August 12, 2011

Amanda Stevens
US Environmental Protection Agency
Ariel Rios Building 6202J
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Dear Ms. Stevens:

This letter comprises the comments of the Pacific Gas and Electric Company (PG&E), Southern California Gas Company (SCGC), San Diego Gas and Electric (SDG&E), and Southern California Edison (SCE) in response to the Environmental Protection Agency (EPA) ENERGY STAR Residential Refrigerators and Freezers Version 5.0 Specification Framework Document, published July 11, 2011.

The signatories of this letter, collectively referred to herein as the California Investor Owned Utilities (CA IOUs), represent some of the largest utility companies in the Western United States, serving over 35 million customers. As energy companies, we understand the potential of energy efficient appliances and equipment to cut costs and reduce energy consumption while maintaining or increasing consumer utility of the products. We have a responsibility to our customers to support standards and programs that accurately reflect the climate and conditions of our respective service areas, so as to maximize these positive effects.

The IOUs strongly support the EPA's effort to introduce demand response and "smart" capabilities in ENERGY STAR appliance specifications; smart products will be a useful tool for utilities and consumers alike to manage their energy use and costs.

1. Energy Consumption Allowance for Smart Grid Functionality
An energy consumption allowance of 5% for smart grid functionality is not appropriate and will not be cost-effective in the near term for consumers or the grid as a whole.

EPA has requested comment on its proposed approach to facilitating the deployment of smart grid functionality in refrigerators and freezers. The CA IOUs think that the EPA's proposed 5% energy efficiency allowance for refrigerators and freezers with smart grid functionality will not be cost-effective in the near term and will not provide adequate financial benefit to consumers.

An energy efficiency (EE) credit for demand response (DR) functionality would sacrifice known benefits in the short term, for uncertain benefits in the future, at the customer's expense. Further, it would jeopardize our ability to reach California's environmental goals as legislated in Assembly Bill (AB) 1109 and AB 32. While the energy and cost savings from energy efficiency are well established, and accrue without any action by the customer, the financial benefits and peak demand savings of smart, DR capable appliances will depend on a number of unknown future factors, such as:

- the number of demand reduction events,
- the percent of customers who can receive DR signals and act upon them using smart products or other means,
- the percent of customers who are willing to shift loads or otherwise curtail demand, and
- the percent of load shifted for a particular appliance.

We think that the factors assumed in the Pacific Northwest National Laboratory's (PNNL)[1] cost-benefit analysis, even under the "pessimistic" scenario, are overly optimistic in the near future based on information we present below. For example, the pessimistic scenario assumes that 50% of customers will be able to receive and act upon grid signals, 70% of customers are willing to shift load (90% curtail for spinning reserves), and that customers will shift 50% of available load (35%-45% consumer response rate for those participating). Additional savings of 3-6% are expected to accrue due to behavioral feedback. Finally, for refrigerators PNNL assumes that a peak event will occur 365 days/year in the optimistic scenario, and 261 days/year in the pessimistic scenario.[2]

Recent data from our programs on residential demand response for air conditioner cycling, and time of use (TOU) rates, indicate lower rates of consumer response, participation, and far fewer events per year. For example, for customers enrolled in PG&E's "Smart Rate" residential critical peak pricing program in 2009, average load reduction was 15% (0.31 kW) over 15 event days. Consumers' load reduction depended in part on the number of times they were notified by the utility. By the end of 2009 about 25,000 residential consumers were enrolled in this program, or about 0.5% of total residential consumers in the service area. Consumer participation of 50% as PNNL has assumed may not occur for many years.

PG&E's residential TOU tariffs produced lower results, with average load percent reductions of 9.6% (0.14 kW) and 12.3% (0.22 kW).[3] In 2010, SDG&E's "Summer

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[1] C. Sastry, R. Pratt, V. Srivastava, S. Li, "Use of Residential Smart Appliances for Peak-Load Shifting and Spinning Reserves: Cost/Benefit Analysis", December 2010, Prepared for the U.S. Department of Energy by the Pacific Northwest National Laboratory, August 2011 <http://www.aham.org/ht/a/GetDocumentAction/i/51596>

[2] Ibid

[3] S. George, J. Bode, M. Perry, Z. Mayer, "2009 Load Impact Evaluation for Pacific Gas and Electric Company's Residential SmartRateTM—Peak Day Pricing and TOU Tariffs and SmartAC Program:

Saver" AC cycling program found average residential load reduction of 0.13 kW/ton cooling, or about 55% of the reference AC load of 0.24 kW/ton.[4] These load reduction rates fall at or far below PNNL's "pessimistic" scenario. While these programs will likely continue to grow and produce significant demand benefits, the benefits will not accrue in the near term.

