



July 10, 2015

Ms. Brenda Edwards, EE-5B
Office of Energy Efficiency and Renewable Energy
Energy Conservation Program for Consumer Products
U.S. Department of Energy
1000 Independence Avenue, SW.
Washington, DC 20585-0121

Re: Pacific Gas and Electric Company comments on the Notice of Proposed Rulemaking on Energy Conservation Standards for Residential Furnaces

Docket Number: EERE-2014-BT-STD-0031
RIN: 1904-AD20

Dear Ms. Edwards:

This letter comprises the comments of the Pacific Gas and Electric Company (PG&E) in response to the Department of Energy (DOE) Standards Notice of Proposed Rule (NOPR) for Residential Gas Furnaces.

Pacific Gas and Electric Company, incorporated in California in 1905, is one of the largest combination natural gas and electric utilities in the United States. Based in San Francisco, the company is a subsidiary of PG&E Corporation. There are approximately 20,000 employees who carry out Pacific Gas and Electric Company's primary business—the transmission and delivery of energy. The company provides natural gas and electric service to approximately 15 million people throughout a 70,000-square-mile service area in northern and central California. We understand the potential of appliance efficiency standards to cut costs and reduce consumption while maintaining or increasing consumer utility of the products. We have a responsibility to our customers to advocate for standards that accurately reflect the climate and conditions of our service territory, so as to maximize these positive effects.

We appreciate this opportunity to provide the following comments on this NOPR. We support DOE updating the current standard adopted over 30 years ago. We commend the DOE for the thorough analysis performed in support of a proposed standard level of 92% Annual Fuel Utilization Efficiency (AFUE). We offer these comments in support of the proposed standard and to encourage the DOE to go even further and adopt higher efficiency standard levels that the DOE has already found to be cost-effective and technically feasible. The resulting savings of 2.78 Quads from the proposed 92% AFUE standard makes this one an important DOE appliance standard. If the standard is moved up to 95% AFUE the savings increase to 4.11 Quads.

PG&E supports the standard level proposed by DOE in the NOPR.

PG&E performed an analysis using the DOE life cycle cost (LCC) model and finds that DOE proposed standard level of 92% AFUE is cost effective, as is the 95% AFUE level. There is apparently a widespread misunderstanding of the LCC model but we support its use as the best way to assess impacts across a broad array of alternative scenarios each of which has a probability distribution.

Improved furnace standards are a key component in meeting state, national, and international climate goals.

PG&E is directed by the California Public Utilities Commission (CPUC) to implement the Long Term Strategic Plan,¹ and the PG&E's Codes & Standards (C&S) program implements the C&S Action Plan.² Implementation of the Plans is done, in part, by the Codes & Standards program supporting the efforts of the California Energy Commission (CEC). Since California's furnace standards are preempted by DOE we are working closely with CEC in developing recommendations to DOE to raise the efficiency of gas furnaces in a cost-effective and technical feasible way.

Induced draft furnaces replaced natural, atmospheric draft units over three decades ago because they provided a boost in efficiency. During the same time period, forced-draft condensing furnaces were developed and perfected. They have reached the point of technological maturity required to become the new standard. A similar evolution of technology occurred in automobiles resulting in there being no new vehicles without fuel injection technology. It took regulatory action to cause this change but the benefits to society are numerous. This will be the case for furnaces. It has been almost 3 decades since the last furnace standards were promulgated during which public policy and our understanding of CO₂ and NO_x pollution have come to support the retirement of a legacy technology.

A nationwide 92% AFUE standard is cost-effective and technically feasible and improvements to DOE analysis make a 95% AFUE standard also cost effective by realizing additional energy savings.

The DOE LCC analysis for residential furnaces, documented in the Notice of Proposed Rulemaking Technical Support Document (NOPR TSD)³, is based on a Monte Carlo analysis that adequately considers the variability and uncertainty of all input parameters. This approach ensures that all possibilities associated with geographic, application, technical, and economic factors are included in the analysis, along with their implications in the market. Therefore, DOE's LCC analysis results are well-suited to reflect the energy savings and cost effectiveness of different efficiency levels under consideration.

