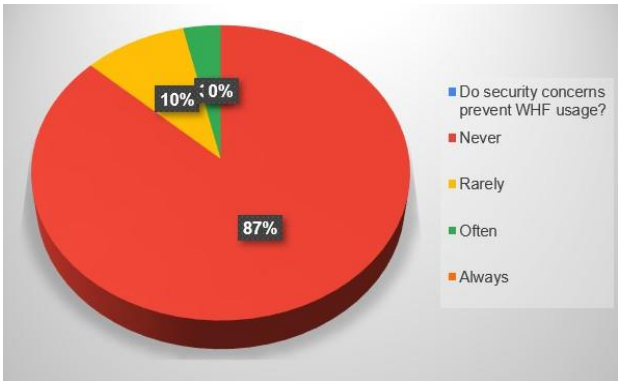
Sincerely,

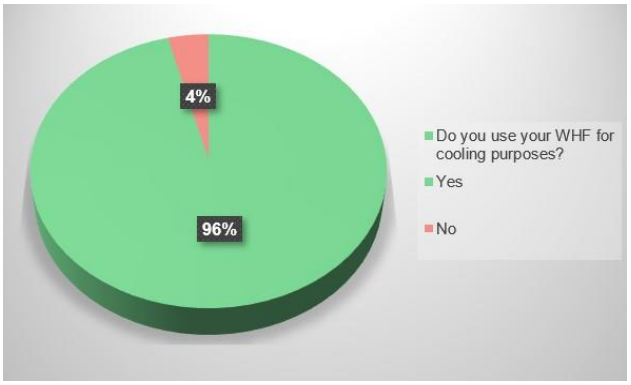
Andy Llora

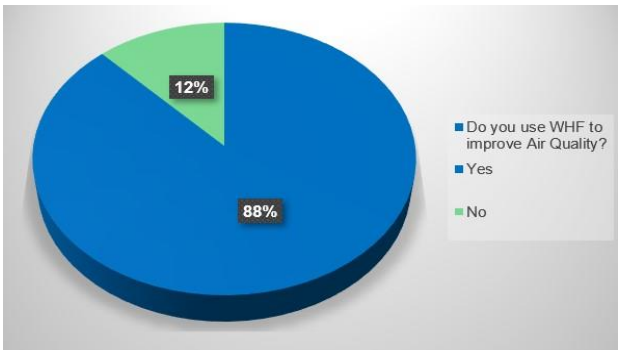
QC Manufacturing, Inc.

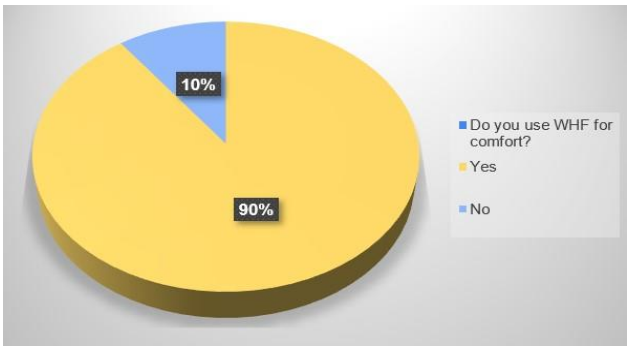
Quiet Cool has asked ConSol to evaluate the viability and quality of the data they've collected regarding the performance of installed whole house fans, and the reliability of their use by building occupants. These reports come in two parts: first, a series of interviews with verified Quiet Cool customers regarding occupant behavior; second, a review of HERS verified whole house fans installations.

Interviews with Quiet Cool Customers









This table contrasts with the existing Lawrence Berkeley National Lab (LBNL) report that CEC based their original derating on, specifically citing security and safety as a key reason for occupants not making use of whole house fans. Table 33A below in the highlighted row shows these findings. However, Table 5B from that same report, shown subsequent shows a much higher likelihood of operating windows for the sake of cooling, further contrasted by the table above showing even high rates of use. The primary explanation for these discrepancies is that the LBNL report was not targeted to occupants with whole house fans, only towards how occupants operated their windows. Given these large

discrepancies, and the fact that the Quiet Cool data is the only dataset that targets occupants with whole house fans, it is prudent to base the occupant operation rating on the data collected by Quiet Cool and their 125 data points.

Table 33A: Reasons for Closing Windows: Statewide Probability Sample

How important is this reason to close windows (percent of houses) Sacramento Area, Southern California Coast, Rest of State, **Total**	**Very**	**Somewhat**	**Slightly**	**Not at all**	**Never close for this reason**
Nobody home	93,84,84,**85**	4,11,10,**9**	2,3,3,**3**	0,1,1,**1**	1,1,2,**2**
Maintain comfortable temperature	74,68,66,**68**	21,24,26,**24**	3,6,6,**5**	1,0,2,**1**	1,1,1,**1**
Reduce pollutants or odors from outdoors	43,37,34,**36**	21,23,19,**20**	15,15,21,**19**	9,14,13,**12**	11,11,14,**12**
Too windy/drafty	44,46,44,**45**	28,26,29,**28**	21,19,18,**19**	3,5,5,**4**	4,4,4,**4**
Keep out noise	40,41,38,**39**	24,25,23,**24**	22,21,19,**20**	7,7,10,**9**	7,6,10,**8**
Keep pets in/out	23,19,22,**22**	6,6,10,**8**	6,8,5,**6**	6,4,8,**7**	59,63,55,**57**
Save energy	68,61,59,**61**	21,21,22,**22**	6,12,10,**9**	2,4,3,**3**	3,3,6,**5**
Keep out rain/snow	73,68,66,**68**	12,12,14,**13**	7,12,11,**10**	2,4,3,**3**	7,4,6,**6**
Keep out woodsmoke	30,21,21,**23**	5,6,5,**6**	8,6,7,**7**	10,12,11,**11**	48,55,55,**54**
Keep out dust	47,37,41,**42**	23,25,23,**24**	16,15,16,**16**	6,8,7,**7**	9,15,13,**12**
Keep out pollen/allergens	45,31,35,**35**	22,18,17,**18**	15,17,18,**17**	5,13,11,**10**	12,21,19,**19**
Keep out insects	62,52,49,**52**	15,20,18,**18**	8,9,14,**12**	5,7,7,**7**	9,12,12,**12**
Privacy from neighbors	38,26,27,**29**	25,26,21,**23**	16,24,22,**21**	8,10,14,**12**	12,15,16,**15**
Security/safety	85,83,78,**80**	8,10,14,**12**	4,4,4,**4**	1,1,1,**1**	2,2,2,**2**
Hard to open/close	3,2,4,**4**	6,5,4,**5**	7,8,6,**7**	19,19,17,**18**	65,66,68,**67**

