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corrected energy saving and consumer benefit calcs

Additional submitted attachment is included below.

Daikin Applied Comments: Commercial and Industrial Fans and Blowers (CIFB)

Subject: Docket # 17 AAER-06

These comments are submitted by Daikin Applied in response to California's proposed appliance efficiency regulations for CIFBs. Daikin Applied is headquartered in Plymouth, Minnesota, manufactures commercial HVAC equipment, employs over 9,000 people, and is a division of Daikin Industries.

The Draft Staff Report, docketed 6-11-2018, needs significant corrections before good decisions can be made regarding proposed embedded fan regulation. The following corrections are quantifiable and documented. Energy savings will still be overstated, even after these corrections, due to subjective corrections covered in separate comments.

- The estimated quantity of housed and unhoused, embedded centrifugal fans in Table A3 is overstated by about 500% due to the DOE AH and EAF/RAF annual shipment errors mentioned in AHRI comments. Corrections are shaded yellow.
- The annual energy savings in the 21st year in Table A9 is overstated by 67% because it assumes the entire population of California fans will improve due to regulations. Actually only about 33% will improve at DOE's EL3 level. Corrections are shaded green.
- The imbedded panel fan P01 bin [1-1.8 HP] in DOE's LCC Tab of Life Cycle Cost Analysis is incorrectly shown to include 0% of the fan population. Many if not most condenser fans fall into this power bin. This can be confirmed in published catalogs. This essentially doubles the correct average panel fan size and energy consumption as shown in gray shading.
- Corrected Table A9 energy savings are in bold font.
- Documentation begins on page 2.

Table A2	Table A3	Table A5		Table A7	**Table A9**			
		Shipments			$ Savings		**Gwh Savings**	
	US 2012	US 2019	Ca 2019	Ca Stock	1st Year	Turn Year	**1st Year**	**21st year**
Panel	125,786	158,243	18,989	398,769	208,881	4,386,459	1.9	40.6
Housed	266,066	336,528	40,383	726,894	1,655,718	29,802,654	15.3	276.0
Unhoused	319,064	409,666	49,160	835,720	688,239	11,700,080	6.4	108.3
	Corrected Table A3 and A5 and			Table A7	**Corrected Table A9**			
Panel	125,786	158,243	18,989	398,769	69,626	1,462,153	**0.3**	**6.8**
Housed	60,830	76,939	9,233	166,189	126,180	2,271,248	**1.2**	**21.0**
Unhoused	50,248	64,517	7,742	131,614	36,129	614,200	**0.3**	**5.7**

Revised 2012 Air Handlers =	60,000	EL3 = 33% of total	2 x average size		
AH [RAF+EAF] / SAF =	15%				

Revised 2012 Rooftop EAF/RAFs					
MBH	65-135	135-240	240-760	Over 760	Total
Units	165,628	63,370	20,793	1,397	
Fan / Unit	1.1	1.2	1.5	1.75	
RAF+EAF	16,563	12,674	10,397	1,048	42,078

We request California consider the potential consumer impact [Staff Report Table A12] if DOE estimated conversion costs [blue shading] are passed on to customers as extra cost [orange shading.] Corrected consumer benefit ratios are unfavorable as shown in bold font. Note that DOE estimated, extra cost and redesign conversion costs are vastly understated as explained in separate comments.

	Table A 12					
	Extra Cost	Annual Energy Savings	Lifetime Years	Lifetime Energy Savings Non Discounted	Lifetime Energy Savings Discounted	**Benefit / Cost Ratio**
Panel	$ 56	$ 17.31	21	$ 364	$ 211	3.8
Housed	$ 178	$ 64.52	18	$ 1,161	$ 709	4.0
Unhoused	$ 47	$ 22.03	17	$ 375	$ 243	5.2
	Table A12 Corrected To Include DOE Redesign Cost				2 x average size	
Panel	$ 147	$ 8.66	21	$ 182	$ 106	**0.72**
Housed	$ 1,498	$ 64.52	18	$ 1,161	$ 709	**0.47**
Unhoused	$ 355	$ 22.03	17	$ 375	$ 243	**0.68**
	Redesign Cost					
	EL3 Redesign Costs [$m] in DOE Engineering Spreadsheet, OEM Equip Conv Cost Tab			33% of Ca, 17-21 Year Shipments		Redesign Cost/Fan
Panel	$ 36.1			398,769		$ 91
Housed	$ 215.9			163,517		$ 1,320
Unhoused	$ 40.2			130,517		$ 308

Documentation – The DOE Impact Spreadsheet, 2012 Shipment Tab overstates the market.

- DOE estimated the air handler market to be 330,402. We suspect that came from a pre-2005, erroneous Commerce Report that was later corrected as shown by AHRI. The correct 2012 air handler market size is about 60,000 and not 330,000.
- DOE erroneously estimated that about 165,000 or 50% of all air handlers have dual fans or integral RAFs/EAFs. The correct estimate is about 15% or 9,000. This can only be confirmed by factory visits but is strongly supported by market experience.
    - Indoor, floor by floor units rarely need RAFs/EAFs.
    - Blower coils are not available with EAFs or RAFs.
    - Most indoor air handler, SAF and RAF/EAF sections ship separately and are often considered 2 air handlers.
- DOE estimated that 50% of packaged rooftops have EAFs/RAFs. This % is fairly accurate on larger equipment but 90% of the market is smaller equipment with 10-20% EAFs as documented by AHRI. This can only be further confirmed by factory visits but is generally confirmed by market knowledge. Smaller rooftops generally are installed on 1 story, single zone applications and building pressure control doesn't require EAFs as explained in our separately submitted, power point presentation.
- Page 3-6 = Air handler report error, unitary RAF / EAF error, condenser fan size error, and redesign cost estimates

Thank you for considering Daikin Applied comments. Please contact me if you have any questions.

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