¹ Available at: <http://www.cpuc.ca.gov/PUC/energy/Energy+Efficiency/eesp/>

² Available at: http://www.cpuc.ca.gov/NR/rdonlyres/33894C3D-BAE7-4051-92A9-E066356FE820/0/CS_ActionPlan_20140219.pdf

³ U.S. Department of Energy, Technical Support Document: Energy Efficiency Program for Consumer Products and Commercial and Industrial Equipment: Residential Furnaces. 2015. Available at: <http://www.regulations.gov/#!documentDetail;D=EERE-2014-BT-STD-0031-0027>

However, DOE’s analysis includes conservative assumptions for several input parameters, as explained in the following sections. We believe that these conservative assumptions are unnecessary and should be removed to more accurately model the costs and benefits of high efficiency furnaces. We provide LCC results using suggested revisions to the assumptions using the DOE LCC Crystal Ball analysis tool.

Results for Trial Standard Level 4 (TSL 4 or Efficiency Level 3 –95% AFUE) are even further cost effective with our modified analysis, on both a national and a regional basis. Adopting a standard to dramatically reduce natural gas use is also critical for California to meet its NOx reduction target and US Environmental Protection Agency’s (EPA) smog control mandates.

Fuel switching effects have little impact on furnace and heat pump manufacturers

Fuel switching is controversial in some regions of the country. Recently observed billboards along freeways in Atlanta advertised incentives of \$550 from the local electric utility for switching to a heat pump. This may be a transient situation but does demonstrate that fuel switching analysis must be addressed from a probabilistic perspective as is done in the DOE LCC. In California fuel switching is unlikely given the requirements of the Title 24 Part 6 Building Energy Efficiency Standards, but in places where it may occur it is important to consider that the impacts of fuel switching to manufacturers. As shown below the manufacturers (and/or parent companies) that comprise 99% of the U.S. residential non weatherized gas furnace (NWGF) market also comprise 97% of the air conditioner and heat pump market.⁴ Furthermore, the relative proportion of the total market share for each manufacturer is similar in both markets. Thus if and when a furnace is replaced with a heat pump the equipment manufacturer does not lose the sale.

Manufacturer	Parent Company	NWGF Market %	AC and HP Market %
Allied Air Enterprises, LLC	Lennox International	See Lennox	See Lennox
Carrier Corporation	United Technologies	32%	27%
GD Midea Heating & Ventilating Equipment Co., Ltd	Midea Group	< 1%	-
Goodman Manufacturing	Daikin	15%	14%
International Comfort Products	United Technologies	See Carrier	See Carrier
Lennox Industries	Lennox International	13%	12%
Nordyne, LLC	Nortek	5%	9%
Rheem	Paloma Group	12%	12%
Texas Furnace	AllStyle Coil	< 1%	-
Trane	Ingersoll Rand	13%	14%
Wolf Steele	Napolean Systems	< 1%	-
York International	Johnson Controls	9%	9%
Total		99%	97%

Following are our recommendations for improvements to the DOE analysis.

⁴ U.S. Department of Energy, Technical Support Document: Energy Efficiency Standards for Consumer Products: Central Air Conditioners, Heat Pumps, and Furnaces. 2011. Available at: <http://www.regulations.gov/#!documentDetail;D=EERE-2011-BT-STD-0011-0012>

1. Make more reasonable product markup assumptions

Section 2.7 of the TSD indicates that incremental markups are necessary for “the change in the manufacturer production cost of higher efficiency models to the change in the retailer or distributor sales price.” Section 6.1 states that “Because companies mark up the price at each point in the distribution channel, both baseline and incremental markups are dependent on the distribution channel”.

Once the furnace efficiency standard takes effect, manufacturer, wholesaler, and contractor costs for furnaces meeting the new requirements are likely to drop due to economies of scale for manufacturers (and thereby wholesalers), product familiarity for contractors, and change of high efficiency furnaces from premium to commodity priced products. However, tables in Section 6.6.1 of the TSD show very high incremental markups, as high as 69% in Alaska. These incremental markups are not reasonable in a market where manufacturers and contractors are competing to provide the best price for a furnace that will be required to meet the new federal standard. Incremental markups should be excluded altogether by treating the new standard as the baseline.

