STATE OF CALIFORNIA
PUBLIC UTILITIES COMMISSION
505 VAN NESS AVENUE
SAN FRANCISCO, CA 94102-3298

August 2, 2016

Advice Letter: 4965-A

Attn: Sid Newsom
Tariff Manager - GT14D6
Southern California Gas Company
555 West Fifth Street
Los Angeles, CA 90013-1011

Subject: Disposition approving Advice Letter 4965-A (U 904 G), Southern California Gas Company High Opportunity Projects and Programs (HOPPs) – Central Water Heater Multifamily Building Solution (CWHMBS) Program

Dear Mr. Newsom:

Commission Staff has determined that Southern California Gas Company (SoCalGas) Advice Letter 4965-A is approved as supplemented. The Tier 1 Advice Letter is effective on July 27, 2016.

SoCalGas submitted the original Advice Letter on May 18, 2016. The review team and Commission Staff requested a Supplement Advice Letter with an updated proposal to address several comments. SoCalGas resubmitted its proposal as Supplemental Advice Letter 4965-A on July 20, 2016. No comments or protests were submitted to the R.13-11-005 Service List in response to either the original Advice Letter or the Supplemental Advice Letter.

Attachment 1 provides a summary of the requirements and the review team's feedback to SoCalGas' final supplemented proposal. Attachment 2 provides a summary of the requirements and verifies that a Commission Staff review team determined that the resubmitted proposal meets each requirement.

Please contact Tory Francisco of the Commission Staff at 415-703-2743 or tnf@cpuc.ca.gov if you have any questions.

Sincerely,

Edward Randolph
Director, Energy Division

Cc: Service list R.13-11-005
Pete Skala, Energy Division
Carmen Best, Energy Division
Hazlyn Fortune, Energy Division
Dina Mackin, Energy Division
Tory Francisco, Energy Division

ATTACHMENT 1: Background, Discussion, and Conclusions

I. Background

On May 18, 2016, Southern California Gas Company (SoCalGas) filed a Tier 1 Advice Letter consistent with the Commission's "Assigned Commissioner and Administrative Law Judge's Ruling Regarding High Opportunity Energy Efficiency Programs Or Projects" (HOPP), dated December 30, 2015. In this original submission of the advice letter, SoCalGas proposed a Comprehensive Multifamily Program, which aims to provide incentives for the upgrade of both central domestic hot water system and other water end uses.

Commission Staff and consultants were assigned to review the Advice Letter on May 18, 2016. This date was established as the start of the 21-day review period prescribed by R.13-11-005, which would end with a Disposition Letter from Commission Staff to SoCalGas. Reviewers completed a preliminary review on June 9, 2016, to determine whether the letter included the necessary information to perform a full review. The preliminary review followed the standard review checklist for HOPP proposals. SoCalGas was asked to provide a supplemental filing addressing questions and concerns raised in the Commission Staff review sheet.

Commission Staff completed its review of the supplemented advice letter on July 27, 2016. Commission Staff and reviewers found the Supplemental Advice Letter acceptable pursuant to the requirements of R.13-11-005. The following section documents the review and includes greater detail on the proposal.

Noting the proposed program design, the SoCalGas MF HOPP program will be formally called the SoCalGas Central Water Heater Multifamily Building Solution (CWHMBS) Program.

II. Discussion and Conclusions of HOPP Proposal

1. General Program Description

The December Ruling established a requirement that a proposal must include a program description.

SoCalGas' Advice Letter 4965-A contains a general description of the proposed multifamily (MF) HOPP program. The attachments elaborate on the general description. The target market for the proposed program is gas master-metered multifamily buildings, regardless of income qualification, built no later than 1984. SoCalGas proposes a bundled measure approach by requiring five distinct high impact energy and water savings measures be upgraded. The benefits of SoCalGas' Multifamily HOPPs program address recent concerns raised regarding low participation of central water heating systems in both the energy efficiency and low income proceedings as well as directly responding to the California Energy Efficiency Strategic Plan Goal 2-1 that all cost-effective potential for energy efficiency, demand response and clean energy production will be routinely realized for all dwellings on a fully integrated, site-specific basis. Given the targeted and innovative nature of this program proposal, Commission staff are satisfied with SoCalGas' description of the program.

2. Principles of HOPPs

The December Ruling summarized that in principle high opportunity programs should focus on activities that are newly permissible as a result of AB 802, and strive to reach stranded potential to achieve energy savings.

SoCalGas' Central Water Heater Multifamily Building Solution (CWHMBS) Program aims to reach stranded potential by targeting end uses (central water heating) that represent a significantly underserved energy saving opportunities. From past program experience and program participation data, SoCalGas states that due to a variety of market barriers, many multifamily properties do not typically pursue central system retrofits. Successfully intervening in this area could yield significant therm savings that otherwise would not likely have been realized. SoCalGas also believes that working with older vintage buildings with outdated systems are good proxies to identify high opportunities for incremental energy savings.

SoCalGas claims that the CWHMBS Program approach reaches stranded savings potential by utilizing new approaches and targets that are not available with the existing Middle Income Direct Install Program (MIDI), Energy Savings Assistance Program (ESA), and the Multifamily Direct-Install Program (MFEER) designs. The proposed program incorporates an intervention that unlocks access to building performance data, specifically requiring customers to enroll in a hot water usage monitoring and metering service agreement. This enables property owners the opportunity to properly manage costs and attain a greater understanding of their building systems, specifically water heating systems which constitutes, on average, 39% of MF building operating costs.

3. Measure Treatment

Per the December Ruling, proposals must describe measures and end uses that will be addressed by the program.

The SoCalGas Multifamily program proposal will promote long-term energy benefits through a comprehensive measure mix consisting of high efficiency central storage water heaters or boilers, central water heater modulating temperature controllers, circulating demand pump controllers and low flow showerheads and faucet aerators. All installations are coupled with hot water usage monitoring and metering service agreements for the property owners.

4. Normalized Metered Energy Consumption

Proposals must document the methods for normalizing data. The models to normalize the data should use recognized, transparent tools, and methods that are repeatable, and reviewable. Additionally, proposals for non-residential programs must explain the link between the meter or meters and building that is acceptable for projects in the program.

SoCalGas' supplemental filing adequately addresses outstanding questions and meets the requirements of the December Ruling. See Attachment B for details.

5. Savings Calculation Methods

Proposals must describe savings calculation methods and provide access to models used for addressing normalized, metered energy consumption.

A whole building approach, described as Option C Whole Facility of the industry-standard International Performance Measurement and Verification Protocol (IPMVP) will be employed to determine the natural gas and water savings for each participant, and for the program. Under Option C, a measurement boundary is drawn around the whole facility, and data from all of the facility's energy meters are used to determine the energy savings. Option C determines the collective savings from all measures implemented in the treated facility, and is most appropriate given the characteristics of the target market and Measurement &Verification (M&V) protocol of this program where:

- Baseline utility data is available to establish a facility's baseline energy performance
- The expected savings could exceed 10% and is large in comparison with the random or unexplained variation in the energy use data
- No significant change to the facility is expected before or after program intervention
- There is a reasonable correlation between energy consumption and routine (independent) variables
- Non-routine adjustments can be made to account for unexpected changes, as necessary

Regression-based energy models may be used to describe how selected parameters such as weather and occupancy rate 'explain' the change in baseline period energy use. Typically, the parameters with the most explanatory power for energy use in a facility are used. While these models do not explain all energy use variations, if the savings are large in comparison, then the determination of savings is more reliable.

To ensure there is sufficient baseline data for developing a baseline regression model, participating MF buildings should have at least one active gas and water meter serving the entire facility at the service address and at least one year of continuous gas consumption and water use data prior to program intervention.

Commission Staff's recommends that the process evaluation of the SoCalGas' Central Water Heater Multifamily Building Solution (CWHMBS) Program include elements to review multifamily property owner customer satisfaction. Additionally, any EM&V of the program must also test SoCalGas' assumption that there is no freeridership amongst the targeted program participants. Commission Staff further recommends that SoCalGas conduct post installation field inspections and targeted M&V as necessary to verify correct installation and operation of measures. Lastly, Commission Staff expects the proposed full process evaluation "at the end of implementation cycle" means that the study effort will begin scoping in mid-2017.

6. Incentive Design

Proposals must 1) provide the basis and rationale for payment structure including how the structure mitigates the risk that potential upfront payments do not overrun the value of the realized savings, 2) identify the estimated capital costs and what portions of costs are to be borne by ratepayer and by implementer, 3) describe the terms and schedule of the incentive including true up over time, and 4) describe the long term tracking and reporting strategy for sustained savings with ongoing feedback.

The CWHMBS Program will utilize a hybrid incentive approach designed to encourage customers to capture deep energy savings and to leverage a metered approach to collect data. Upon completion of an audit, customers that agree to the retrofits after education and outreach will be informed of their eligible incentives:

A) Pre-Measurement Incentive

Property owners who participate in the CWHMBS program are eligible to receive the standard up front post installation incentive based on the following tiers:

a) Tier 1: For buildings with less than a 100 units, a $150 per unit incentive will be paid and total pre-measurement incentives will be capped at 40% of the total project measure cost.

b) Tier 2: For buildings with 100 units or greater, a $225 per unit incentive will be paid and total pre-measurement incentives will be capped at 50% of the total project measure cost.

B) Post-Measurement Incentive

Program participants who comply with all program requirements are eligible to receive a post-measurement incentive of $1.00/therm saved after 12 months of main metered normalized data on energy saved. Once the post measurement has been conducted evaluated and verified, SoCalGas would only pay for incentives energy savings materialized.

Commission Staff understands that while performance period payments may be reduced, the upfront incentives are at risk if total performance based incentives are less than the upfront incentive. Staff expects SoCalGas will provide Energy Division a risk assessment plan to account for these instances.

7. Type of Program

Programs must include a minimum of 1 year of post-intervention data for retrofits, and a minimum 12 months of post-intervention data for behavioral, retrofit, or operations projects.

SoCalGas is using a retrofit approach and does not intend to capture behavioral, retrocommissioning or operations effects. SoCalGas proposes to measure ex post savings using an individual customer site billing analysis approach. All meters identified in the pre-installation analysis will be used in the ex post analysis.

8. Threshold for Expected Savings

Proposals must include a description of the expected saving from the proposed program or project intervention, and literature or data to support that demonstrate the expected impacts and certainty of the estimates.

The CWHMBS Program will aspire to achieve at least 15% reduction in both energy (therms) and water consumption for each project. SoCalGas submits that this constitutes a "stretch goal." However, SoCalGas estimates that 15% target is a prudent goal based on recent studies and standard practice.

Commission Staff will request further documentation from SoCalGas on the 15% savings assumption. Previous workpapers, cost data, and units per property data should be able to help estimate savings ranges for the program intervention.

9. Baseline Adjustments

The proposal must 1) document the baseline assumptions and strategy for collecting necessary information, 2) describe how normalization methods capture (or not) baseline assumptions,

and 3) describe the methods that will be used to adjust the baseline for non-routine adjustments.

SoCalGas' supplemental filing adequately addresses outstanding questions and meets the requirements of the December Ruling. See Attachment B for details.

III. Conclusion

For the reasons stated above, and the details and caveats outlined in the review sheet, the proposal described in the supplemental advice letter is approved. Commission Staff expects to continue collaborating with SoCalGas and the review team as the program is designed and implemented. Collaboration should begin with a project kick-off meeting and continue through regular updates via the Multifamily Project Coordination Group (PCG).