We also question the assumption that a demand response program will reduce refrigerator load for the majority of the year (261 on-peak days per year in the pessimistic scenario). A 2009 review of the CA IOU residential air conditioners (AC) cycling programs (PG&E's "Smart AC", SCE's "Summer Discount", and SDG&E's "Summer Saver"), found that the most peak reduction events called in 2009 in one territory were seven separate events in SDG&E's territory. SDG&E found that 30-40% of consumers chose to override the response.[5] Under PG&E's residential AC cycling program ("Smart AC"), a maximum of 15 events are called each year.[6]

Furthermore, it is questionable to assume 3-6% behavior based energy savings due to energy information feedback. This savings, obtained from an American Council for an Energy-Efficient Economy (ACEEE) meta-analysis, is not due to operational improvements in an individual appliance but rather to new appliance purchases. Consumers with energy feedback are prompted to purchase more efficient appliances in the future.[7]

Second, any demand response benefit should be accounted for separately from energy efficiency and should be specific to the product of interest and the climate zone, not a general number applied across multiple products. Because of their largely flat load profile and even diversified load, refrigerators and freezers may not create demand savings large enough to offset the energy savings lost from relaxed energy efficiency. According to the analysis performed by Pacific Northwest National Laboratory (PNNL), the controllable load available to residential refrigerators is largely during defrost and ice making

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Volume 1: Ex Post Load Impacts ", April 1 2010, Prepared by Freeman, Sullivan and Co. for the Pacific Gas and Electric Company, August 2011 <http://calmac.org/publications/2009_PGE_SmartRate_SmartAC_and_Residential_TOU_Evaluation_Final_-_Volume_I_%28Ex-Post%29.pdf>

[4] S. George, J. Bode, S. Woehleke, "2010 Load Impact Evaluation of San Diego Gas & Electric Company's Summer Saver Program", April 1 2011, Prepared by Freeman, Sullivan and Co. for the San Diego Gas and Electric Company, August 2011 <http://calmac.org/publications/SDGE_2010_Summer_Saver_Load_Impact_Report.pdf>

[5] C. Dyson, "Process Evaluation of CA IOU Direct Load Control Programs", November 10 2009, Presentation for Demand Response Management and Evaluation Committee (DRMEC), KEMA, August 2011 <http://www.energy.ca.gov/electricity_analysis/notices/2009-11-10_cpuc_workshop/presentations/KEMA-DLC_Comparison_Task.pdf>

[6] Ibid.

[7] Ehrhardt-Martinez, Karen et al. "Advanced metering initiatives and residential feedback programs: a meta-review for household electricity-saving opportunities",2010, American Council for an Energy Efficiency Economy (ACEEE), Report E105, August 2011 <http://www.aceee.org/node/3078?id=131>

activities (delay load) and in temporary temperature rise (spinning reserve or emergency response). PNNL calculated that the amount of energy contained in defrost and ice making amounts to 134 kWh/year, or about 30% of average consumption of 450 kWh/year. The on-peak consumption shifted in the pessimistic scenario, 5.5 kWh for refrigerators and 5.7 kWh for freezers, amounts to a fraction of this total amount.[8] Given the largely flat refrigerator load profile, this is a small amount of on-peak consumption available to shift, as compared to the other appliances analyzed by PNNL (19.7 kWh for clothes dryers, 10.8 kWh for room ACs, 4.0 kWh for clothes washers, and 6.2 kWh for dishwashers). It's also small compared to typically peak-heavy residential products like central air conditioners, pool pumps, and water heaters. Thus, a "readiness measure" program offering, such as one offering a DR incentive before residential programs are in place, is more difficult to justify given that the potential savings seem small and not yet fully known.

Demand response and load reduction have the potential to create significant benefits for consumers and the grid alike through enhanced product operation, reduced need for new power generation and transmission infrastructure, and reduced number of emergency power events. However, these benefits will not accrue for consumers until the necessary infrastructure and programs are in place and should not be traded off of known EE benefits.

2. Regulatory Approach Towards Smart Grid Functionality

A regulatory approach that provides an optional "Smart Grid Capable" designation to highlight qualifying ENERGY STAR products would facilitate the deployment of smart grid functionality in refrigerators and freezers, without compromising consumer value.

Currently, SCE provides a $50 rebate for residential customers who purchase ENERGY STAR qualified refrigerators and refrigerator-freezers. PG&E, SCE, and SDG&E also provide rebates for consumers who recycle old refrigerators and freezers.

In planning such incentive programs, the IOUs must justify the costs and savings benefits to consumers to the California Public Utilities Commission (CPUC). The CPUC considers the costs and benefits of energy efficiency separately from those of demand response. The CA IOUs must create voluntary programs that will realize savings for consumers immediately. Thus, a "readiness measure" program, such as one offering a DR incentive before residential programs are in place, is more difficult to justify given that potential savings are not yet fully known. As noted previously, it is difficult to support future, uncertain DR savings to the consumer, at the cost of immediate, certain EE savings.

