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Proposal Information Template for:
Air Filter Labeling

Submitted to:

California Energy Commission

In consideration for the 2011 Rulemaking Proceeding on Appliance Efficiency Regulations,
Docket number 11-AAER-1

Prepared for:

Pacific Gas and Electric Company
San Diego Gas & Electric
Southern California Edison
Southern California Gas Company



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Please note: all savings estimates and information in this document are preliminary and are based on data available to the authors at the time of the report. If the CEC moves forward with this topic, we anticipate updating our estimates and recommendations based upon additional input from stakeholders.

Proposal Information Template – Air Filter Labeling

2011 Appliance Efficiency Standards

Prepared for: Pacific Gas and Electric Company, San Diego Gas & Electric, Southern California Edison, Southern California Gas Company

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Purpose

This document is a report template to be used by researchers who are evaluating proposed changes to the California Energy Commission’s (Commission) appliance efficiency regulations (Title 20, Cal. Code Regulations, §§ 1601 – 1608) This report specifically covers Air Filter Labeling.

Background

2008 Title 24, Part 6 has adopted by reference ASHRAE Standard 62.2-2007 which requires that air filters for residential air conditioners have a Minimum Efficiency Reporting Value (MERV) rating of at least MERV 6, and a maximum initial pressure drop of 0.1 inches water column (inches w.c.). However, air filter products sold in CA for residential systems currently do not have adequate labels to communicate the air filter efficiency and pressure drop rating information to system owners and designers necessary to select filters to meet these requirements. A label with airflow and pressure drop performance information is needed to determine Title 24 compliance, to provide consumers with the information necessary to select air filter replacement products that work properly in their central forced air space conditioning systems, and to provide HVAC system designers with the information necessary to design residential HVAC systems properly. Note: ASHRAE Interpretation IC 62.2-2007-7 specifies an air filter with a minimum Particle Size Efficiency of 50% in the 3.0–10 µm range rated in accordance with AHRI Standard 680 that meets the MERV 6 requirement in the Standard.

The 2013 update to Title 24, Part 6 will likely reference ASHRAE Standard 62.2-2010 including the 2011 supplement that incorporates addenda to specify use of AHRI Standard 680 ratings for determining compliance with the Particle Size Efficiency/MERV requirements and pressure drop requirements. Standard 62.2-2010 will specify that new mechanical and distribution systems installed after January 1, 2014 shall be designed to accommodate the specific system design clean filter pressure drop as rated using AHRI Standard 680, and the

filter locations shall be labeled with the design airflow and maximum allowable clean filter pressure drop with a label visible to a person replacing the filter.

The AHRI Standard 680 Rating procedure establishes a rating report format sufficient for a standardized label for air filter products. AHRI has an established infrastructure to provide a directory of certified ratings for air filter products to meet the needs of consumers, designers and builders.

Overview

Description of Standards Proposal	Require that air filters for residential air conditioners have a standardized label that discloses the AHRI Standard 680 rating for particle size efficiency and pressure drop. This label will allow consumers and builders to ensure compliance with Title 24 requirements, provide consumers with the information necessary to select air filter replacement products that work properly in their central forced air space conditioning systems, and provide HVAC system designers with the information necessary to design residential HVAC systems properly.
California Stock and Sales	According to the <i>2009 California Residential Appliance Saturation Study</i> (KEMA 2010), there are roughly 10,760,000 residential central AC units in California. Assuming that the majority of systems have one air filter, the California air filter stock would be about the same. We currently don't have specific sales information, but if you assume that on average a filter is replaced every year, the annual sales would also be roughly 10,760,000 (most filter manufacturers recommend a filter change every three months but the statewide average is likely less frequent). For the purposes of savings calculations, we use these values but we recommend soliciting additional input from industry and other stakeholders.
Energy Savings and Demand Reduction	According to the <i>2009 California Residential Appliance Saturation Study</i> (KEMA 2010, Table ES-2), residential central AC units consume 766 kWh/yr. Multiplying this number by the stock, statewide energy consumption is approximately 8,250 GWH/yr. Assuming a 1.56 MW/GWH ratio (Brown and Koomey 2002), the coincident peak load is 12,860 MW. Assuming that properly chosen air filters can reduce energy consumption by 6% (Proctor 2011), the savings per filter is 46 kWh/yr. It's unclear exactly how many improper air filters are installed each year, but if you assume 50% (Proctor 2011), the statewide savings per year would be roughly 247 GWH/yr and coincident peak demand reduction of 386 MW. Since we assume a one-year average lifetime, the savings after stock turnover are the same.