REVIEW SHEET FOR 2016 HOPPs PROPOSALS

PROGRAM ADMINSTRATOR: Southern California Gas **PROPOSAL TYPE:** Program Project **PROPOSAL NAME:** Central Water Heater Multifamily Building Solutions (CWHMBS) Program

ORIGINAL SUBMISSION DATE: 5/18/2016 **DATE OF RESUBMISSION** 7/20/2016 **DATE OF ED DISPOSITION** 7/27/2016

Compliance Area	PA Proposal Requirements	Comments: If you checked not included, or included/don't accept. Provide a summary of what is missing, what is needed, and/or what needs to be changed.	CPUC Staff Comments on SCG Response
General Program Description (p.24)	1. Description of the intervention strategy employed, with reference to the type of known existing business model being employed (e.g. Standard Performance Contracting, ESCO models, retro-commissioning, experimental design, financing)	**1)** The program is misnamed. As this intervention focuses solely on domestic hot water in multifamily buildings, a more appropriate and accurate name could be "Domestic Hot Water Multifamily Building Solutions" or something similar	**1**. The program focuses on creating a whole building approach to both gas and water used for domestic hot water. The name has been changed to "Central Water Heating Multifamily Building Solution (CWHMBS)" and is reflected throughout Attachment A, B and the Advice Letter. CPUC Staff: OK – No Comment.
	2. Provides specifics on the terms of the program structure	**2)** The program focuses solely on master-metered multifamily buildings without providing information on how representative this metering makeup is in the SoCalGas service territory. That information would be helpful to determine the potential impact of this type of intervention.	**2)** The multifamily sector constitutes approximately 22% of SoCal Gas's total residential gas consumption. In the multifamily segment, there are over 42,000 designated multifamily central water heater accounts currently being served in SCG territory. These accounts alone constitute around 6% of SoCalGas' total residential consumption. CPUC Staff: OK – No Comment.
	3. Explains how the project/proposal addresses past challenges that have arisen with the business model being employed?	**3)** Proposal is unclear about how it will be implemented and evaluated "simultaneously." This approach will be difficult to do as some time must pass to measure energy savings. The proposal also does not explain how it will determine ex ante usage estimates or control for changes in water usage that are unrelated to the program such as other water conservation actions. See discussion on sub-metering below.	**3)** The language "implemented and evaluated simultaneously" was included to describe the nature of HOPPs programs. Traditional programs are implemented and then evaluated after the specific program has ended. With HOPPs SoCalGas has the advantage of implementing (putting program in the field) and collecting savings data all at the same time. Specifically, "The evaluation will deliver preliminary results one year after the start of the data collection and will deliver annual reports at the end of each program year."

<table>
<tr><th>Compliance Area</th><th>PA Proposal Requirements</th><th>Comments: If you checked not included, or included/don't accept. Provide a summary of what is missing, what is needed, and/or what needs to be changed.</th><th>CPUC Staff Comments on SCG Response</th></tr>
<tr><td></td><td></td><td>4) The CWHMBS program relies on a third party implementer to provide a list of targeted customers and will market the program to these customers. This outreach model is similar to that employed by the SoCalGas/SCE MF whole building program. How will the CWHMBS effort overcome the low participation rates seen in the SoCalGas/SCE MF whole building program?</td><td>This is included in Attachment A page 4, second to last paragraph.

ED Staff comments bring up an excellent point and internally SoCalGas has decided for improve customer engagement and to cost-effectively use gas EE ratepayer funds and that the proposal should be modified to indicate a deemed savings approach for water measures.

CPUC Staff: Staff assumes the last paragraph indicates that SoCalGas will use a deemed savings approach for water measures provided by the program.

4) The program will be targeted to multifamily property owners by leveraging existing relationships that have been established through single points of contact and lists such as TCAC to outreach to property owners. The program will also work with vendors, installers and retailers to further promote the program.

CPUC Staff: OK – No Comment.</td></tr>
<tr><td rowspan="2">Principals of HOPPs (p. 6)</td><td>1. Proposal will increase energy efficiency in existing buildings</td><td></td><td></td></tr>
<tr><td>2. Proposal references studies, pilots, EM&V etc. that support the idea that this project/program is a high opportunity.</td><td>5) Each proposed measure is available as a deemed measure. Please refer to the appropriate workpaper and estimate savings for the package of measures.

6) Compare to MF gas Unit Energy Consumption data from RASS to validate the 15% savings expectation. Show calculations to validate the 15% water savings expectation.

7) Proposal only provides a cursory review of recent ratepayer and other-funded evaluation work in this market sector. Proposal needs to better address the barriers raised in the "MF HERCC Recommendations Report 2015 Update" identified below.

8) Proposal should include information on how this program will work with, or learn from, the SoCalGas Shared Network Pilot: http://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=91929)</td><td>5)
<table>
<tr><th>Measure</th><th>Work Paper ID/ Title/Location</th><th>Savings</th></tr>
<tr><td>Circulating demand pump controller</td><td>WP5CGODE091116/DEER Database</td><td><table><tr><td>Storage Unit Size (gal)</td><td>therms/unit</td></tr><tr><td>< 250</td><td>1093</td></tr><tr><td>>= 250</td><td>1745</td></tr></table></td></tr>
<tr><td>Central water heater modulating temperature controller (one per circulating loop)</td><td>WP5CGNRCS051219A/DEER Database</td><td>This particular measure has a range of savings based on building vintage, # of units, etc. Please refer to page 12 of the work paper cited for full details.</td></tr>
<tr><td>Central storage water heater or boiler</td><td>WP5SCGREWH050101B/ Deer Database</td><td>Heater – 1,900 therms/ yr
Boiler – 750 therms/yr</td></tr>
<tr><td>Low flow shower heads</td><td>SCGWP100303A/ DEER Database</td><td>MF (Therms/Yr)
Showerheads 1.7gpm 6.2
Showerheads 1.6gpm 7.3
Showerheads 1.5gpm 8.4</td></tr>
<tr><td>Hot water usage monitoring and metering service agreement</td><td>Not Applicable</td><td>Not Applicable</td></tr>
</table>
CPUC Staff: OK – No Comment.</td></tr>
</table>

Compliance Area	PA Proposal Requirements	Comments: If you checked not included, or included/don't accept. Provide a summary of what is missing, what is needed, and/or what needs to be changed.	CPUC Staff Comments on SCG Response
		Proposal lacks an EM&V process evaluation component. **10)** Proposal lacks any discussion of risks.	**6)** Based on the RASS study of 2009 page 20 "Natural-gas water heating UECs ranged from 195 therms for single-family homes to 183 therms for apartments in buildings with five or more units." Unfortunately the RASS gives data based on units for multifamily and not necessarily the whole building which is the overall objective of this HOPPs program. So to make an assumption that **each unit** would possibly expect to see a 27.45 therms in energy savings (=15% * 183) would be premature and inappropriate given that our proposal is measuring at the "whole building" level, rather than the unit level. Similarly for water savings, it would be inappropriate to compare unit levels to a whole building level estimates. In addition, the 15% is a stretch goal in which our program will aim to achieve. This is stated in the last paragraph of Attachment A (page 4). CPUC Staff: Commission Staff will request further documentation from SoCalGas on the 15% savings assumption. Previous workpapers, cost data, and units per property data should be able to help estimate savings ranges for the program intervention. **7)** Added table on how the CWHMBS program will address some of the recommendations of the MF HERCC Report. CPUC Staff: OK – No Comment. **8)** Added to the process evaluation described below. CPUC Staff: OK – No Comment. **9)** SCG agrees to add a process evaluation to this MF HOPP. Below is a high level scope of work (Step-1 Project Concept). This process evaluation may include the following: (1) A review of MF HOPP intervention theory against the effectiveness of implementation, including participant targeting and market outreach activities, (2) A review of best practices for performance based program design, (3) A review of this HOPP's ability to overcome MF market barriers as planned,

Compliance Area	PA Proposal Requirements	Comments: If you checked not included, or included/don't accept. Provide a summary of what is missing, what is needed, and/or what needs to be changed.	CPUC Staff Comments on SCG Response
			(4) Provide program design and implementation feedback from implementer and program participants (i.e., property owners). (5) A review of HOPP program impact analysis in coordination with the M&V results. (6) The above work can be done in two stages: (1) at the early implementation stage to obtain rapid feedback to support program adjustment/s, (2) full process evaluation at the end of implementation cycle. (7) The above process evaluation should coordinate its activities with the planned NTG survey and analysis. (8) This process evaluation will generate a list recommendations for future program design, implementation as well as improvements for future data collection efforts. SCG will submit statement of work for M&E step-2 approval when appropriate. Once this HOPP is approved, SCG will augment the M&E roadmap to incorporate this study into the M&E Study Roadmap. CPUC Staff: It is Commission Staff's recommendation that the process evaluation include elements that review multifamily property owner customer satisfaction with the program. Additionally, any EM&V of the program must test SoCalGas' assumption that there is no freeridership amongst the targeted program participants. As this work is scheduled to be integrated in the M&E study roadmap, Commission Staff expects "the full process evaluation at the end of implementation cycle" to begin scoping in mid-2017. **10)** In Attachment A, SoCalGas provides that upfront payments will not exceed 40% to 50% of the total project costs. This up-front payment is provided to mitigate the risks of the program participant and the cap is provided to mitigate all the upfront cost burden on ratepayer dollars. To mitigate risk of non-materialized savings, language has been added to the proposal stating "Once the post measurement has been conducted evaluated and verified, SoCalGas would only pay for incentives energy savings materialized." CPUC Staff: Commission Staff recommends that SoCalGas conduct post

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			installation field inspections and targeted M&V as necessary to verify correct installation and operation of measures.
	3. Proposal demonstrates how the program/project will focus on activities that are newly permissible under CPUC code 381.2 (b), by a) Program/project will reach stranded potential by utilizing the new approaches to value and measure savings	**11)** Please explain in greater detail how the measures provided under this program will capture stranded savings.	**11)** The CWHMBS will push customers to replace whole boiler systems instead of replacing parts and pieces prolonging the life of an inefficient system. The new boiler system will be replaced to current Title 24 Building Codes & Standards and thereby achieving savings that would not otherwise be realized. CPUC Staff: Commission Staff believes that the SoCalGas Central Water Heater Multifamily Building Solution program will provide high efficiency, above-code measures where applicable.
	3b) Focus on interventions that PAs could not previously do.	Previously noted. The proposal needs to include information on how the CWHMBS program addresses barriers outlined in the "MF HERCC Recommendations Report 2015 Update." How does the program: **12)** Reduce long-term program implementation costs and enable programs to scale-up by automating and systematizing the services provided; for example, employ project tracking software with multiple user interfaces to minimize off-line communication? **13)** Leverage program single points of contact to nurture long-term relationships with owners of large portfolios? **14)** Coordinate with owner-selected raters or consultants to allow them to influence the scope development process if desired by the owner (this will facilitate the participation of owners of large portfolios in multiple program partner programs)?	**12)** SoCalGas will leverage existing technology to allow for direct entry and file uploads of project data by participating contractors thus reducing manual input by processing personnel. Existing SCG database technology also allows for automated customer notification following system workflow updates that impact the customer and or program staff. Enhancements to SoCalGas' database will incorporate advances in technology to help reduce cost as they become available. CPUC Staff: OK – No Comment **13)** For CWHMBS, single points of contact (SPOCs) will act in the delivery of the program to the property owners and continue to work with the owners throughout the implementation and follow-up as a resource and representative of SoCalGas. SPOCs will maintain the relationship with MF owners for programs besides CWHMBS by identifying additional program participation opportunities for other properties within a portfolio and working to advocate on behalf of the customer. CPUC Staff: OK – No Comment **14)** The SPOC, Program Manager or Program Consultant will provide

Compliance Area	PA Proposal Requirements	Comments: If you checked not included, or included/don't accept. Provide a summary of what is missing, what is needed, and/or what needs to be changed.	CPUC Staff Comments on SCG Response
			customers with participation and measure requirements. A basic assessment of the domestic hot-water distribution system will be a Program requirement and will be part of the application. The assessment will allow coordination with owner-selected raters and contractors to allow them to influence the scope development process if desired by the owner. CPUC Staff: Commission Staff expects SoCalGas to establish program rules that clearly inform owner-selected raters and contractors of the 15% savings threshold in order to reduce the risk of those actors re-scoping or downsizing the project below the minimal savings target.
	3c) If proposal is a modification to an existing program, then proposal should clearly identify the differences with the existing program and benefits of the proposal consistent with the HOPPs principals stated on p. 6.		
Measure Treatment (p.25)	1. Measures and end uses that will be addressed- describe what type of intervention activities will be applied to what measures. If implementers propose to use deemed savings values, then the DEER value applicable to the site's existing condition baseline treatment must be identified (or an alternative work paper offered per CalTF vetting process)		