2. Improve accuracy of market for vent system upgrade for orphaned water heater vents

We believe that DOE’s assumptions on vent system upgrade for orphaned water heaters should be improved for replacement, new owner, and new construction installation categories.

- a. Reduce frequency assumptions for common-vented furnaces and water heaters:** In particular, DOE analysis should include the effect of market penetration of high-efficiency water heaters by 2021, which would cause many homes to upgrade their water heater vents. For example, in 2009 DOE⁵ estimated that the market share for gas instantaneous water heaters could reach 28% based on a median projection. The new DOE water heater efficiency standards, which took effect in April 2015 effectively requires gas water heaters with more than 50 gallon storage capacity to be condensing water heaters. California’s 2016 Building Efficiency Standards includes a prescriptive requirement of tankless (instantaneous) water heater for all newly constructed homes. To accommodate high-efficiency water heaters, newly constructed homes and many existing homes (including those with common vents for the furnace and water heater) will need to upgrade water heater vents. DOE’s analysis of vent system upgrade cost for orphaned water heaters was based on market data collected before 2010. By 2021, the number of homes with a common venting system shared by a non-weatherized gas furnace (NWGF) and a natural vent water heater will be greatly reduced, making DOE’s assumptions obsolete.

⁵ U.S. Department of Energy, Technical Support Document: Energy Efficiency Program for Consumer Products: Residential Water Heaters, Direct Heating Equipment, and Pool Heaters. 2009. Available at: <http://www.regulations.gov/#!documentDetail;D=EERE-2006-STD-0129-0170>

b. Use consultant reported frequencies: For existing NWGF replacement, DOE analysis relied on a 2010 consultant report⁶ to estimate the costs of upgrading the vent system for orphaned water heaters. This consultant report was used to support the prior DOE residential gas furnace standard development. However, as shown in the following table, DOE increased the frequencies for applying vent resizing costs in the current NOPR TSD (from 40% to 75% and 20% to 40%) without detailed explanation or supporting data. These frequencies represent the percentages of existing homes where the common vent for the non-condensing furnace and water heater would be too large for the orphaned water heater. As explained above, we expect that increased market adoption of high-efficiency water heaters would reduce these frequencies from the estimates provided in the consultant report. We recommend that DOE not increase the frequencies provided in the 2010 consultant report for either resizing orphaned water heater chimneys or upgrading metal vents, and include further reduction of these frequencies due to increased market adoption of high-efficiency water heaters.

Existing Non-Condensing Furnace	Replacement Furnace	Installation Requirement	Frequency of applying requirements	
			2010 Consultant Report Table 8-B.6.5	Current NOPR Analysis Table 8D.2.19
Natural Draft	Condensing Furnace	Convert Water Heater from single wall to Type B vent Connector	100%	100%
Natural Draft	Condensing Furnace	Resizing Orphaned Water Heater Chimney or upgrading Metal Vent	40%	75%
Natural Draft or Fan Assisted	Condensing Furnace	Reline all unlined chimneys for Orphaned Water Heater	100%	100%
Fan Assisted	Condensing Furnace	Resizing Orphaned Water Heater Chimney or upgrading Metal Vent	20%	40%

c. Eliminate added costs for new owner installations that are assumed to be commonly vented with non-condensing water heaters: DOE included a common venting adder of \$956 for all new-owner NWGF installations planned to be commonly vented with a non-condensing design option (Table 8D.2.27), assumed to represent 45% of the new owners. These installations are in homes that did not previously have a central forced air gas furnace. This adder is unnecessary. Homes in this category did not previously have a furnace, and therefore did not have an existing common vent for the furnace and water heater. Adding a dedicated vent for the new condensing NWGF does not affect the existing vent for the water heater and, therefore, does not trigger any vent upgrade

⁶ EER Consulting, L., Appendix 8-B (Section 8-B.5) part of Final Rule Technical Support Document: Energy Efficiency Standards for Consumer Products: Central Air Conditioners, Heat Pumps, and Furnaces. 2010. Dallas, TX. Available at: <http://www.regulations.gov/#1documentDetail;D=EERE-2011-BT-STD-0011-0012>

requirement for the existing water heater. This common venting adder should be removed from the LCC analysis.

