State of California

Memorandum

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From: Peter Biermayer P.E., Utilities Engineer, EE Planning & Forecasting Section, Energy Division, CPUC

Subject: Energy Efficiency Disposition Rejecting Dry Well Steam Table Measure **SWFS024-01**

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1. Discussion and Direction

The California Public Utilities Commission (CPUC) rejects the statewide measure on Dry Well Steam Tables: SWFS024-01. This measure package was originally submitted in April of 2021 and resubmitted on June 2, 2021. This measure package does not replace any active measure package.

2. Measure Package Summary

Southern California Gas (SCG) submitted this new measure package on April 2, 2021. The review team posted preliminary review comments to the CPUC's Measure Project Archive (WPA) on April 28, 2021. The measure package was resubmitted on June 2, 2021.

The measure is replacement of a natural gas fired wet well steam table with a dry well steam table, which is claimed to be a more efficient design and operation. The measure package proposes two versions of this measure, one for accelerated replacement (AR) and one for New Construction / Normal Replacement (NC/NR). Key details relevant to this disposition are:

- The AR measure is replacing a custom-built, uninsulated, multi-pan single-cavity wet well steam table with a manufactured, insulated, individual-pan dry well steam table. Measure savings are based on the reduced heat loss versus the large, single open wet well and more effective heating control of the individual wells via separate, smaller burners versus a single or double large burner used for the wet well steam table.
- The NR/NC measure is replacement of a manufactured wet well steam table with a manufactured dry well steam table. This scenario assumes that customers buying a dry well

steam table would have otherwise bought a wet well steam table without the program intervention.

- Saving estimates for this measure are based on three case study customer sites, a single pan configuration (5 pans), and pre/post metering of 12 steam tables which were documented in a report from Frontier Energy[1]. The report also includes lab testing of 3 steam tables, but this work did not contribute to estimated saving results for the measure.
- Saving estimates are provided for 3, 4, and 5 pan units for Com, Ag, and Ind sectors and are proposed for all deemed delivery types (upstream, downstream, and direct install).
- Steam table savings estimates are calculated from 10 characteristics and parameters with values derived either directly from the Frontier Energy report results using simple averages or simply stipulated as engineering estimates.

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 updated if warranted.

This measure package in its current state does not meet these objectives and is rejected primarily because the data used to develop the measure is not sufficient for ensuring that the estimated savings will accurately reflect the actual savings expected from participants. This and other issues are described in more detail below:

- **Limited data used to develop savings estimates:** Only three restaurants were used as case studies that included field test monitoring for five existing wet well steam tables. Each site had two existing 5-pan gas steam tables, however only five of the six units were wet well (one was already dry well), and only three steam tables were custom-built, which is the more compelling savings target based on study results (the other two were manufactured). The potential savings between wet well steam tables and dry well steam tables is not adequately established by this very small dataset, as demonstrated by the significant variation in observed baseline conditions and variation in savings based on the metered data.
- **Uncertainty and variability in savings results**: Calculated energy use and savings results shown in the Frontier Energy report are highly variable based on the range of savings values noted in the report of 20% to 71% of baseline energy use. Additional market data analysis and field testing for more specific configuration variations would be required.
- **A unique and limiting measure definition:** This measure differs from other typical deemed measures because the baseline and measure equipment are quite different configurations: The inefficient *baseline* is a wet well steam table while the efficient *measure* is a

[1] Steam Table Technology Assessment and Gas Energy Savings Demonstration, Frontier Energy Report # 50174.000-R0, July 2020.

manufactured dry well steam table. There are currently no codes or standards for dry well steam table minimum performance levels, nor has an ISP study been conducted to examine dry well steam table performance levels or customer standard practice.

- **Steam tables are not covered by minimum efficiency standards so an ISP study is needed:** Steam tables are not governed by codes and standards or Energy Star, do not have existing performance testing procedures or efficiency ratings, and are not supported by a list of certified high-efficiency equipment like many other food service measures. An industry standard practice (ISP) study for wet well and dry well units would be needed to establish the baseline practices, manufacturer market information, and standard and high-efficiency threshold values for dry well steam tables.
- **No testing protocol:** A key goal for the study was to create a performance testing protocol but the study was unsuccessful due to the lack of thermostatic control (units cannot be set to a specific temperature), and variation in actual configuration and operation. If a certified testing protocol could be established, measures could be placed on a qualified product list and incentivized as has been done for other food service measures.
- **Hours of use should be specified by building type:** The hours of use for savings is only estimated at an average for the sector (Com) but operation should vary significantly by building type e.g. fast-food, sit-down, institutional. It also does not make sense to include agricultural and industrial sectors for this measure.