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Savings Calculation Methods (p.25)	1. For normalized metered energy consumption, detailed description of the savings calculation methods and provide access to models used for addressing normalized, metered and energy consumption, detailed in Attachment A.		
	2. For deemed savings projects that are providing incentive payments based on ex ante values, standard custom project savings calculation methods apply.		
Incentive Design (p. 25 & 26)	1. Basis and rationale for payment structure--Explain the payment structure, including the basis for setting the upfront payment (if any) and how the structure mitigates the risk that potential upfront payments do not overrun the value of the realized savings.	**15)** The program offers both pre measurement and post measurement incentives. If the post measurement energy savings do not materialize, will the pre measurement incentives be adjusted?	**15)** Once the post measurement has been conducted evaluated and verified, SoCalGas would only pay for incentives energy savings materialized. CPUC Staff: Commission Staff understands that while performance period payments may be reduced, the upfront incentives are at risk if total performance based incentives are less than the upfront incentive. Staff expects SoCalGas will provide Energy Division a risk assessment plan to account for these instances.
	2. Measure costs and capital burden—Identify the estimated capital costs and what portions of costs are to be borne by ratepayer and by implementer.	**16)** This proposal relies heavily on coordination with the Metropolitan Water District. Proposal must provide additional details on how SoCalGas/MWD will use their customer information systems to identify potential participating properties. Furthermore, the proposal must include more information on cost sharing for DHW measures already incented by MWD.	**16)** This program is a Core SoCalGas program and will utilize the existing collaborative relationship with MWD. SoCalGas will not be utilizing MWD interface but instead and as mentioned before will utilize existing relationships that have been established through SPOCS and lists such as the Tax Credit Allocation Committee (TCAC) to outreach to property owners. This initial round already has a substantial market potential just based on SCG

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<tr><td></td><td></td><td>17) Please provide estimated measure cost data for all proposed measures.</td><td>current DHW accounts. This coupled with the already existing relationships will successfully result in maximizing the programs direct implementation budget.

The cost sharing with MWD will only be for incentive costs related to water measures.

CPUC Staff: OK – No Comment

17)
<table><tr><th>Measure</th><th>Source: DEER Workpaper - Incremental Measure Cost</th></tr><tr><td>Master (Whole Building) Storage Water Heater</td><td>Values: $4,000 (all measures).

Measure data assume a “small” 15 dwelling multi family building.

IMC data are per the “Boiler WH” worksheet of the “MF RCP NOV10” workbook. Full installed cost is used since measure is modeled as an early replacement.</td></tr><tr><td>Master (Whole Building) Hot Water Boiler</td><td>Values: $4,060 (all measures).

Measure data assume a “mid size” 35 dwelling multi family building.

IMC data assume installed cost for a Raypak WH752 84% efficient 750 MBTUH boiler. Data are per the “MF boiler costs” document. Full installed cost is used since measure is modeled as an early replacement. IMC also assumes base unit storage tank is not in need of replacement.</td></tr><tr><td>Low Flow shower heads</td><td>Per unit cost range based on Work paper 14.90-45.96</td></tr><tr><td>Circulating demand pump controller</td><td>NPV from latest Work paper update $1,500.</td></tr><tr><td>Central water heater modulating temperature controller (one per circulating loop)</td><td>Deer Source Not available.

Google search revealed costs range from $287 – $839 depending on CWH system</td></tr></table>
CPUC Staff: OK – No Comment</td></tr>
<tr><td></td><td>3. Partial or incremental payments with true up over time—Describe the terms and schedule of the incentive</td><td>18) Previously noted. The program offers both pre measurement and post measurement incentives. If the post measurement energy savings do not materialize, will the pre measurement incentives be adjusted?</td><td>18) Please see response to #15

CPUC Staff: See response to #15.</td></tr>
</table>

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	4. Strategy for tracking persistence—describe the long term tracking and reporting strategy for sustained savings with ongoing feedback.		
Normalized Metered Energy Consumption (Attachment A p. 1-4)	1. Programs and projects must document the method for normalization and list a) the variables included in the normalization process and		
	1b) Documentation of specific program actions that are intended to drive savings.		
	2. Models, methods, and tools must use recognized engineering, economic or statistical approaches to normalization.		
	3. Models, methods and tools must be transparent, reviewable and replicable by peer reviewers.		
	4. In addition to normalized savings as defined here, programs and projects shall also report absolute changes in consumption expressed with a common denominator.		

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	5. Models must include pre and post-intervention data streams. Minimum 1 year post data for retrofits, and minimum 3 years for Behavior Retrofit or Operations.		
	6. Models, methods, tools must be transparent, reviewable and repeatable		
	7. Meter does not necessarily equal whole building, so proposals must make clear the link between meter and building	**19)** Will the CWHMBS install a sub-meter at the central water heating intake?	**19)** No, this program will not install sub metering at the central water heating intake. The water savings should be viewed as a derivative of the gas savings. The EM&V plan is to collect monthly water bills. This water bill will be used as an explanatory variable in the regression analysis. We theorize that we should see linkage between reduce gas usage and reduce water usage. SCG will follow the M&E steps as described Attachment B section I.EM&V Process Evaluation. CPUC Staff: Staff recommends that SoCalGas reconsider. While water savings may be measured using billing data, installation of a water submeter and logger at time of central water heater/boiler installation could provide precise data that may benefit the multifamily retrofit market beyond this HOPPs intervention. Labor and cost analysis of this type of monitoring 'add-on' are negligible in comparison to the value provided to both the EM&V process associated with this intervention and the growing knowledgebase in this market sector.
	8. Proposals for programs or projects must document the market barriers they are designed to address and the interventions planned to achieve reductions in energy consumption	**20)** Previously noted in response to HOPPs 3b above.	**20)** Please see responses to questions #12, #13, and #14 above. CPUC Staff: OK – No Comment

Compliance Area	PA Proposal Requirements	Comments: If you checked not included, or included/don't accept. Provide a summary of what is missing, what is needed, and/or what needs to be changed.	CPUC Staff Comments on SCG Response
	9. If proposal deviates from Attachment A, PA must provide clear rationale.		
Type of Program or Project (Attachment A p. 5-6)	1. Description of the nature of the proposed program or project intervention with respect to whole building or single measures	**21)** Any "comprehensive" domestic hot water invention in multifamily must include thermostatic shower valves and faucet aerators. –we don't include this because it is negated by the CWH loop.	**21)** Thermostatic shower valves will be not offered as an option for this program because of the potential for crossover between hot water and cold water. According to SoCalGas Work Paper 100303B, "The measure (thermostatic shower valves) cannot be applied where recirculation pumps are used or where potential crossover between hot water and cold water may occur." This program specifically targets MF properties with recirculation pumps/loops, thereby introducing this crossover. This program will offer low-flow faucet aerators as an optional measure based on the feasibility of installation. CPUC Staff: OK – No Comment
	2. Site level results will be discernable at building level for verification purposes.	**22)** Will the CWHMBS install a sub-meter at the central water heating intake? If not, how will non-routine events, like reduced or eliminated landscaping water use, be factored into the program savings claims?	**22)** No. To account for non-routine events the EM&V plan will include a few solutions based on if a building has or does not have landscaping on site. Water bill data for buildings without landscaping energy use may have some explanatory power in regression analysis of natural gas usage, and we will use this data when available (water bill data may be very difficult to obtain and a hurdle to implementing this program). For buildings with landscaping water use, an alternate and more direct parameter describing hot water use would be occupancy rate. We will track monthly occupancy rate of the buildings, as well as collect historical occupancy rate for the baseline period, and use this variable in the savings analysis. CPUC Staff: OK – No Comment
Threshold for Expected Savings (Attachment A p. 6-7)	1. Description of the expected saving from the proposed program or project intervention	**23)** Previously noted. Please refer to the appropriate workpaper and estimate savings for the package of measures. Compare to MF gas Unit Energy Consumption data from RASS to validate the 15% savings expectation. Show calculations to validate the 15% water savings expectation.	**23)** Please see response to Question #5 and #6 above. CPUC Staff: Commission Staff will request further documentation from SoCalGas on the 15% savings assumption. Previous workpapers, cost data, and units per property data should be able to help estimate savings ranges for the program intervention.

Compliance Area	PA Proposal Requirements	Comments: If you checked not included, or included/don't accept. Provide a summary of what is missing, what is needed, and/or what needs to be changed.	CPUC Staff Comments on SCG Response
	2. Literature or field performance data demonstrating the expected impact and expected certainty of estimates.		
Baseline Adjustments (Attachment A p. 8-9, and under "Normalized", p. 2)	1. Documentation of the baseline assumptions and strategy for collecting necessary information		
	2. Description of how normalization methods capture (or not) baseline assumptions		
	3. Description of the methods that will be used to adjust the baseline for non-routine adjustments, when applicable for the type of proposal.	**24)** Previously noted. Will the CWHMBS install a sub-meter at the central water heating intake? If not, how will non-routine events, like reduced or eliminated landscaping water use, be factored into the program savings claims? Duplicate	**24)** Please see response to Question #22. CPUC Staff: OK – No Comment
Customer incentives (Attachment A p. 11-12)	1. Basis and rationale for payment structure-- Explain the payment structure, including the basis for setting the upfront payment (if any) and how the structure mitigates the risk that potential upfront payments do not overrun the realized savings	**25)** Previously noted. The program offers both pre measurement and post measurement incentives. If the post measurement energy savings do not materialize, will the pre measurement incentives be adjusted? Duplicate	**25)** Please see response to #15. CPUC Staff: OK – No Comment
	2. Capital costs and access to capital— Identify the estimated capital costs and the sources of capital funding the project		

Compliance Area	PA Proposal Requirements	Comments: If you checked not included, or included/don't accept. Provide a summary of what is missing, what is needed, and/or what needs to be changed.	CPUC Staff Comments on SCG Response
	3. Partial or incremental payments with true up over time—Describe the terms and schedule of the incentive payments		
Application to Behavioral, Operational, Retro-commissioning (B.R.Os) (Attachment A p. 9-10)	1. Program/project proposals shall: Include requirement that participant sign up for a maintenance plan for at least three years.		
	2. Program/project proposal shall: Include requirement that participants commit to install a minimum set of measures according to PA pre-defined criteria.		
	3. PA is encouraged to include a training component to program/project offerings.		
	4. Performance post-intervention: a) Must ensure persistence of savings that ensures multiyear savings for measures that are based in changes in behavior or operational practices.		
	4b) During the claimable expected useful life (EUL) period of one year, continuous feedback should be in place.		
	4c) PAs shall consider incentive structures that encourage long term		

Compliance Area	PA Proposal Requirements	Comments: If you checked not included, or included/don't accept. Provide a summary of what is missing, what is needed, and/or what needs to be changed.	CPUC Staff Comments on SCG Response
	savings		
	4d) Incentives shall only be paid once participant commits to a maintenance plan for a minimum of three years (evidence should be made available to Commission staff upon request).		
Financing (Attachment A p. 12)	1. Description of any use of financing programs or external financing to support the program or proposed project.		

Ronald van der Leeden
Director
Regulatory Affairs

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July 20, 2016

Advice No. 4965-A
(U 904 G)

Public Utilities Commission of the State of California

Subject: Supplement - Southern California Gas Company High Opportunity Projects and Programs (HOPPs) – Central Water Heater Multifamily Building Solution (CWHMBS) Program

Southern California Gas Company (SoCalGas) hereby requests California Public Utilities Commission (Commission) approval of its proposed Central Water Heater Multifamily Building Solution (CWHMBS) Program, formerly known as Comprehensive Multifamily Building Solutions Program, consistent with Ordering Paragraph (OP) 2 in the Assigned Commissioner and Administrative Law Judge's Ruling Regarding High Opportunity Energy Efficiency Programs or Projects (Ruling) issued on December 30, 2015.