- d. Reduce the frequency of common-vented new construction homes:** DOE assumed that 44% of the new construction homes planned to have a common venting system for a non-condensing NWGF and water heater as the baseline design option (Table 8D.2.28). As we indicated previously, this assumption does not properly reflect the market trend of increased adoption of high-efficiency water heaters, especially for new construction home. In California, due to the 2016 Title 24 building standards, all newly constructed homes likely would have a tankless water heater (0.82 EF) or a storage water heater with similar efficiency (condensing water heater) by 2021. Therefore, this cost adder should not be applicable to California new construction homes. Accordingly, the applicable percentage nationwide would reduce from 44% to 40%, as California represents about 10% of the national NWGF shipment. Assuming other states will reduce the market share of non-condensing storage water heaters by 30%, the applicable nationwide market share for the common venting adder would be 28% ($40\% * (100-30\%)$).

3. Include learning curve effects on product price trends the effect of which will reduce overall costs in DOE's analysis

When using the DOE LCC tool it appears that the learning rate impacting product price was instead set to "No Learning (Constant)." Section 8.2.1 states that a decreasing learning factor of 0.937 was applied to total consumer price, but the spreadsheet settings indicate otherwise. Please provide clarification for the learning factor used.

Concerns have been raised about installation costs in row houses and potentially in other existing conditions. These should be addressed by using the "learning" concept. In the case of row houses there are often existing masonry chimneys that go straight up, making the installation of the condensing gas furnace and a new water heater venting feasible. New venting technologies have and will be introduced to meet the market demand for low cost venting alternatives.

Revised LCC analysis summary

We ran multiple scenarios using the DOE's LCC tool with modified assumptions as described above, namely:

1. Incremental markups set to equal 1
2. Setting product price trends to include learning
3. With 1 and 2 combined

LCC analysis was performed for the entire U.S., Northern U.S., Southern U.S., and California.

Original Results

NWGF Efficiency Level	U.S.		Northern U.S.		Rest of U.S.		California Only	
	LCC	LCC Savings	LCC	LCC Savings	LCC	LCC Savings	LCC	LCC Savings
0 - NWGF 80%	\$12,611	NA	\$15,412	NA	\$9,453	NA	\$8,465	NA
1 - NWGF 90%	\$12,129	\$232	\$14,835	\$205	\$9,078	\$263	\$8,301	\$157
2 - NWGF 92%	\$11,984	\$301	\$14,647	\$273	\$8,983	\$333	\$8,230	\$218
3 - NWGF 95%	\$11,867	\$379	\$14,486	\$363	\$8,914	\$398	\$8,193	\$254
4 - NWGF 98%	\$11,823	\$422	\$14,406	\$442	\$8,912	\$400	\$8,289	\$158

Without Incremental Markup

NWGF Efficiency Level	U.S.		Northern U.S.		Rest of U.S.		California Only	
	LCC	LCC Savings	LCC	LCC Savings	LCC	LCC Savings	LCC	LCC Savings
0 - NWGF 80%	\$12,611	NA	\$15,412	NA	\$9,453	NA	\$8,465	NA
1 - NWGF 90%	\$12,084	\$253	\$14,784	\$221	\$9,041	\$288	\$8,256	\$192
2 - NWGF 92%	\$11,938	\$322	\$14,590	\$293	\$8,947	\$355	\$8,178	\$259
3 - NWGF 95%	\$11,786	\$425	\$14,387	\$410	\$8,855	\$442	\$8,111	\$325
4 - NWGF 98%	\$11,696	\$514	\$14,240	\$554	\$8,828	\$469	\$8,123	\$312

