

State of California



Memorandum

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CC:

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Subject: Energy Efficiency Disposition Rejecting Residential Infrared BBQ Grill Measure Package
SWAP019-01

1. Discussion and Direction

The California Public Utilities Commission (CPUC) rejects the statewide measure package on Residential Infrared BBQ Grill: SWAP019-01.

2. Measure package Summary

This measure package proposed replacing a conventional natural gas fired BBQ grill with an infrared (IR) natural gas fired grill. Southern California Gas (SCG) submitted this new measure package on August 17, 2020. The measure package included calculations based on unjustified assumptions and engineering judgment. The Review Team posted preliminary review comments to the CPUC's Workpaper Project Archive (WPA) on August 19, 2020, suggesting that measured performance data was needed to support measure inputs and assumptions. During subsequent discussions it was decided that laboratory testing should be used to compare conventional gas grills and grills equipped with IR burners. It was assumed that SCG would test a reasonable number of models, that would represent the market and did not specify a specific number of required tests.

SCG submitted laboratory test results for review and discussion on May 17, 2021, and once again on June 7, 2021. The BBQ grill workpaper was discussed during a monthly meeting on June 10, 2021 and further clarification was given in an email on June 14, 2021, that the number of tests were not sufficient. Since the sample size for the baseline and measure cases is dependent on the number of models, manufacturers, and whether they are typical and represent the market, and specific number

of tests needed for statistical significance was not provided by Energy Division; again, staff assumed that this guidance was sufficient to indicate to SCG that they would need to develop a testing and sampling plan that would result in statistically significant results.

In addition to the sample size being inadequate, CPUC also submitted comments to the SCG that there was a lack of uniformity of testing data and lack in sources demonstrating the basis for the types and pounds of food cooked for a “typical” residential BBQ use. SCG resubmitted the measure package on July 16, 2021. After reviewing the additional data, CPUC determined that lab test results were still too uncertain to approve the measure package. CPUC cannot provide direct guidance for testing requirements and statistics of variability appropriate due to the highly variable and intermittent use of residential BBQs, and the onus is on SCG to show that operation can be bounded in a way that yields high confidence in a deemed average savings value. The limited amount of data, highly variable BBQ configurations tested, and uncertainty of energy savings does not make this appropriate for a deemed measure at this time. This disposition outlines some general direction for additional efforts, should SCG choose to pursue this measure.

Key details relevant to this disposition include:

- **Residential cooking “load” testing approach:** Testing used a commercial average load approach to characterize BBQ usage, which tested the pre-heat and cooking process for five different “products” - burgers, chicken, steaks, hot dogs, slim steaks). It also included an assumption that each BBQ “load” was 6-8 pounds of food.
- **Savings calculations for both Single Family (SF) and Multi-Family (MF) applications.** Grill testing results are used with “professional judgment” operation assumptions to estimate savings. Savings calculation for SF operation include two loads per event and 36 events per year. Savings calculations for MF common areas also assume 2 loads per event and 221 events per year. Assumptions are also made for grill pre-heating periods which are also a considerable part of the energy use.
- **Variation in grill configurations and energy use:** Testing was performed for a total of six grills from different manufacturers, half of which were conventional burners and the other half IR burners. Key characteristics included grill physical dimensions including grilling surface area, grill weight (relevant for heat retention), and total rated and measured burner capacity. Grill areas in sq. ft for the conventional grills were 3.5, 4.3 and 4.5 and IR grills were 2.7, 3.1, and 3.9. Rated total input values for all grills ranged from 40 to 66 kBtuh but actual measured maximum input capacities varied considerably and were all lower than rated capacity ranging from 0.1% to 26.8%. Tested normalized average savings was 23 percent. However, one of the non-IR BBQs used less energy than one of the IR BBQs, even after the energy use was normalized.

3. Critical Review Issues

An overarching objective for every deemed measure is to provide a “best estimate” of average actual expected savings, which also requires a clear description of the baseline and efficient configurations to ensure the measure is installed and implemented consistent with those assumptions. Ideally, the

parameters used in the assumptions can also be validated by EM&V and used to update the assumptions if needed.