[1]

[1] Price, Phillip and Max Sherman, Ventilation Behavior and Household Characteristics in New California House. Lawrence Berkeley National Laboratory, 2006.

Table 5B: Reasons for Opening Windows: Builders' Sample

Reasons to open windows (Percent, adjusted by sampling weight) Sacramento Area, Southern California, Rest of State, **Total**	Very Important	Somewhat Important	Slightly Important	Not at all important	Never open for this reason
Cool the house	52,53,46,**50**	27,11,25,**21**	0,16,14,**11**	0,5,7,**5**	20,16,7,**13**
Warm the house	0,5,7,**5**	8,5,11,**8**	15,32,25,**25**	0,21,14,**13**	78,37,43,**48**
Provide air movement	56,42,55,**52**	13,37,24,**25**	0,11,10,**8**	6,0,3,**3**	25,11,7,**13**
Remove odors	20,26,36,**29**	13,42,18,**24**	20,11,18,**16**	13,5,14,**11**	33,16,14,**19**
Remove moisture	14,6,17,**14**	0,20,10,**10**	14,25,21,**20**	21,13,7,**12**	50,38,45,**44**
Air out the house during cleaning	31,37,46,**39**	0,11,19,**12**	19,16,12,**15**	13,11,12,**12**	38,26,12,**23**
Remove smoke	7,17,11,**12**	7,11,11,**10**	14,11,4,**8**	0,6,11,**7**	71,56,64,**63**
Provide draft for fireplace etc.	7,11,0,**5**	0,11,22,**14**	7,17,19,**15**	0,11,0,**3**	86,50,59,**63**
Save energy	33,37,45,**40**	33,21,31,**29**	13,16,7,**11**	0,0,3,**2**	20,26,14,**19**
Allow pet access	7,11,7,**8**	0,5,14,**8**	0,16,7,**8**	0,16,0,**5**	93,53,71,**71**

These data show a strong preference for opening the windows to cool the house and save energy. Providing air movement, which may be related to providing a breeze to cool the occupants, was also high. Removing odors also seemed to be important, but the more direct IAQ questions of removing smoke, providing draft and airing out the house were not as high.

HERS Verified Whole House Fan Installations

[2] Id.

The next category is to address the down rating of installed whole house fans. In this category we find that the CEC did not sufficiently measure fan performance in homes but instead relied on a best-guess threshold of a 33% performance loss. Quiet Cool has not only studied the loss of fan performance but has also verified through the thousands of existing 3rd party verified HERS registry entries that all installed fans meet or exceed a much lower loss threshold

. Based on these findings, ConSol recommends the CEC adopt the worst-case HERS verified fan performance loss of 15%.

Description	HVI-916		T24 HERS Verified		Loss	Loss
	CFM	Watts	CFM	Watts	CFM	%
STL 3.3X	2350	264	2204	415	146	6%
STL 4.8X	3130	408	2737	490	393	13%
STL 5.5X	3750	490	3206	529	544	15%
STL 6X	4030	462	3916	597	114	3%
STL 7X	5200	725	4962	773	238	5%

PROPOSED CHANGES TO CBECC-RES DERATING ALGORITHMS.

Primary Derating Removal

Change WHFDivisor from 3 to 1 to remove the primary derating

We recommend the current WHF primary derating be removed, by changing WHF-DIV of 3 to WHF-DIV of 1, located in the file T24RClimateZoneCodeBaselines.csv

Purpose: This will allow builders to:

- Obtain proper credit when using old right-sizing combinations.
- Obtain relevant credit when using lower efficacy brands/models
- Return WHF sizing to 2016 code sizing guidelines.
- Ensure builders get credit for the WHF CFM installed which is 3rd party verified.

HERS Derating

We are also recommending a change in the amount of EDR gains that is assigned to the default WHF, which has the HERS derating applied.
Change in the amount of EDR gains that is assigned to the default WHF by modifying the .67 multiplier to .85 in the file Rules_Default_Loads.rule.

Purpose:

- This would resolve the issue where WHF can be removed in CZ with no penalty in EDR deficits.

These proposed changes are based on higher quality, more replicable, current, and appropriate data compared to the existing whole house fan derating defaults. These changes will enable builders to downsize whole house fan systems, whereas many builders today are forced to use two fan systems. With appropriate whole house fan ratings, a single system would often be sufficient. ConSol finds no conflicts in the data and is pleased to support any further necessary discussions to establish the veracity of the data, or the appropriate response thereof.