With Learning Curve Effects

NWGF Efficiency Level	U.S.		Northern U.S.		Rest of U.S.		California Only	
	LCC	LCC Savings	LCC	LCC Savings	LCC	LCC Savings	LCC	LCC Savings
0 - NWGF 80%	\$12,533	NA	\$15,333	NA	\$9,376	NA	\$8,379	NA
1 - NWGF 90%	\$12,042	\$236	\$14,746	\$208	\$8,994	\$267	\$8,215	\$156
2 - NWGF 92%	\$11,897	\$305	\$14,556	\$277	\$8,901	\$336	\$8,140	\$220
3 - NWGF 95%	\$11,773	\$388	\$14,385	\$374	\$8,828	\$404	\$8,099	\$261
4 - NWGF 98%	\$11,718	\$441	\$14,290	\$467	\$8,820	\$412	\$8,174	\$185

Without Incremental Markup and With Learning Curve Effects

NWGF Efficiency Level	U.S.		Northern U.S.		Rest of U.S.		California Only	
	LCC	LCC Savings	LCC	LCC Savings	LCC	LCC Savings	LCC	LCC Savings
0 - NWGF 80%	\$12,533	NA	\$15,333	NA	\$9,376	NA	\$8,379	NA
1 - NWGF 90%	\$12,003	\$252	\$14,697	\$224	\$8,967	\$283	\$8,171	\$191
2 - NWGF 92%	\$11,854	\$324	\$14,500	\$298	\$8,872	\$352	\$8,092	\$258
3 - NWGF 95%	\$11,700	\$428	\$14,295	\$414	\$8,775	\$443	\$8,024	\$324
4 - NWGF 98%	\$11,600	\$526	\$14,136	\$571	\$8,742	\$476	\$8,018	\$330

As seen above, when including the revised assumptions recommended by PG&E, the LCC Savings for 95% AFUE furnaces increases over the original results by \$49 for the U.S. and \$72 for California. These results will be further improved when revising inputs so that the new-owner common-vent installation is 0% and common-vented new construction homes to 28%.

4. Clarify treatment of constant torque fan motor costs.

The DOE's treatment of the incremental costs of constant-torque BPM motors is unclear. As stated in the NOPR TSD Section 5.8.1, "following the 2014 furnace fan rulemaking, in 2019 fan efficiency requirements will be set at a level that will likely essentially require constant-torque BPM blower motors to be used for non-weatherized gas-fired furnaces".

However, later in the section the Residential Furnaces NOPR TSD states “Therefore, DOE determined the additional cost of changing from a PSC to a constant-torque BPM blower motor [...] in the engineering analysis.” Please confirm that this statement refers to the engineering analysis of the previous furnace fan rulemaking and that no costs were assumed from a PSC motor to constant-torque BPM motor in the NOPR analysis.

Furthermore, Table 5.8.1 suggests that incremental costs to change to constant-torque BPM motors are included in overall costs. Please confirm that the only incremental costs included in the analysis are from constant-torque to constant-airflow (e.g., for a 60 kBtuh/h NWGF, the incremental cost is $\$89.60 - \$37.29 = \$52.31$).

5. Consider impending air quality regulations that will also increase demand for high-efficiency gas furnaces

California Air Quality Management Districts have set forth air quality action plans that mandate specific measures to reduce pollutant emissions and bring concentration levels down to comply with EPA standards. Due to the climate and geography of California, air quality is a significant issue and many districts have experienced difficulty reaching EPA standards for pollutant concentration, especially in the southern part of the state, which represents 60% of California’s population (7% of the U.S. population). Of the pollutants causing air quality concerns, NO_x is of significant importance because of its role in forming particulate matter, smog, and ozone, all of which can have harmful effects on people and the environment. The atmospheric warming potential from NO_x is 300 times that of the same amount of CO₂.⁷ Greater adoption and installation of high efficiency furnaces in California will aid in attainment of the EPA’s 24-hour PM_{2.5} and the 8-hour Ozone targets in Air Pollution Control Districts and Air Quality Management Districts throughout California.