This measure package in its current state does not meet these objectives and is rejected primarily because the comparability of the conventional versus infrared BBQ performance is not convincingly demonstrated, and the data used to develop the savings is based on very limited tests that show savings are highly variable and even negative in one case. This and other issues are described in more detail below:

- **Limited, incomparable, inconclusive testing and savings results.** Savings for this measure are based on a laboratory test procedure developed by SCG. The tests involved measurement of gas use in natural gas grills equipped with conventional burners, and also natural gas grills equipped with IR burners. Testing was performed for a total of six grills, half with conventional burners and the other half IR burners. The six grills in the test pool are varied in terms of grill size, burner rating and other features, making equivalent performance comparisons impossible. This was demonstrated in the testing results which showed the energy use savings between conventional grills and IR grills are highly variable and inconclusive.
- **Cooking Load Assumptions.** The savings calculations for this measure were based on unsourced/assumed inputs. This includes the mix of foods being cooked (based on unweighted test results for steaks, chicken and hamburgers), the food load per cooking event (roughly 14 pounds), the number of units in a multi-family building that share a grill, and that operating cooking events per year are equal for both single family and multi-family households.
- **Lack of ISP information for this market:** Residential gas grills are not governed by codes and standards, do not have differentiation defined by Energy Star, do not have existing testing procedures, and therefore are not supported by a certified list of existing energy efficient equipment. At a minimum, an ISP study of the residential grill market focused on conventional and infrared natural gas-fired barbecues would be required to clarify measure configurations, and baseline and measure conditions, and market percentages. Many other deemed food service measures are supported by some of the above methods.

4. Direction

The CPUC rejects the statewide measure package SWAP019-01 Residential Infrared BBQ Grill for the reasons stated in Section 3 and summarized below. If SCG chooses to move forward with the IR grill measure then the CPUC offers the following guidance to improve the accuracy and reliability of the resulting “best estimate” of savings. With approval from the CPUC, SCG can elect to deviate from this suggested work scope and guidance, if SCG has other approaches to consider.

SCG should prepare a measure package plan that identifies the scope of work that will be conducted in order to develop robust interim results in each of the areas outlined below. The measure package plan will include a testing plan, an analysis plan and data collection and sampling plan (with sample

size and precision targets) for review by the CPUC. The plan will also include mutually agreed upon interim delivery dates for each work product so that these can be reviewed as the work is completed.

4.1 Conduct Market Research to Determine Key Operating Parameters

SCG is directed to initiate and complete a study to determine key participant operating parameters consistent with the research needs outlined in Section 3 and to also verify sourced-parameters and assumptions from the current measure package version, including cooking events per year for single family and multifamily households and lack of variation in grilling with climate. SCG should use an appropriate mix of secondary literature review, targeted interviews/data collection with relevant industry groups and manufacturers, and customer surveys with a representative sample of households. Data collection efforts should target natural gas grills and differentiate among built-in BBQs and stand-alone BBQs. SCG shall offer the CPUC an opportunity to review interim work products including the study scope of work, sample plan, survey instruments, and other pertinent details on proposed research activities.

4.2 Conduct Market Research to Determine Market Share Statistics

SCG is directed to initiate and complete a study to determine market share for various natural gas BBQ grill configurations consistent with the research needs outlined in Section 3, including segmentation for built-in vs. stand-alone grills, grill size, burner ratings, burner configurations and other relevant features. SCG should use an appropriate mix of targeted interviews/data collection with relevant industry groups, industry experts, distributors, and manufacturers. Data collection efforts should target high volume manufacturers of both conventional and IR natural gas grills. The purpose of this work will be to identify make and models with high market share to inform the testing and ISP tasks noted below, and to ensure comparability between conventional and IR grills in those tasks. SCG shall offer the CPUC an opportunity to review interim work products including the study scope of work, sample plan, survey instruments, and other pertinent details on proposed research activities.

4.3 Develop Testing Protocols and Conduct Laboratory Tests for a Sample of Grills

SCG is directed to refine testing protocols developed for savings calculations completed to date. SCG should then submit a testing plan CPUC review, ensuring tests of both conventional and IR grills, while ensuring representation of market share approaching 50% of sales by segment, as defined in 4.2 above. Testing will then proceed using the protocol and recording gas consumption in both pre-heat and then cooking modes of operation. SCG shall offer the CPUC an opportunity to review interim work products including the study scope of work, sample plan, testing protocols, and other pertinent details on proposed testing activities.

4.4 Establish Industry Standard Practice and Qualifying Grills Using Testing and Market Share Results

SCG is directed to combine the test results and market share results from 4.3 and 4.2 above and then examine patterns of grill sales and efficiency by segment, with the vision being to assess

qualifying characteristics/models and high-volume sales (i.e., ISP) characteristics/models, while ensuring comparability among those two groups, as needed for 4.5 activities. SCG should seek to isolate the characteristics of the most efficient grills and recommend a qualifying efficiency threshold that normally isolates the most-efficient units. Note, eligible units may or may not be predominantly IR grills. SCG shall offer the CPUC an opportunity to review interim work products including the study scope of work, conclusions, recommendations, and other pertinent details on proposed ISP and qualifying grill models.

4.5 Run Savings Calculations and Submit Measure Package for Review

SCG is directed to combine the conclusions on eligibility/ISP, test results and market share results from 4.4, 4.3 and 4.2 above and calculate savings using average test results for comparable eligible and ISP units. The savings should be submitted for review by the CPUC. With approval of savings results SCG is next directed to prepare a measure package for review.