Purpose

This supplemental filing replaces in its entirety Advice No. 4965, filed on May 18, 2016. Advice No. 4965-A includes clarifications to the CWHMBS Program as a result of the Energy Division Review Team's assessment.

Background

On October 8, 2015, the Governor enacted Assembly Bill (AB) 802, which amended Section 381.2 of the Public Utilities Code (Pub. Util. Code). Subsection (b) directed the Commission, by September 1, 2016, to authorize electrical corporations and gas corporations to provide incentives, rebates, technical assistance, and support to their customers to increase the energy efficiency of existing buildings.[1] In addition, subsection (c) authorized, effective January 1, 2016, electrical corporations and gas corporations to implement the provisions for high opportunity projects or programs and that the

[1] Pub Util. Code § 381.2(b)

Commission shall provide expedited authorization for high opportunity projects and programs.[2]

In response to AB 802's directives, the Ruling outlines the necessary framework and guidance for the development and implementation of HOPPs. Additionally, the Ruling included an expedited review and approval process in which Program Administrators (PAs) shall submit program proposals as Tier 1 Advice Letters (AL).[3] Furthermore, the Ruling directed that each AL include the information specified in the Ruling, including the requirements set forth in Attachment A.[4]

Program Overview

The CWHMBS Program is a bundled measure program that proposes to address stranded opportunities within the multifamily sector and enable better data access by proactively providing whole-building information to building owners. Specifically, the program will provide incentives for the upgrade of both central domestic hot water system and water usage improvements, thus capturing a multi-measure approach and stranded energy savings that would have been otherwise overlooked. The CWHMBS Program will target owners of existing multifamily master metered buildings for a high impact of energy savings through water heating. The CWHMBS Program will be implemented in collaboration among SoCalGas and Metropolitan Water District (MWD), allowing for the CWHMBS Program to be evaluated by monitoring two key metrics, energy savings (natural gas) and water savings.[5]

The CWHMBS Program is designed to incentivize projects to go from an existing condition baseline to or above code in order to encourage customers to implement gas and water measure upgrades that they would not have completed without the program incentive. These incentives would be provided both on a pre- and post-measurement of energy savings, as described in Attachment A. This pre- and post-measurement incentive strategy which will be facilitated by metered data. This will also help serve to collect the necessary information needed for accurate saving evaluation.

Given that the program will be providing incentives calculated based on existing conditions, the program will need to be implemented and evaluated simultaneously. The evaluation will be conducted by an external evaluation, measurement, and verification (EM&V) contractor, as described in Attachment B. The evaluation will deliver preliminary results one year after the start of the data collection and will deliver annual reports at the end of each program year. A summary of the EM&V contractor responsibilities are provided in Attachment A, Table 3.

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[2] Pub Util. Code § 381.2(c)
[3] The Ruling, OPs 1 and 2, page 36.
[4] The Ruling, OP 4, p. 37.
[5] The CWHMBS program is being proposed as a core SoCalGas offering and will not seek a co-fund agreement with its water partner MWD in its initial implementation. However, incentives for all water savings would be sought out to be paid by the water partner.

The CWHMBS Program will aspire to achieve at least 15% reduction in both energy (therms) and water consumption for each project.[6] SoCalGas submits that this constitutes a "stretch goal." However, SoCalGas estimates that 15% target is a prudent goal based on recent studies and standard practice.

Upon approval by the Commission, SoCalGas anticipates the full implementation of the CWHMBS Program in August 2016. To facilitate consistency, coordination, and communication, SoCalGas will work with a program implementer for services such as marketing, auditing, and installation of the upgrades. The program implementer will be hired by SoCalGas through a targeted competitive solicitation process.

Once the CWHMBS Program is implemented, SoCalGas will evaluate the effectiveness of the program in achieving cost-effective energy savings in the multifamily segment.

On March 3, 2016, Energy Division provided parties to Rulemaking (R.) 13-11-005 with a review sheet that will be used by Energy Division Review Teams to assess each program administrator proposal. In an effort to assist in the review process, SoCalGas provides a reference to each PA proposal requirement as it relates to SoCalGas' CWHMBS Program in Attachment C.

Clarifications to the CWHMBS Program

Modifications to the Name of the Program:

Based on review by Energy Division, SoCalGas is revising the name of the program from the Comprehensive Multifamily Building Solutions Program to Central Water Heating Multifamily Building Solution to closely reflect the purpose of the program which focuses on creating a whole building approach to both energy and water used for domestic hot water.

Modifications have been made to Attachment A to:

- To improve the proposals customer engagement and to cost-effectively use Gas EE ratepayer funds the proposal has been modified to indicate a deemed savings approach for water measures. Table 5 in Attachment A has been updated to reflect this updated approach.
- Language has been added on how the proposal will address low participation rates in the multifamily segment, capture additional stranded savings, and indicate that SoCalGas will pay for any unmaterialized savings.
- Table 3 has been added to clarify how this proposal addresses some of the MG HERCC report recommendations.

[6] We will not impose any minimum requirement for expected savings for each CWHMBS project, but we will encourage proposals with forecast savings of at least fifteen percent of baseline consumption levels.

- Clarify how the proposal we seek to leverage existing relationships that have been established by single-point of contacts and how the program will address risk.
- Provide further information regarding MWD role and responsibilities.

Modifications have been made to Attachment B to:

- Clarify the use and collection strategy concerning water use data and address water non-routine events.
- Add a process of evaluation to improve on the EM&V plan.

Protests

Anyone may protest this AL to the Commission. The protest must state the grounds upon which it is based, including such items as financial and service impact, and should be submitted expeditiously. The protest must be made in writing and received within 20 days of the date of this AL, which is August 9, 2016. There is no restriction on who may file a protest. The address for mailing or delivering a protest to the Commission is:

CPUC Energy Division
Attn: Tariff Unit
505 Van Ness Avenue
San Francisco, CA 94102

Copies of the protest should also be sent via e-mail to the Energy Division Tariff Unit (EDTariffUnit@cpuc.ca.gov). A copy of the protest should also be sent via both e-mail and facsimile to the address shown below on the same date it is mailed or delivered to the Commission.

Attn: Sid Newsom
Tariff Manager - GT14D6
555 West Fifth Street
Los Angeles, CA 90013-1011
Facsimile No. (213) 244-4957
E-mail: snewsom@SempraUtilities.com

Effective Date

SoCalGas believes this AL is subject to Commission staff disposition and, pursuant to General Order (GO) 96-B, Energy Industry Rule 5.2, this AL is submitted with a Tier 1 designation. Therefore, SoCalGas respectfully requests that this AL become effective for service on and after August 19, 2016, the 30th calendar day after the date filed.

Notice

A copy of this AL is being sent to SoCalGas' GO 96-B service list and the Commission's service lists for R.13-11-005. Address change requests to the GO 96-B should be directed by electronic mail to tariffs@socalgas.com or call 213 244 3387. For changes to all other service lists, please contact the Commission's Process Office at 415- 703-2021 or by electronic mail at Process_Office@cpuc.ca.gov.

_____

Ronald van der Leeden
Director – Regulatory Affairs

Attachments

CALIFORNIA PUBLIC UTILITIES COMMISSION

ADVICE LETTER FILING SUMMARY
ENERGY UTILITY

MUST BE COMPLETED BY UTILITY (Attach additional pages as needed)

Company name/CPUC Utility No. **SOUTHERN CALIFORNIA GAS COMPANY (U 9O4G)**

Utility type:
☐ ELC ☒ GAS
☐ PLC ☐ HEAT ☐ WATER

Contact Person: Sid Newsom
Phone #: (213) 244-2846
E-mail: SNewsom@semprautilities.com

EXPLANATION OF UTILITY TYPE
ELC = Electric GAS = Gas
PLC = Pipeline HEAT = Heat WATER = Water

(Date Filed/ Received Stamp by CPUC)

Advice Letter (AL) #: 4965-A

Subject of AL: Supplement - Southern California Gas Company High Opportunity Projects and Programs (HOPPs) – Central Water Heater Multifamily Building Solution (CWHMBS) Program

Keywords (choose from CPUC listing): Energy Efficiency

AL filing type: ☐ Monthly ☐ Quarterly ☐ Annual ☒ One-Time ☐ Other

If AL filed in compliance with a Commission order, indicate relevant Decision/Resolution #:
N/A

Does AL replace a withdrawn or rejected AL? If so, identify the prior AL No

Summarize differences between the AL and the prior withdrawn or rejected AL[1]: N/A

Does AL request confidential treatment? If so, provide explanation: No

Resolution Required? ☐ Yes ☒ No

Tier Designation: ☒ 1 ☐ 2 ☐ 3

Requested effective date: 8/19/16

No. of tariff sheets: 0

Estimated system annual revenue effect: (%): N/A

Estimated system average rate effect (%): N/A

When rates are affected by AL, include attachment in AL showing average rate effects on customer classes (residential, small commercial, large C/I, agricultural, lighting).

Tariff schedules affected: N/A

Service affected and changes proposed[1]: N/A

Pending advice letters that revise the same tariff sheets: N/A

Protests and all other correspondence regarding this AL are due no later than 20 days after the date of this filing, unless otherwise authorized by the Commission, and shall be sent to:

CPUC, Energy Division
Attention: Tariff Unit
505 Van Ness Ave.,
San Francisco, CA 94102
mas@cpuc.ca.gov and jnj@cpuc.ca.gov

Southern California Gas Company
Attention: Sid Newsom
555 West 5th Street, GT14D6
Los Angeles, CA 90013-1011
SNewsom@semprautilities.com

[1] Discuss in AL if more space is needed.

ATTACHMENT A

Advice No. 4965-A

Detailed High Opportunity Projects and Programs (HOPPs) Proposal for SoCalGas' Central Water Heater Multifamily Building Solution (CWHMBS) Program

Attachment A

Detailed High Opportunity Projects and Programs (HOPPs) Proposal for SoCalGas' Central Water Heater Multifamily Building Solution (CWHMBS) Program

A. HOPPs Principles and Program Rationale

The foundation for the SoCalGas HOPPs CWHMBS Program resides under four overarching principles, as outlined in Assembly Bill (AB) 802: (1) the proposal addresses high opportunity; (2) greatly increases savings in existing buildings; (3) reaches stranded savings potential in an underserved sector by utilizing new approaches; and (4) enlists interventions that unlock access to building performance data.

The SoCalGas residential sector is entering a period of great change with new entrants, new innovative energy efficiency programs, and government regulations promising to reshape the market in the upcoming years. Residential existing buildings offer great potential for energy savings through the implementation of energy efficiency building upgrades. In California alone, there are a total of 10 million existing single family homes and over 3 million existing multifamily units. These two residential segments constitute for 46% of the energy consumption within the state of California.[1]

The multifamily sector alone represents 11% of the state's energy consumption and more than 70% of California's existing multifamily buildings were constructed before there were even any building energy efficiency standards (pre-1978), creating a larger opportunity to reach additional statewide efficiency savings.[2] As illustrated in Figure 1 below, the highest energy uses in multifamily units are water heating (39%) and space heating (22%).[3] The CWHMBS Program is designed especially to capture the stranded energy savings potential from water heating equipment.

In SoCalGas territory, the multifamily sector represents 32% (1.7 million) of SoCalGas residential customers and makes up for 22% of the residential energy consumed, approximately 448 MMtherms. As we dive further into SoCalGas's multifamily sector**,** we find that 6% of the multifamily residential energy consumed is from multifamily central water heater system accounts.

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[1] California Energy Commission (CEC). Existing Buildings Energy Efficiency Action Plan. September 2015. p. 11,14.

[2] California Energy Commission (CEC). Existing Buildings Energy Efficiency Action Plan. September 2015. p. 14.