Residential and small commercial furnaces are considered stationary area sources of pollutants, which were responsible for 7% of NO_x emissions and 39% of directly emitted particulate matter less than 2.5 micrometers (PM_{2.5}) in a 2008 emissions inventory from South Coast Air Quality Management District (SCAQMD).⁸ A 2016 SCAQMD White Paper on Residential and Commercial Energy identifies gas-fired water and space heating as the second highest stationary emitters of NO_x.⁹ Current air quality management plans throughout California require specific NO_x emission targets for residential and small commercial furnaces that are less than 175,000 Btu/hr, as shown in the table below. Many districts have recently reduced the target levels from 40 ng/J of heat output, which is the national standard, to 14 ng/J of heat output for furnaces of this capacity.

⁷ EPA. (2015). “Overview of Greenhouse Gases: Nitrous Oxide Emissions”. Available at: <http://epa.gov/climatechange/ghgemissions/gases/n2o.html>

⁸ SCAQMD. (2013). Final 2012 Air Quality Management Plan.

⁹ Katzenstein, A. (2015). South Coast AQMD Residential and Commercial Energy White Paper – Draft.

Table of California Air Quality Management District NOx Rules

Jurisdiction	Description	Rule	Date	Standard
Bay Area AQMD	Nitrogen Oxides from Fan Type Residential Central Furnaces	Rule 9-4	1983	40 ng/J
Ventura County Air Pollution Control District	Natural Gas-Fired, Fan-Type Central Furnaces	Rule 74.22	1993	40 ng/J
Yolo-Solano AQMD	Central Furnaces	Rule 2.44	2009	40 ng/J
Sacramento Metropolitan AQMD	Water Heaters, Boilers and Process Heaters Rated Less than 1,000,000 Btu per Hour	Rule 414	2010	14 ng/J
South Coast AQMD	Reduction of NOx Emissions from Natural-Gas-Fired, Fan-Type Central Furnaces	Rule 1111	2014	14 ng/J
San Joaquin Valley Air Pollution Control District	Natural Gas-Fired, Fan-Type Central Furnaces	Rule 4905	2015	14 ng/J

The districts have written the emission targets using a metric that does not specifically promote high efficiency furnace technology; however, due to the fact that high efficiency furnaces require the combustion of less fuel for the same heat output as a standard efficiency furnace, high efficiency furnaces can be designed to meet the lower NOx emissions level more easily than a standard efficiency furnace. A furnace with a 92% AFUE is 15% more efficient at producing heat output from the same amount of fuel input as a furnace with an 80% AFUE. Therefore, high efficiency, condensing furnaces can result in a 15% reduction in NOx emissions due to less fuel input required for the same heat output.

According to an Air Quality Specialist¹⁰ at SCAQMD who led a technical study on the feasibility of reaching the 14 ng/J NOx emissions for all furnace types, although there are other factors to consider, condensing furnaces generally will be able to achieve lower NOx emissions than a standard efficiency furnace when combined with low NOx burner technology.

According to an Air Quality Specialist¹¹ at SCAQMD, manufacturers requested that the reduced NOx emission targets go into effect for condensing furnaces prior to other furnace types because it is easier to meet the NOx emission limits with these furnace types, whereas further technology developments are required to get standard efficiency furnaces in compliance. Another Air Quality Specialist¹² from the San Joaquin Valley Pollution Control District stated that although the NOx reduction rule does not specify any particular type of furnace technology, high efficiency furnaces would certainly help to meet NOx emission reduction goals.

Moving forward, Air Quality Management Districts will likely need to implement further measures to reach pollutant emission goals by their target dates. Districts have already implemented the majority of low hanging fruit measures, and, according to air quality management plans, will begin to look at energy conservation measures as opportunities to further reduce emissions from combustion equipment. The 2016 white paper from SCAQMD specifically notes that, in regards to residential and commercial gas-fired water and space heaters, the district should look at energy efficiency as an effective means to further reduce NOx emissions. The white paper suggests offering financial incentives to encourage installation of equipment beyond regulatory minimum efficiencies to supplement utility incentives.