Economic Analysis	Given that this is only a labeling requirement, there are no costs associated with changing the physical air filters. There would be some upfront costs for manufacturers to slightly redesign their packaging materials, but this measure should be overwhelmingly cost-effective. If you assume a \$0.02 per filter cost for the label, the statewide costs per year are roughly \$215,000. Assuming the savings discussed above, and a residential average rate of \$0.144/kWh (CEC 2011), the per unit avoided costs are \$7 and the annual statewide avoided costs are \$35.6 million (the first year avoided costs are the same for after stock turnover since we assume a one year average lifetime). The benefit/cost ratio is 331 to 1. This measure will likely remain significantly cost-effective even if more precise data show that savings should be reduced and/or the costs increased.
Non-Energy Benefits	The label requirement will lead to appropriately-chosen air filters, which will lead to increased system performance and a reduction of installed filters that quickly get dirty and clogged. These benefits can lead to less maintenance and prolonged filter and system performance.
Environmental Impacts	No adverse environmental impacts are anticipated.
Acceptance Issues	Consumers, HVAC system designers and home builders should overwhelmingly welcome and accept this labeling requirement. The need for this label has been surfaced at recent CEC Title 24 workshops and we anticipate support from the California Building Industry Association.
Federal Preemption or other Regulatory or Legislative Considerations	There are no known federal preemption issues. The requirement will lead to increased Title 24 compliance.

Methodology and Modeling used in the Development of the proposal

The table below provides the key assumptions, methodology, sources and notes to develop the savings model. The source Excel file is available upon request.

Table 1. Assumptions, Methodology and Sources

Value	Metric	Source / Notes
10,763,766	Central AC units in CA	KEMA, Inc. 2010. 2009 California Residential Appliance Saturation Study. California Energy Commission. Publication number: CEC-200-2010-0040-ES.
1	Filters per central AC unit	Assumed. Seek input from industry.
10,763,766	CA filter stock	Calculated
1	Filter changes per year	Estimate. Most literature recommends a change every three months, but average is likely lower. Seek input from industry.
10,763,766	California annual sales	Calculated
50%	Percent of units without an appropriate air filter	Estimate, per John Proctor 8/26/11 email.
766	kWh/yr per CA household per central AC	KEMA, Inc. 2010. 2009 California Residential Appliance Saturation Study. California Energy Commission. Publication number: CEC-200-2010-0040-ES. Table ES-2.
6%	% savings per unit for propoer sized air filter	Estimate, per John Proctor 8/26/11 email.
8,245	CA annual central AC energy consumption (GWH/yr)	Calculated
46	Savings per filter (kWh/yr)	Calculated
247	CA 1st year savings (GWH/yr)	Calculated
247	CA savings after stock turnover (GWH/yr)	Calculated
1.56	kW/MWH ratio	Brown and Koomey 2002. "Electricity Use in California: Past Trends and Present Usage Patterns". Table 3.
1.56	MW/GWh ratio	Calculated
12,862	CA Coincident Load (MW) for all central ACs	Calculated
386	Coincident peak demand reduction - CA 1st year (MW)	Calculated
386	Coincident peak demand reduction - CA after stock turnover	Calculated
\$ 0.144	CA residential rate in 2014	California Energy Commission (CEC). 2011. Estimated using the "Statewide Average Customer Class Electricity Prices". Electricity Rates Combined. Excel. http://energyalmanac.ca.gov/electricity/index.html#table
\$ 7	Avoided cost per filter	Calculated
\$ 35,618,593	CA avoided costs - first year	Calculated
\$ 35,618,593	CA avoided costs - after stock turnover	Calculated
\$ 0.02	Cost for compliance (\$/filter)	Likely \$0, but assume \$0.02 per filter
\$ 215,275	CA statewide compliance cost per year	Calculated
331	Benefit/Cost ratio	Calculated

Data, Analysis, and Results

See section above.

Proposed Standards and Recommendations

The standard should require that air filters sold in California have a standardized label that discloses the AHRI Standard 680 rating for particle size efficiency and pressure drop. If the CEC moves forward with this topic, the IOUs will further engage with stakeholders and will recommend specific draft Title 20 language for consideration.

Bibliography and Other Research

Brown, R. & J. Koomey. 2002. "Electricity Use in California: Past Trends and Present Usage Patterns." Lawrence Berkeley National Laboratory. May.

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