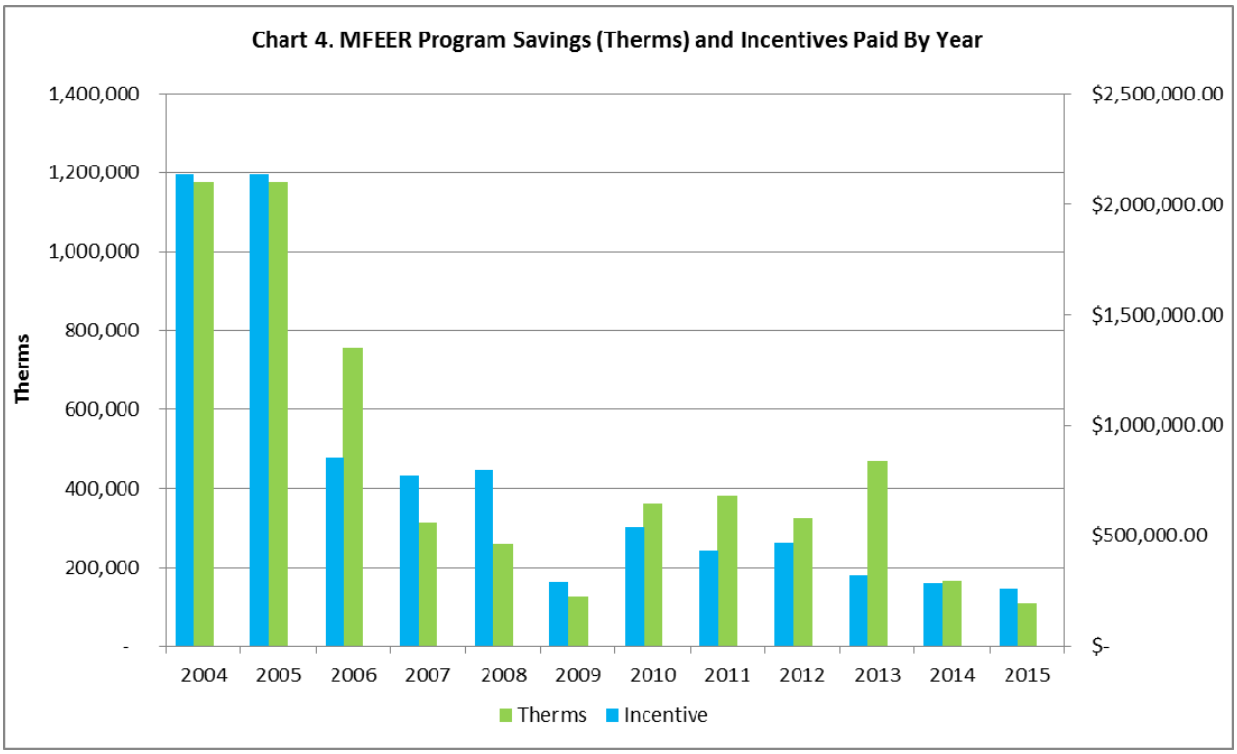
[3] *I.d.*

Furthermore, the SoCalGas multifamily sector poses an underserved segment as it relates to energy efficiency. In the 2013-2015 program cycle, the SoCalGas multifamily program offerings only reached 51% of their savings targets, leaving 1,905,000 therms to still be saved. In addition, program participation in SoCalGas' multifamily energy efficiency programs has seen a steady decline and or/little participation. Table 1 and 2 below provide the most recent multifamily programmatic efforts to date for SoCalGas.

Table 1. California Home Upgrade Multifamily Program Figures, 2015

Number of Projects	15
Total Therm Savings	95,177
Total SoCalGas Incentives Paid	$457,000

Table 2. MFEER Program Savings (therms) and Incentives Paid, 2004-2015



Given this large opportunity, SoCalGas CWHMBS program will utilize a bundled measure approach by requiring five distinct high impact energy and water savings measures be upgraded. It will specifically target the opportunity of central systems within the multifamily sector. In addition, it will utilize a new innovative approach of

allowing pre and post incentive payments, thus encouraging first the initial upgrade and then long-term savings. The CWHMBS will push customers to replace whole boiler systems instead of replacing parts and pieces prolonging the life of an inefficient system.

SoCalGas is aware that energy savings goals in the multifamily sector cannot be accomplished by expanding single-family or modifying commercial building approaches. The critical elements that set the multifamily sector apart include the size and complexity of buildings and systems, variability of ownership structure, and split payment of utility costs between owners and tenants. As a result, the CWHMBS program also incorporates an intervention that unlocks access to building performance data, specifically requiring customers to enroll in a hot water usage monitoring and metering service agreement, thus providing owners the opportunity to properly manage costs and attain a greater understanding of its building system, specifically their water heating system which constitutes, on average, 39% of the buildings operating cost.[4]

The CWHMBS Program specifically targets existing multifamily sector buildings and provides incentives for upgrades to stranded assets. Based on the recognition of the facts previously mentioned, the CWHMBS Program focuses on a portfolio of high impact gas and water savings measures that capture a large potential of stranded energy savings and will provide new flexible incentive options that have not been done before. In addition, the bundled measure approach is ideally suited to assist SoCalGas and its partners in transforming the multifamily market in becoming a more energy efficient sector.

B. General Program Description

The CWHMBS Program is a bundled measure program that addresses stranded opportunities within the multifamily sector. Specifically, the program will provide incentives for the upgrade of both central domestic hot water system and water usage improvements, thus capturing a multi-measure approach and stranded energy savings that would have been otherwise overlooked. The CWHMBS Program will target owners of existing multifamily master metered buildings for a high impact of energy savings through water heating. The CWHMBS Program will be implemented in collaboration among SoCalGas and Metropolitan Water District (MWD), allowing for the CWHMBS Program to be evaluated by monitoring two key metrics, energy savings (natural gas) and water savings (gallons).[5]

The CWHMBS Program is designed to incentivize projects to go from an existing condition baseline to or above code in order to encourage customers to implement

[4] *I.d.*

[5] The CWHMBS program is being proposed as a core SoCalGas offering and will not seek a co-fund agreement with its water partner MWD in its initial implementation. Incentives for water savings would be paid by the water partner.

upgrades that would not have been completed absent the program incentive. These incentives would be provided both on pre- and post-measurement of energy savings. This pre- and post-measurement incentive strategy, which will be facilitated by metered data, will also help to collect the necessary information needed for energy savings evaluation. Additionally, in support of participants employing the program's required upgrades, this program will offer data access by proactively providing whole-building gas usage information to building owners.

Given that the program will be providing incentives calculated based on existing conditions, the program will be implemented and evaluated simultaneously. The evaluation will be conducted by an external evaluation, measurement, and verification (EM&V) contractor, as described in Attachment B. The evaluation will deliver preliminary results one year after the start of the data collection and will deliver annual reports at the end of each program year. Further details on the EM&V contractor responsibilities can be found below in Table 2.

The CWHMBS Program will aim to achieve at least 15% reduction in both gas and water consumption for each project.[6]

Full implementation of the CWHMBS Program is anticipated in August 2016. To facilitate consistency, coordination, and communication, SoCalGas will work with a program implementer for services such as marketing, auditing, and installation of the upgrades. The program implementer will be hired by SoCalGas through a competitive solicitation process.

C. Intervention Strategy and Market Barriers Addressed

Once the CWHMBS Program is implemented, SoCalGas will evaluate the effectiveness of the CWHMBS Program in achieving cost-effective energy savings in the multifamily segment. Should the approach be determined viable, the data could inform an expansion of the CWHMBS Program to other residential segments. The multifamily represents a large unserved segment to program administrators attempting to promote and implement energy and water efficiency. The segment resides in a diverse and complex sector, and any investment in infrastructure needs to be thoroughly evaluated. Opportunities for addressing energy and water savings in the multifamily segment fall into two main categories: central building systems and common areas. Unfortunately, central building systems are often the most overlooked opportunity in achieving the maximum amount of energy and water efficiency in multifamily buildings due to their upgrade costs. Multifamily owners identify areas of cost reduction in their daily activities but primarily focus on simple common area upgrades, ignoring the energy savings that could be had from building systems in which they own.

[6] We will not impose any minimum requirement for expected savings for each CWHMBS project, but we will encourage proposals with forecast savings of at least 15% of baseline consumption levels.

SoCalGas believes that the following intervention strategies are the key approaches to address specific market barriers in order to increase adoption of targeted energy efficiency improvements. Table 2 below provides examples of some of the common barriers faced by the multifamily segment in regards to energy efficiency improvements and the intervention strategies that the CWHMBS Program will utilize to overcome those barriers.

Table 2. Multifamily Segment Barriers and the CWHMBS Intervention Strategies

Multifamily Segment Barriers In Implementing Energy Efficiency (EE)	CWHMBS Intervention Strategies
Low cost of gas and energy efficient upgrades are often more costly than standard equipment[7]	The CWHMBS program will offer an upfront rebate (i.e., "pre-measurement" post installation incentive) to the customer for a portion of the installed upgrade measures.
Size and complexity of buildings and systems[8]	The CWHMBS Program will provide technical assistance, energy audits, and evaluation support in regards to the required upgrades.
"Split incentive barrier" - split payment of utility costs between owners and tenants[9]	The CWHMBS program targets owners of central water heating systems which will drive much larger energy savings and, in turn, will create value for the owner in costs and improved environmental benefits for its tenant.[10]
No current intervention strategies enable central water heater system upgrades and access to data monitoring	The CWHMBS program utilizes a new an integrated multi-measure approach that is allowed by the HOPPs framework and incorporates a measure for data monitoring.

[7] Department of Energy. Energy Star for Commercial Kitchens: Helping Customers Manage Costs Through Energy Savings. July 2013.
[8] 2010-2012 MFEER Process Evaluation Final Report. April 15, 2013.p.2
[9] *I.d.*
[10] By only targeting central water heating systems (owner pays for energy costs) we eliminate the split incentive barrier for upgrades on gas measures.

In addition, the CWHMBS program incorporates many of the Multifamily Subcommittee's "California Home Energy Retrofit Coordinating Committee" (MF HERCC) published report's recommendations for multifamily energy retrofit programs. The recommendations incorporated in the CWHMBS program are outlined in Table 3 below.

Table 3. 2015 MF HERCC Report Recommendations and the Applicable CWHMBS Strategies

MF HERCC Recommendations	CWHMBS Strategies
Streamline Program Participation Process – Improve the delivery model[11]	SoCalGas will leverage existing technology to allow for direct entry and file uploads of project data by participating contractors, thus reducing manual input by processing personnel. Existing SCG database technology also allows for automated customer notification following system workflow updates that impact the customer and or program staff. Enhancements to SoCalGas' database will incorporate advances in technology to help reduce cost as they become available.
Streamline Program Participation Process – Program Coordination[12]	For CWHMBS, SPOCs will act in the delivery of the program to the property owners and continue to work with the owners throughout the implementation and follow-up as a resource and representative of SoCalGas. SPOCs will maintain the relationship with MF owners for programs besides CWHMBS by identifying additional program participation opportunities for other properties within a portfolio and working to advocate on behalf of the customer.
Streamline Program Participation Process – Improve the delivery model[13]	The SPOCs, Program Manager or Program Consultant will provide customers with participation and measure requirements. A basic assessment of the domestic hot-water

[11] Multifamily Subcommittee of the California Home Energy Retrofit Coordinating Committee. *MF HERCC Recommendations Report 2015 Update*. January 25, 2015. p. 9

[12] *I.d.* p.10

[13] *I.d.*

	distribution system will be a Program requirement and will be part of the application. The assessment will provide the customer and their contractor system and program information to make system upgrade decisions.
R**efine Incentive** S**tructures – Simplicity and flexibility**[14]	The CWHMBS program streamlines the incentive structure by providing a flat rate per dwelling incentive and offers a reduction in up-front costs by providing a pre-measurement incentive.