¹⁰ Personal Communication. Brian Choe, SCAQMD, June 30, 2015

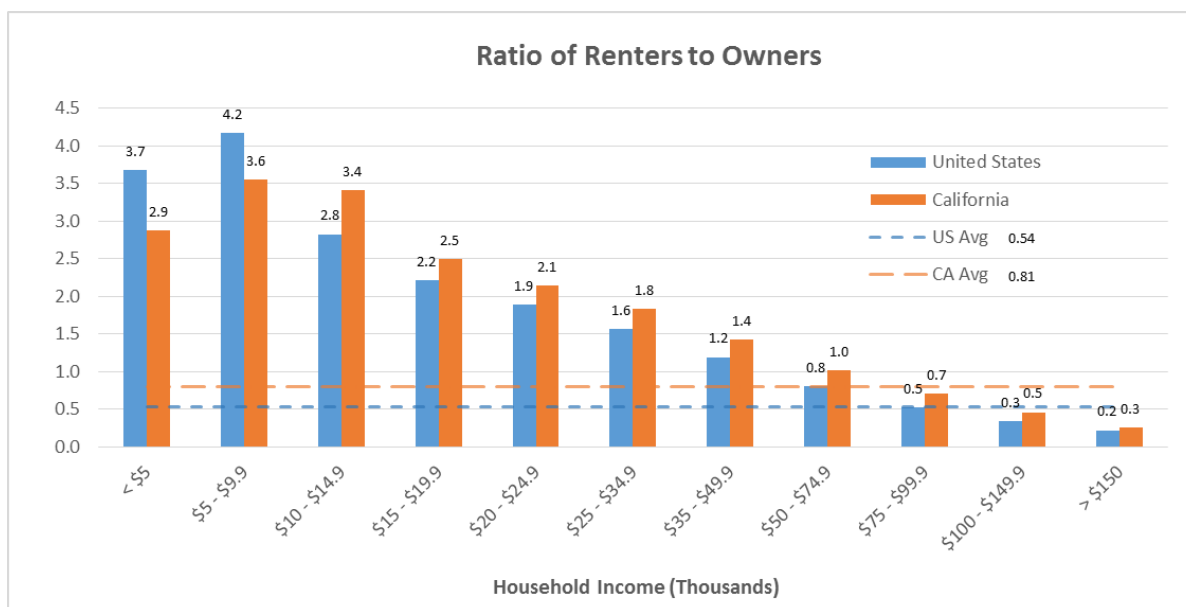
¹¹ Personal Communication. Wayne Barcikowski, June 26, 2015.

¹² Personal Communication. Jesse Madsen, SJVAPCD, June 29, 2015

It is not clear at this time what measures the Air Quality Management Districts will push forward in their air quality action plans; however, it is clear that condensing furnaces are a readily available technology that can reduce NOx emissions and meet federal standards. DOE should account for this co-benefit of meeting EPA Standards through a reduction in compliance costs under the NOPR analysis.

6. Highly efficient furnaces benefit renters and low-income consumers.

The DOE analysis does not appear to address use cases of renters and low-income occupants. Census data for the US and CA shows that renters outnumber owners for household incomes at or below \$50k. In the chart below the data for the US and California are plotted side by side.¹³ The California average renter to owner ratio is 0.81, which is 150% of the national average. In California, the median income for owners (\$82,000) is twice the median income of renters (\$41,000).



Nationally the trend is for more rentals as noted in an article by Diana Orlick of CBNC.¹⁴

Even though apartment construction has increased dramatically in the past few years, rents continue to surge, as demand grows, and both are unlikely to abate anytime soon. The drop in the homeownership rate among middle-aged cohorts is a huge driver, as they often prefer larger single-family rentals over less family friendly apartments.

¹³ U.S. Census 5-year American Community Survey. Available at: http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_13_5YR_B25118&prodType=table

¹⁴ Available at: <http://www.cnbc.com/id/102811764>, accessed July 7, 2015.