[8] C. Sastry, R. Pratt, V. Srivastava, S. Li, "Use of Residential Smart Appliances for Peak-Load Shifting and Spinning Reserves: Cost/Benefit Analysis", December 2010, Prepared for the U.S. Department of Energy by the Pacific Northwest National Laboratory, August 2011 <http://www.aham.org/ht/a/GetDocumentAction/i/51596>

Residential dynamic pricing will likely be implemented over the next decade across the United States, but pricing will not be implemented with the same rates, nor on the same timeframe across different utility territories. Therefore, consumers will not realize the same value everywhere. Consumers who purchase an ENERGY STAR rated appliance but do not or cannot participate in a demand response or dynamic pricing program should still be able to receive a value from their appliance.

The approach that the EPA has proposed for the Room Air Conditioner (AC) Draft 2 ENERGY STAR Specification (v3.0)[9] would be more appropriate for refrigerators and freezers. This approach includes optional criteria for smart grid capable designation, which would allow the EPA to highlight "smart grid capable" products on the Qualifying Products List.

This approach, if taken for refrigerators and freezers, would distinguish advanced smart functional products for consumers without compromising the enhanced operation and energy savings that is provided by the ENERGY STAR label. By maintaining the savings due to energy efficiency, this approach would also allow incentive programs to justify the cost spent to support ENERGY STAR products. These programs would be able to provide an incentive for smart functional products separately or in addition to an incentive for the energy savings alone. Such a tiered approach would allow consumers to opt-in to a DR program if available and desired.

3. Data and Control Requirements Under a Demand Response Program

To manage a demand response program using smart appliances, it will be necessary for program implementers to access data about total power load before and during events, and control that load according to preauthorized program settings.

The EPA has requested feedback on the type of appliance data that is relevant to energy management and diagnostics of smart grid capable refrigerators and freezers, and on what degree of remote control will enable energy savings without significantly impacting product performance.

From a utility DR program perspective, the necessary data relevant to energy management will include:

- The diversified total load before the event.
- The diversified total load during the event (reduced load).
- The length of time the utility can expect to sustain the load reduction.

While other appliance operational data such as refrigerator compartment temperature is useful, it is not necessary for the utility to have such data to manage a strictly DR program.

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[9] "ENERGY STAR® Program Requirements Product Specification for Room Air Conditioners Eligibility Criteria Draft 2 Version 3.0", May 17 2011, Environmental Protection Agency, August 2011 <http://www.energystar.gov/ia/partners/prod_development/revisions/downloads/room_air_conditioners/ENERGY_STAR_Draft_2_Version_3.0_RAC_Specification.pdf>

IOUs strongly support customer control over their appliance, and customer ownership of private appliance operational data. Response to a demand event will always need to be authorized by the customer. However, there may be situations in which a customer agrees ahead of time to let the utility quickly reduce their appliance's load during an emergency event, or in response to a call for spinning reserves. This will require remote control of the appliance, either authorized at the time of the event or preauthorized by the consumer. In such a case, a customer may sign a participation agreement or permission form with the utility, confirming the understanding that the remote control might cause the appliance to operate in an atypical manner, perhaps without much previous notice.

To avoid impacting product performance, any communications module within the appliance should be programmed to operate the appliance in a manner consistent with its available load. It is reasonable to expect that, for refrigerators and freezers, the only significant form of load shifting is the energy used in ice making and defrost cycles, and the significant form of short-term spinning reserve availability is in brief temperature increases.

4. Revisions to Refrigerator-Freezer Maximum Annual Energy Use Specifications
The EPA's proposed changes to the ENERGY STAR specification levels for standard sized refrigerators and refrigerator-freezers are sensible insofar as they increase overall energy savings from ENERGY STAR refrigerator-freezers.

The EPA has proposed to set one criteria limit of maximum annual energy use across all product classes of standard sized refrigerator-freezers with automatic defrost (top-mounted freezers, bottom-mounted freezers, and side-mounted freezers). The EPA has requested feedback on this approach.

From an energy savings perspective, it makes sense to craft a specification that improves the energy efficiency of the total sales-weighted "fleet" of ENERGY STAR rated refrigerator-freezers to achieve maximum energy savings. According to the most recent data provided to the Department of Energy (DOE) by the Association of Home Appliance Manufacturers (AHAM), as of 2007 top-mount refrigerators represent 53.9% of the market of standard size refrigerator-freezers, bottom-mounts represent 13.9%, and side-by-sides 32.4%. Therefore, a specification level that sets one linear function of maximum energy consumption across product classes, may create additional energy savings by increasing the share of ENERGY STAR-eligible top-mount refrigerators.

Thank you for providing the opportunity to submit comments. We look forward to working with the EPA on this specification development.

Sincerely,

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