D. Program Structure

To successfully implement the CWHMBS Program, SoCalGas will work with a third party implementer to perform the initial market assessment and provide a list of targeted customers. This initial market assessment will be a collaborative effort between SoCalGas and the implementer and will target multifamily property owners by leveraging existing relationships that have been established through SPOCs and lists such as TCAC to outreach to property owners. The program will also work with vendors, installers, and retailers to further promote the program. The implementer will then provide the necessary marketing and outreach materials that will help guide program participants. These materials will be designed to build customer awareness of central water heater system upgrades to multifamily buildings and the many corresponding benefits of improving the energy savings potential. In collaboration with MWD, SoCalGas will advise the implementer about the energy and water components to ensure program consistency. Lastly, the implementer will be responsible in offering technical assistance on upgrades, conducting facility inspections as appropriate and metering for the program (additional details on meter requirements can be found under incentive structure and Attachment B). SoCalGas will conduct an expedited targeted competitive solicitation process to hire a third party implementer. SoCalGas will also seek support for EM&V for the roles listed in the following table as well as the work detailed in Attachment B. Table 3 below provides a summary of program responsibilities. SoCalGas, in collaboration with the MWD, will be responsible for the overall program design and any modifications needed for the program.

[14] *I.d.* p.14

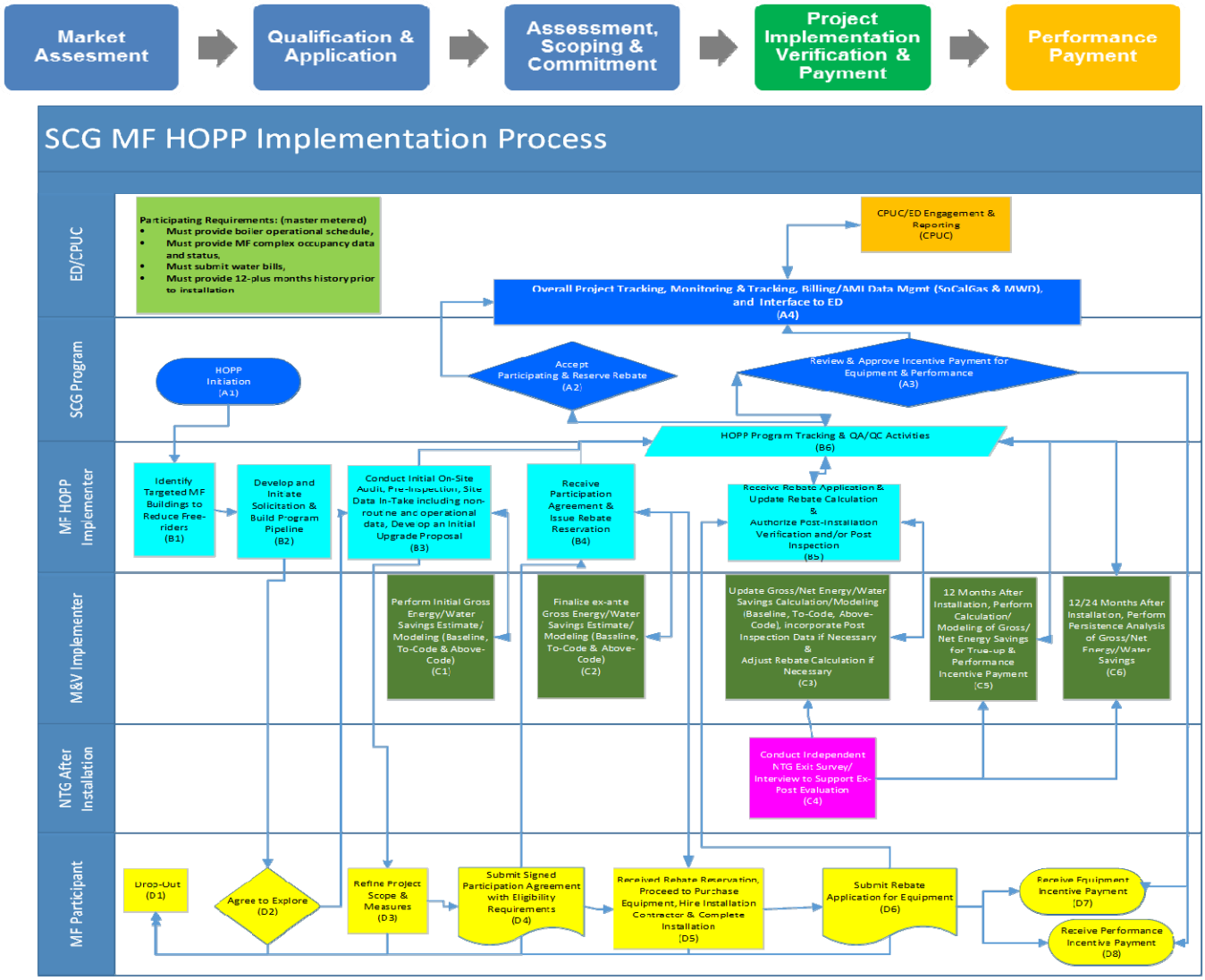
Table 4. Summary of Program Responsibilities

SoCalGas Responsibilities	MWD Responsibilities	Implementer Responsibilities	EM&V Contractor Responsibilities
Program design and project management	Provide funds for Water measure incentives only	Conduct outreach and marketing	Analyze billing/AMI, independent variables (routine), and non-routine variables
Maintain application procedures and materials	Advise on water measures	Offer technical assistance for upgrades	Establish baseline energy performance
Advise on energy and water saving measures		Conducts comprehensive energy audit on the central domestic water system	Normalization
Track program data and provide usage/AMI data to M&E as applicable		Metering	Calculated energy savings and persistent
Monitor M&E analysis		Track all program data	Net-to-Gross adjustment for net energy savings
CPUC and ED Staff Coordination			

1. Program Sequence

The CWHMBS program will follow a standard program sequence in order to provide a simple engagement process for both the implementer and the customer. Figure 3 below provides a descriptive schematic of the program sequence, the key milestones, and a detailed program process flow chart.

Figure 3. CWHMBS Program Implementation Sequence and Process



2. Customer Eligibility

Multifamily property owners and managers[15] (5 or more units) with an active SoCalGas account that are served by a central water heating system with a recirculating loop, and have at least 12 months of historical billing data, will be eligible to participate in the CWHMBS Program. Participating properties must not have been built later than 1984.[16]

[15] Must have owner authority.

[16] Based on the final 2010-2012 MFEER Evaluation report, 84.1% of Multifamily buildings were constructed before 1989 within the SoCal Edison territory.

In addition, customers may participate in the CWHMBS program provided they utilize a participating contractor per program guidelines.

Participating contractors will work with the contracted implementer and will serve as a point of contact for customers and are responsible for submission of all program requirements. Participating contractors will install or ensure installation of all measures in accordance with Quality Assurance/Quality Controls and Measures Installation Standards guidelines in accordance with applicable contractor agreements.
All CWHMBS Program participants must install all five required program measures per each central system which are listed below in Table 4 under the Measures Incented section.

3. Measures Incented

The CWHMBS Program objective is to promote long-term energy benefits[17] through a comprehensive building solution. The energy efficiency measures identified represent the best measure mix with the highest potential for both energy (therms) and water savings.

Table 5. Measure Treatment by Measure Category

End Use	Measure	Intervention Strategy	Source Savings
Water Heating	Central storage water heater or boiler	Pre measurement (post install) incentive and post-measurement incentive	Normalized metered based
Water Heating	Central water heater modulating temperature controller (one per circulating loop)	Pre measurement (post install) incentive and post-measurement incentive	Normalized metered based
Water Heating	Hot water usage monitoring and metering service agreement	Pre measurement (post install) incentive and post-measurement incentive	Normalized metered based
Water	Low flow shower heads or Low Faucet Aerators	Pre measurement (post install) incentive	Deemed
Water Heating	Circulating demand pump controller	Pre measurement (post install) incentive and Post-measurement incentive	Normalized metered based

[17] The CWHMBS program is designed to meet the energy efficiency needs of SoCalGas customers and thus include only gas measures.

4. Incentive Structure

The CWHMBS Program will utilize a hybrid incentive approach designed to encourage customers to capture deep energy savings and to leverage a metered approach to collect data. Upon completion of an audit, customers that agree to the retrofits after education and outreach will be informed of their eligible incentives:

i. Pre-Measurement Incentive[18,19]

Customers who participate in the CWHMBS program are eligible to receive the standard up front post installation incentive based on the following tiers:

a) **Tier 1:** For buildings with less than a 100 units, a $150 per unit incentive will be paid and will be capped at 40% of the total project measure cost.
b) **Tier 2:** For buildings with 100 units or greater, a $225 per unit incentive will be paid and will be capped at 50% of the total project measure cost.

ii. Post-Measurement Incentive

Program participants who comply with all program requirements are eligible to receive a post-measurement incentive of $1.00/therm after 12 months of main metered normalized data on energy saved. Once the post measurement has been conducted evaluated and verified, SoCalGas would only pay for incentives energy savings materialized.

This performance based approach will assist property owners with making informed decisions, identify measures for energy savings, and to maximize energy and water reductions for each multifamily sector building.

5. Funding Sources

Program applicants will be responsible to cover the costs of all installed measures. These encumbrances may include and are not limited to the estimated capital costs as well as identifying the sources of funding for the project. However, incentives will be provided through the program, and program implementers will provide program-related services, as shown in Table 3.

[18] These pre-measurement incentives have been developed to minimize the risk of the participant. The Percentage caps on the total project measure costs is necessary for this proposal to mitigate the cost burden on ratepayer dollars.

[19] For ease of program incentive structure and customer convenience, water measures will be paid based on deemed rebates. MWD will be responsible for covering the cost of these incentives only.

Program Savings Potential and Program Objectives

1. Program Objectives

The program objectives for the CWHMBS Program fall into two categories: performance and process. The performance objectives of the CWHMBS Program are objectives that will be used to assess the performance of the HOPPs program to ensure it is meeting expectations and is on a path to succeed. The performance objectives will be carefully tracked and will be reported to the Commission so that SoCalGas can ensure that program progress can be conveyed properly. The process objectives are aimed at ensuring that a strong infrastructure for program implementation and evaluation that could support the scaling up of the CWHMBS Program in the future.

Program Goals and Objectives:

- Assess incentive levels to identify and promote strategies to align financial and energy benefits for multifamily owners**;**
- Determine whether this model (bundled measures targeting central water heater system) approach is effectively more enticing to segment candidates to participate in ratepayer-funded programs and achieve greater energy savings;
- Demonstrate an effective pay-for-performance method to determine savings using weather normalized meter consumption data in an underserved segment; and;
- Establish a scalable model for the multifamily existing building sector by incentivizing market participants to achieve measureable energy savings.

2. CWHMBS Program Forecasted Energy Efficiency Savings

Based on market potential, the program's aspirational goal and the objectives mentioned above, SoCalGas estimates this program to achieve 1.3 MMtherms over the next four years. The table below is the program's annual estimates of potential MMtherms savings for the next four years.

	2016[20]	2017	2018	2019
Gas Savings (MMTherms)	0	0.394	0.433	0.476

[20] Program requires 12 months of post measurement data so energy savings will not be reported in 2016.

CWHMBS Program Budget

In the December 30, 2015 Ruling, the Commission has authorized PAs to draw down unspent funds, or utilize funds from existing programs or use funds authorized for PA EM&V studies. SoCalGas provides the estimated CWHMBS program budget below.[21]

		2016	2017	2018	2019	Total
	Administrative Costs	60,000	60,000	60,000	60,000	**$240,000**
	Marketing Costs	**40,000**	**40,000**	**40,000**	**30,000**	**$150,000**
Direct Implementation	**Incentive Costs**	200,000	350,000	450,000	500,000	**$1,500,000**
Direct Implementation	**Implementer Costs**[22]	100,000	200,000	200,000	100,000	**$600,000**
	Savings Measurement	50,000	50,000	50,000	50,000	**200,000**
	Total Initial Program Budget	450,000	700,000	800,000	740,000	**$2,690,000**

[21] Does not include incentive funds provided by MWD for water savings.
[22] Includes external implementer fees only.