Millennials are also key drivers. In 13 million of the 22 million new households that will form between 2010 and 2030 the occupants will seek to rent, rather than buy, their homes, according to the Urban Institute. Families will likely continue to make up a larger-than-normal share of renters, as they try to repair their credit. Investors are well aware of that.

Rents are set by location and building characteristics such as age and interior amenities. In some areas there is rent control. Replacement of equipment, such as a furnace, is part of normal repair and maintenance of a property and is built into the landlord's cost structure. Rents do not increase because a furnace is replaced. In California location is the key variable as noted in a recent California report¹⁵:

Rents vary throughout the state as well. The average monthly rent for a two-bedroom apartment in San Francisco (\$2,000) was two and a half times greater than the average in Fresno or Bakersfield (both about \$800).

When a furnace needs replacing there is little if any financial reason for the landlord to install a more efficient and expensive furnace since the tenant pays the utility bill. This is a classic "split incentive" situation that can only be effectively addressed through minimum appliance efficiency standards.

Utility subsidies are given to low-income customers, who are predominately renters, to cover gas and electricity consumption. A condensing furnace will save gas allowing the subsidy to cover a large portion of the heating season gas costs. This is a benefit to all rate payers who are the source of the incentive.

We request that DOE clarify how renters are benefited by the proposed 92% AFUE standard. If this analysis has not been done we recommend that DOE perform the analysis. It is likely that a segment of "losers" at 92% AFUE will diminish since renters do not experience the cost increase of condensing furnace installations.

7. Use region-specific source energy multipliers and accurately represent renewable generation

The NOPR TSD references the Energy Information Administration's (EIA) Annual Energy Outlook (AEO) 2014¹⁶ for the assumption of primary/site conversion factors for electricity, calculated as the heat input (Btu/hr) for each electricity unit produced (kWh) (also known as a "heat rate"). These assumptions impact the benefits summaries in Tables 1.2.1 and 1.2.2 of the NOPR TSD.

Table A17 in AEO 2014 states that "Consumption at hydroelectric, geothermal, solar, and wind facilities is determined by using the fossil fuel equivalent of 9,716 Btu per kilowatthour." A fossil fuel equivalent is an inaccurate representation of the heat rate for renewable energy sources, considering that renewable energy input rate can be treated as 'zero' for all practical purposes.

¹⁵ California Legislative Analyst's Office. California's High Housing Costs: Causes and Consequences. Page 7. Available at: <http://www.lao.ca.gov/Publications/Detail/3214> accessed July 7, 2015

¹⁶ U.S. Department of Energy: Energy Information Administration, Annual Energy Outlook 2014 with Projections to 2040. 2014. Washington, DC. Available at: www.eia.gov/forecasts/aeo/

We recommend using region-specific factors that accurately reflect renewable energy sources. California's heat rate as determined from the California Energy Commission's Energy Almanac,¹⁷ which includes natural gas, solar, geothermal nuclear, coal, biomass, hydroelectric, and wind plants, is approximately 6,700 Btu/kWh. This is 30% less than the value used in the NOPR TSD. The largest utilities in California are currently serving 23% renewable power, which will increase to 33% in 2020 as required by California's Renewables Portfolio Standard (RPS).¹⁸ Many other states have similar RPS requirements. Increases in renewable energy will drive the heat rate further down. Using region specific heat rates that accurately capture the benefits of renewable sources and coming increases in future renewable generation will drastically improve the energy savings and other benefits associated with higher efficiency residential furnaces.

Conclusion

PG&E strongly supports DOE adopting a national 92% AFUE at a minimum and consider the option of moving to 95% AFUE based on a revised analysis incorporating the comments outlined in this letter.

Sincerely,

A handwritten signature in black ink, appearing to read "Patrick Eilert". The signature is fluid and cursive, with the first name "Patrick" and last name "Eilert" clearly distinguishable.

Patrick Eilert
Manager, Codes and Standards
Pacific Gas and Electric Company

¹⁷ Available at: http://energyalmanac.ca.gov/electricity/web_qfer/Heat_Rates.php

¹⁸ Available at: <http://www.cpuc.ca.gov/PUC/energy/Renewables/>