4. Direction

The California Public Utilities Commission (CPUC) rejects the statewide measure on Dry Well Steam Tables: SWFS024-01 for the reasons stated in Section 3 and summarized below. If SCG chooses to move forward with the steam table 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 to develop robust interim results in each of the areas outlined below. The measure package plan will include a field data collection plan, a market data collection plan, an analysis plan, and a 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 supporting energy savings calculations, equipment characterization and to also verify sourced-parameters and assumptions from the current measure package version, including number of pans, burner configuration, use of pan lids, burner ratings, type of restaurant, type of foods heated in pans, days of operation per week, operating hours per day of the week, etc. 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 businesses. Data collection efforts should differentiate among custom wet well tables, manufactured wet well tables and manufactured dry well tables. 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 steam table configurations consistent with the research needs outlined in Section 3, including segmentation for dry well vs. wet well tables, number and size of pans, 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 wet well and dry well steam tables. The purpose of this work will be to identify make and models with high market share to inform the field monitoring and ISP tasks noted below, and to ensure comparability between wet well and dry well tables 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 Option to Conduct Additional Field Monitoring for a Sample of Steam Tables

This task would be required if SCG desires to retain the accelerated replacement (AR) offering, since laboratory testing would not likely include replaced customer wet well tables, nor gather information concerning any unique operating characteristics of custom units relative to manufactured units. If gathering AR results is the desired primary outcome of this activity, then SCG can focus efforts more on custom wet table replacement equipment. The paragraph that follows addresses NR/NC and AR outcomes and reflects data collection relevant for manufactured equipment in addition to custom wet well tables.

SCG is directed to submit a field data collection plan for CPUC review, ensuring representative data collection of replaced custom wet well tables, manufactured wet well tables, and manufactured dry well tables, while ensuring representation of manufactured market share approaching 50% of sales by segment, as defined in 4.2 above, and while metering all replaced custom and manufactured wet well tables. Field data collection and monitoring will then proceed using field data collection protocols developed by SCG and approved by the CPUC. Interval gas consumption will be collected for a period of one-month for both the replaced and new dry well units. Approved protocols will also record other useful information for downstream analyses to ensure representativeness between wet well and dry well cohorts used to establish savings in 4.6 below, and to obtain information that explains differences in observed operation for various sites and configurations – observations to include number of pans, burner configuration, burner ratings, type of restaurant, type of foods heated in pans, days of operation per week, operating hours per day of the week, etc. SCG shall offer the CPUC an opportunity to review interim work products including the study scope of work, sample plan, field data collection protocols, and other pertinent details on proposed activities.

4.4 Option to Develop Testing Protocols and Conduct Laboratory Tests for a Sample of Steam Tables

This task would be required if SCG desires to use a laboratory focused approach to estimating NR/NC savings instead of field data collection activities outline above in 4.3. CPUC staff does not believe this approach is appropriate, however, to support savings estimation for an accelerated replacement (AR) offering using existing equipment as the baseline.

For several other food service measures, a certified test procedure was developed to quantify the energy usage of equipment available in the market. While a previous attempt by Frontier was unsuccessful, CPUC staff does not see any insurmountable barriers to establishing a valid test procedure for newly manufactured units.

SCG is directed to develop testing protocols for steam tables. SCG should then submit a testing plan for CPUC review, ensuring tests of both manufactured wet well and dry well tables, while ensuring representation of market share approaching 50% of sales by segment, as defined in 4.2 above, and to best reflect real-word behaviors observed in 4.3 and 4.1 above, such as use of pan lids. A qualified product list could also be developed. 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.

4.5 Establish Industry Standard Practice and Qualifying Steam Table Attributes/Models Using Field Monitoring, Laboratory Testing and Market Share Results

SCG is directed to combine the field monitoring results, laboratory testing and market share results from 4.4, 4.3 and 4.2 above and then examine patterns of steam table sales and efficiency by segment, with the vision being to assess qualifying characteristics/models and high-volume sales (i.e., Industry Standard Practice - ISP) characteristics/models, while ensuring comparability among those two groups, as needed for 4.6 activities. SCG should seek to isolate the characteristics of the most efficient steam tables that constitutes a qualifying efficiency threshold. Note, eligible units may or may not be predominantly dry well steam tables. 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 steam table attributes.

4.6 Run Savings Calculations and Submit Measure Package for Review

SCG is directed to combine the conclusions on eligibility/ISP, laboratory testing results, field monitoring results, market share results and key operating parameters from 4.5, 4.4, 4.3, 4.2 and 4.1 above and calculate savings using average monitoring and/or laboratory testing results for comparable eligible vs. ISP and replaced custom wet well units. The resulting NR/NC and AR saving estimates should be submitted for review by the CPUC. With approval of savings results SCG is next directed to prepare a measure package for review.