ATTACHMENT B

Advice No. 4965-A

Evaluation, Measurement & Verification (EM&V) Plan

Attachment B: Evaluation, Measurement & Verification (EM&V) Plan

A. Description of Program

This program is targeting energy savings utilizing a bundled measure whole building approach by leveraging existing approved measures to create a single solution which includes energy use in real time boiler consumption monitoring. This program will require a bundle of five measures to be installed as early-replacement and data sharing agreement with a contracted vendor.

B. Measure Treatment

The CWHMBS Program objective is to promote long-term energy benefits through a comprehensive building solution. The energy efficiency measures identified represent the best measure mix with the highest potential for both energy and water savings.

Table 4. Measure Treatment by Measure Category

End Use	Measure	Intervention Strategy	Source Savings
Water Heating	Central Storage Water Heater or Boiler	Pre measurement (Post Install) incentive and Post-Measurement Incentive	Normalized Metered Based
Water Heating	Central Water Heater modulating temperature controller (One per circulating loop)	Pre measurement (Post Install) incentive and Post-Measurement Incentive	Normalized Metered Based
Water Heating	Hot Water usage monitoring and metering service agreement	Pre measurement (Post Install)	Not applicable
Water	Low Flow Shower Heads or Low Faucet aerators	Pre measurement (Post Install) incentive	Deemed
Water Heating	Circulating demand pump controller	Pre measurement (Post Install) incentive and Post-Measurement Incentive	Normalized Metered Based

C. Savings Calculations General Methodology & Background

A whole building approach, described as Option C Whole Facility of the industry-standard IPMVP[1] will be employed to determine the natural gas and water, savings for each participant, and for the program. Under Option C, a measurement boundary is drawn around the whole facility, and data from all of the facility's energy meters are used to determine the energy savings. Option C determines the collective savings from all measures implemented in the treated facility, and is most appropriate given the characteristics of the target market and Measurement &Verification (M&V) protocol of this program where:

- Baseline utility data is available to establish a facility's baseline energy performance
- The expected savings could exceed 10% and is large in comparison with the random or unexplained variation in the energy use data
- No significant change to the facility is expected before or after program intervention
- There is a reasonable correlation between energy consumption and routine (independent) variables
- Non-routine adjustments can be made to account for unexpected changes, as necessary

Regression-based energy models may be used to describe how selected parameters such as weather and occupancy rate 'explain' the change in baseline period energy use. Typically, the parameters with the most explanatory power for energy use in a facility are used. While these models do not explain all energy use variations, if the savings are large in comparison, then the determination of savings is more reliable.

Two types of whole facility data are expected in the targeted multi-family (MF) buildings: monthly billing data from utility natural gas bills and short time interval natural gas data from advanced metering infrastructure (AMI) or 'smart' meters. We will refer to the monthly billing data as 'monthly data' and the short-time interval data as 'AMI data.' Both types of data may be used in the whole building approach. In general, monthly data may be used with linear ordinary least squares regressions, while AMI data is used with advanced regression techniques that generally exhibit a degree of serial correlation. The differences in M&V analyses of data using different measurement frequencies is discussed in ASHRAE Guideline 14 Measurement of Energy, Demand,

[1] International Performance Measurement and Verification Protocol (IPMVP), 2012, or IPMVP Core Concepts, 2014, available from the Efficiency Valuation Organization (EVO), at www.evo-world.org.

and Water Savings, 2014.[2] ASHRAE Guideline 14 is a more technically detailed M&V guideline than IPMVP. Therefore, concepts and formulas from ASHRAE Guideline 14 will be used in the estimation of savings and uncertainties for this program.

D. Data Collection Strategy

Required Energy Data

The required energy data to be used in the whole building approach includes monthly gas and water bills during the baseline, installation, and post-installation periods. If AMI meters are present, then hourly reads of natural gas use over these periods will be collected. If AMI meters are not present, then monthly billing data and meter read dates are required so that the duration (in days) of the billing period may be determined. We expect the predominant form of energy and water use data to be from monthly billing periods.

To ensure there is sufficient baseline data for developing a baseline regression model, participating MF buildings should have:

- At least one active gas and water meter serving the entire facility at the service address
- At least one year of continuous gas consumption and water use data prior to program intervention

A minimum of twelve months of both monthly data and/or AMI data will be collected for the period prior to the installation of the program measures; this is referred to as the baseline period. The same data will be collected for the twelve month period following confirmation of measure installation and commissioning; this is referred to as the reporting period. It is often the case that less than twelve months of AMI data will be available for participating buildings. In such cases, we will evaluate the accuracy of AMI models on a case-by-case basis.

Data Quality

The quality of data will be evaluated to ensure data collected, either through manual reads or AMI, is continuous and accurate. The collected data will be reviewed to assure there are enough acceptable continuous data to complete the defined analysis procedures. Facilities with billing data gaps, estimated billing data, and missing data will be flagged, and may require additional data collection to meet the twelve months of continuous data requirement during the baseline and reporting period.

[2] American Society of Heating, Refrigeration, and Air-conditioning Engineers (ASHRAE) Guideline 14, Measurement of Energy, Demand, and Water Savings, 2014. Available at www.ashrae.org.

Independent Variables

MF buildings are expected to serve water heating load through their hot water delivery systems. For this program, the gas tariff is assumed to have minimal impact on energy consumption. The influencing parameters expected to explain water heating energy use are therefore ambient weather conditions which drive hot water supply temperature as well as the occupant's need for warm or cool showers throughout the seasons, and the water use rate which is indicative of the demand for hot water production.

Weather

Ambient dry-bulb temperatures will be collected for each participant from a local weather station nearby the building's climate zone for the period coincident with the energy use data (baseline and reporting period).

Water Use

The monthly water use, as shown on monthly water bills, will be collected from each participating owner; this will be a requirement of the program. After ambient temperatures, water use is expected to be a primary driver of gas use in these buildings. A common exception is the use of water for landscaping. In such cases when water use is an independent variable for a building's natural gas energy model, curtailments in its use may cause inaccurate estimates of building gas use. To account for non-routine events the EM&V plan will include a few solutions based on if a building has or does not have landscaping on site. Water bill data for buildings without landscaping energy use may have some explanatory power in regression analysis of natural gas usage, and we will use this data when available (water bill data may be very difficult to obtain). For buildings with landscaping water use, an alternate and more direct parameter describing hot water use would be occupancy rate. We will track monthly occupancy rate of the buildings, as well as collect historical occupancy rate for the baseline period, and use this variable in the savings analysis.

Occupancy Rate

The number of units being occupied will be collected. The number of people living in each unit would provide valuable information, but this data can be difficult to obtain. Data for this parameter will be collected for the period coincident with the energy use data (baseline and reporting period), and will be used to determine whether major shifts in building occupancy have occurred in these periods. If so, this information will be used as part of a non-routine adjustment to the buildings baseline or post-installation energy use. (Non-routine adjustments are described briefly below.) Discussions with each building owner will be conducted to identify a normal year level of occupancy. If no normal year occupancy rate can be identified, the reporting period occupancy rate will be used in normalized savings calculations, as described below.

E. Calculations, Regression Models and Description of Normalization

Monthly Data

The following methodology describes the determination of natural gas therm normalized metered energy consumption and savings.

To estimate gross savings for each customer, a regression model using twelve months of energy use data, and corresponding heating degree-days (HDD), cooling degree days (CDD), and occupancy rate (OC) will be developed. This model, and its variables are checked for explanatory power and accuracy, and the process is repeated until a valid regression model is achieved. After twelve months of reporting period data is collected, the normalized metered energy use and savings is determined. Program gross savings are determined from the cumulative sum of savings from all participants. The following provides a detailed step-by-step procedure of this analysis.

Step 1. Fit a degree-day regression model using the baseline period energy, weather, and production rate variables for each HOPP customer. The model is shown in equation (1).

$$E_n = \alpha_n + \beta_H HDD_n + \beta_C CDD_n + \gamma_W W_n + \varepsilon_n \quad (1)$$

Where:

$E_n =$	Energy consumption per day for baseline period n
$\alpha_n =$	Baseload energy consumption per day for baseline period n, estimated by the regression
$\beta_H =$	Heating coefficient estimated by the regression
$T_{amb} -$	Ambient temperature
$HDD_n =$	Heating degree days per day at the base temperature (τ_H) during baseline period n, based on daily average ambient temperatures on those dates, where $HDD_n = \sum_{i=0}^{n}(\bar{T}_{amb,i} - \tau_H)$
$\beta_C =$	Cooling coefficient estimated by the regression
$CDD_n =$	Cooling degree days per day at the base temperature (τ_C) during baseline period n, based on daily average ambient temperatures on those dates, where $CDD_n = \sum_{i=0}^{n}(\bar{T}_{amb,i} - \tau_C)$
$\gamma_W =$	Water use coefficient estimated by the regression
$W_n =$	Water use per day reporting period n (i.e. avg. gallons used per day)
$\varepsilon_n =$	Regression residual

Examine the statistical significance of each independent variable (t-statistic for each coefficient should be greater than 2). Adjust the heating and cooling balance point temperatures and repeat the regression. Eliminate the extraneous variables. Calculate the model goodness-of-fit and accuracy metrics CV(RMSE) and mean bias error (MBE) to determine whether the model can be improved.

$$CV(RMSE) = \frac{\sqrt{\frac{1}{n}\sum_{i=1}^{n}(E_i - \hat{E}_i)^2}}{\hat{E}} \quad (2)$$

$$MBE = \frac{1}{n}\sum_{i=1}^{n}(E_i - \hat{E}_i) \quad (3)$$

Where:

n = number of points used to develop the model,
E_i and $\hat{E}_i$ are the actual and predicted energy use values at time i.

Record the goodness-of-fit metrics CV(RMSE) and the mean bias error (MBE) and the selected heating and cooling balance point temperatures.

Step 2. After twelve months of reporting period data has been collected, fit a degree-day regression model using the reporting period energy, weather, and production rate variables for each HOPP customer.

$$E_m = \alpha_m + \beta_H HDD_m + \beta_C CDD_m + \gamma_W W_m + \varepsilon_m \quad (4)$$

Where:

$E_m =$	Energy consumption per day for reporting period m
$\alpha_m =$	Baseload energy consumption per day for reporting period n, estimated by the regression
$\beta_H =$	Heating coefficient estimated by the regression
$HDD_m =$	Heating degree days per day at the base temperature (τ_H) during reporting period m, based on daily average ambient temperatures on those dates, where $HDD_m = \sum_{i=0}^{n}(T_{amb,i} - \tau_H)$
$\beta_C =$	Cooling coefficient estimated by the regression
$CDD_m =$	Cooling degree days per day at the base temperature (τ_C) during in reporting period m, based on daily average ambient temperatures on those dates, where $CDD_m = \sum_{i=0}^{n}(T_{amb,i} - \tau_C)$
$\gamma_W =$	Water use coefficient estimated by the regression
$W_m =$	Water use per day reporting period m (i.e. avg. gallons used per day)
$\varepsilon_m =$	Regression residual

Step 3. Normalize the baseline period and reporting period energy use models to typical meteorological year (TMY) weather and water use data. Use the TMY data set for the MF building's climate zone. This is accomplished by inputting the TMY and water use data from the reporting period year into the baseline and the reporting period models.

Step 4. Calculate the savings by subtracting the normalized reporting period energy use from the normalized baseline period energy use. Calculate the savings uncertainty

using equation 5 below, which is from ASHRAE Guideline 14-2014 for weather dependent models with uncorrelated residuals.

$$\Delta E_{base,norm} = 1.26 t_{(1-\alpha/2),n-p} \frac{\bar{E}_{b,g}}{\bar{E}_{base,n}} \sqrt{MSE \left(1 + \frac{2}{n}\right) g} \quad (5)$$

Where:

n =	number of points in baseline period
g =	number of points in typical year
p =	number of parameters in the baseline or reporting period regression models
$t_{(1-\alpha)/2,n-p}$ =	100(1-α)/2 percentage point of a t-distribution with n-p degrees of freedom (see table below, this specifies the confidence interval)
MSE =	$\frac{1}{n-p}\sum_{i=1}^{n}\left(E_i - \hat{E}_i\right)^2$, the mean squared error of the regression model
$\bar{E}_{b,n}$ =	mean energy use per period in the baseline period
$\bar{E}_{b,g}$ =	mean of the predicted normalized baseline energy use in the typical year, i.e. $\ddot{E}_{b,g}/g$

Selected values of student's t-statistic are shown in Table 1 for various confidence intervals and values of n – p (degrees of freedom). Note that for monthly models and a year of baseline data, n = 12. The number of parameters in the monthly model will be on the order of 9 (n = 12, p = 3).

Table 1. Selected t-statistics.

	Confidence			
n-p	68%	80%	90%	95%
5	1.00	1.48	2.02	2.57
10	1.00	1.37	1.81	2.23
15	1.00	1.34	1.75	2.13
20	1.00	1.33	1.73	2.09
25	1.00	1.32	1.71	2.06
Infinite	1.00	1.28	1.65	1.96

To be discernable for each MF building, the savings uncertainty should not exceed half of the estimated savings amount, expressed as a percentage of annual energy use. This means that the savings uncertainty should not be more than 50% of the estimated savings, a large value which we anticipate the projects will not approach. We will record the savings uncertainty for each HOPP customer.

Water Savings

Water savings will follow a similar monthly billing analysis as described above for gas savings, however there may not be independent variables and data we can collect that explains water use. Ambient temperature and operation hours may provide some explanatory power, and we will attempt to collect this data for each participant. However, if no relationship is found between water use, ambient temperatures, and operation hours, we will quantify water savings based on annual baseline to reporting period year totals. We will also work with the municipal water districts for insights on how to determine water savings for this program.

AMI Data

The following methodology describes the use of hourly AMI interval data when developing whole building energy models.

To estimate gross savings for each customer using their AMI data, a regression model using up to twelve months of energy use data, and corresponding ambient dry-bulb temperature (T) data will be developed. The model and its variables will be checked for explanatory power and accuracy. Should the model be unsatisfactory, the input parameters will be adjusted and the regression process repeated until a valid regression model is achieved. After twelve months of reporting period data is collected, the normalized metered energy use and savings is determined. Program gross savings are determined from the cumulative sum of savings from all participants. The following provides a detailed step-by-step procedure of this analysis.

An advanced regression modeling algorithm developed by Lawrence Berkeley National Laboratory will be used to develop energy models for this program. A detailed description of this model is provided in Appendix 1.

Step 1. Fit a time-of-week and temperature model using the baseline period energy and dry-bulb temperature for each HOPP customer. The model is shown in equation (6).

$\hat{E}_{o,b}(t_i, T(t_i)) - \alpha_i + \sum_{j=1}^{n} \beta_j T_{c,j}(t_i)$, and

$\hat{E}_{u,b}(t_i, T(t_i)) = \alpha_i + \beta_u T(t_i)$, and

$$\hat{E}_b = \sum_{i=1}^{n} (\hat{E}_{o,b} - \hat{E}_{u,b}) \quad (6)$$

Where:

The coefficients, α_i and β_i are the regression coefficients for the time indicator and temperature variables t and T, respectively, and

$\ddot{E}_{o,b}$, $\ddot{E}_{u,b}$, and $\ddot{E}_b$ are the occupied, unoccupied, and total baseline energy use, respectively.

The model coefficients may be determined using the Python or R programs or the M&V analysis module in PG&E's Universal Translator, version 3, as described in Appendix 1. Due to their extensive number of components, it is impractical to provide these models in spreadsheets.

Calculate the model goodness-of-fit and accuracy metrics CV(RMSE) and mean bias error (MBE) using equations (2) and (3) to determine whether the model can be improved.

Good values of CV(RMSE) and MBE are as low as possible. For daily gas models, good values of CV(RMSE) are about 10%, and for MBE less than 1%. If the values are too high and not acceptable, repeat the regression after adjusting input parameters or by eliminating the extraneous variables. Record the metrics CV(RMSE) and MBE.

Step 2. After twelve months of reporting period data has been collected, fit a time-of-week and temperature model, using the reporting period energy and dry-bulb temperature from the reporting period for each HOPP customer.

$\hat{E}_{o,r}(t_i, T(t_i)) - \alpha_i + \sum_{j=1}^{n} \beta_j T_{c,j}(t_i)$, and

$\hat{E}_{u,r}(t_i, T(t_i)) = \alpha_i + \beta_u T(t_i)$, and

$$\hat{E}_r = \sum_{i=1}^{n} (\hat{E}_{o,r} - \hat{E}_{u,r}) \quad (7)$$

Where:

The coefficients, α_i and β_i are the regression coefficients for the time indicator and temperature variables t and T respectively, and

$\ddot{E}_{o,r}$, $\ddot{E}_{u,r}$, and $\hat{E}_r$ are the occupied, unoccupied, and total reporting period energy use, respectively.

Step 3. Normalize the baseline period and reporting period energy use models to typical meteorological year (TMY) weather data. Use the TMY data set for the building's climate zone. This is accomplished by inputting the TMY data from the reporting period year into the baseline and the reporting period models.

Step 4. Calculate the savings by subtracting the normalized reporting period energy use from the normalized baseline period energy use. Calculate the savings uncertainty

using equation 5 below, which is from ASHRAE Guideline 14-2014 for weather-dependent models with correlated residuals.

$\Delta E_{save} = \sqrt{\left(\Delta \hat{E}_{b,norm}\right)^2 + \left(\Delta \hat{E}_{r,norm}\right)^2}$, where

$\Delta \hat{E}_{b,norm} = 1.26 t_{(1-\alpha)/2,m'-p} \frac{\bar{E}_{b,g}}{\bar{E}_{b,n}} \sqrt{MSE\left(1 + \frac{2}{n'}\right) g}$, and

$\Delta \hat{E}_{r,norm} = 1.26 t_{(1-\alpha)/2,m'-r} \frac{\bar{E}_{r,g}}{\bar{E}_{r,m}} \sqrt{MSE\left(1 + \frac{2}{m'}\right) g}$ (8)

Where:

n =	number of points in baseline period
m =	number of points in reporting period
g =	number of points in typical year
n' =	n × (1-ρ)/(1+ρ), m' = m × (1-ρ)/(1+ρ)
ρ =	autocorrelation coefficient, see ASHRAE Guideline 14-2014.
p =	number of parameters in the baseline or reporting period regression models
$t_{(1-\alpha)/2,n-p}$ =	100(1-α)/2 percentage point of a t-distribution with n-p degrees of freedom (see Table 1, this specifies the confidence interval)
$MSE = \frac{1}{n-p}\sum_{i=1}^{n}\left(E_i - \hat{E}_i\right)^2$,	the mean squared error of the regression model
$\bar{E}_{b,n}$=	mean energy use per period in the baseline period
$\bar{E}_{b,g}$ =	mean of the predicted normalized baseline energy use in the typical year, i.e., $\ddot{E}_{b,g}/g$

Selected values of student's t-statistic are shown in Table 1 for various confidence intervals and values of n – p (degrees of freedom). Note that for hourly models and a year of baseline data, n = 8760. The number of parameters in the temperature and time-of-week (TTOW) model will be on the order of 168 (hours of week) + 10 (temperature segments) + 1 (PR segments) ≈ 190. This means that n – p is very large. We use the n – p = ∞ row from Table 1 by convention.

To be discernable for each building, the savings uncertainty should not exceed half of the estimated savings amount, expressed as a percentage of annual energy use. This means that the savings uncertainty should not be more than 50% of the estimated savings, a large value which we anticipate the projects will not approach. We will record the savings uncertainty for each HOPPs customer.

Program Savings

Program savings will be reported as the total gross savings achieved from each participating building's first twelve month reporting period. That is, only the savings

from the buildings that have completed one year of metering after the measures have been installed will be included in the program savings total. The total savings achieved for that year will be reported with an estimate of the total savings uncertainty. The following equations will be used.

$$E_{tot} = \sum_{i=1}^{PY} E_{sav,i}$$

$$\Delta E_{sav,tot} = \sqrt{\sum_{i=1}^{PY} \Delta E_{sav,i}{}^2}$$

Where:

$E_{sav,i}$ = annual normalized energy savings for customer i

$\Delta E_{sav,i}$ = annual normalized savings uncertainty for customer i

PY = total number of completed projects in current reporting year

Absolute Changes Expressed with a Common Denominator

For each building, the baseline period annual energy use for natural gas will be summed to determine the total annual use without adjustments. Energy use intensities (EUIs) will be determined by dividing by the building's square footage. This process will be repeated using the annual reporting period energy use to determine the post-installation energy use intensity for natural gas. The differences between baseline and reporting period energy use and energy use intensity will be determined. All values will be recorded and used in the program evaluation.

Non-Routine Adjustments

When unexpected or one-time changes occur during the reporting period, non-routine adjustments to the energy savings must be made. Unexpected changes include static factors which are not usually expected to change, examples include:

- Changes to building occupancy
- Changes to building size
- Changes to common area facilities
- Changes to space heating equipment or operations

The baseline conditions of these static factors need to be fully documented during the baseline period, and continually monitored for change throughout the reporting period, so that changes can be identified and proper non-routine adjustments made. The

tracking of conditions may be performed by the building owner, a project implementer, or a third-party verifier. Engineering calculations will be used to quantify the energy impact from such changes using IPMVP Option A, retrofit isolation techniques, and used in adjusting the energy savings. To the degree possible, energy impacts from non-routine events will be calculated based on actual measurements.

Water non-routine events: Anticipated water-related non-routine events are related to the use of water for landscaping in some buildings.

Optional: Validating Models for a Population Sample

An optional task may be explored to validate our assumptions that accurate models may be developed and used to quantify the savings and uncertainty for the amount of savings expected for each customer. This activity would include collecting a sample of annual monthly billing and/or AMI data for MF buildings in SCG service territory. The data would need to be from MF buildings where no known energy efficiency measures have been implemented during the year of data collected.

Using this data, monthly energy models would be developed as described above in the Monthly Data section. Similarly, for AMI data, hourly models would be developed as described above in the AMI data section. For each model, its goodness of fit and accuracy metrics CV(RMSE) and MBE would be logged. In addition, using the formulation for calculating annual savings uncertainty as described by equations 5 and 8, the savings uncertainty would be estimated for different levels of savings.

Results of these runs as well as MF building location, size, and other parameters of interest would be stored in a spreadsheet or database. These results could be queried to determine where this whole building approach would work well (good model fit, low uncertainties) and where it would not work well. The results may help determine how well small, medium, and large MF buildings are suited to this approach, or whether there are more favorable climate zones. In addition, the results may enable a screening criteria to be developed that helps assure future similar AB 802 projects and programs are successful. These methods are documented in the PG&E-sponsored Emerging Technology Report completed in 2013.[3]

[3] "Commercial Building Energy Baseline Modeling Software: Performance Metrics and Method Testing with Open Source Models and Implications for Proprietary Software Testing," Project number ET12PGE5312, available at: http://www.etcc-ca.com/reports/commercial-building-energy-baseline-modeling-software-performance-metrics-and-method-testing.

Performance Period and Persistence

Energy savings will be determined at 12 and 24 months after measures have been implemented (reporting period). The 12 month savings estimation, net of non-routine adjustments, will be used to determine savings for each participant. This process will be repeated at 24 months to ensure savings persist throughout and beyond the reporting period. The procedures are as follows: at each milestone, calculate the energy savings and evaluate its pattern with the following steps:

1. Calculate the Adjusted Baseline Energy Use with equation (1) for monthly data analysis, or equation (6) for AMI data analysis, using ambient temperatures and water use from the reporting period.
2. Calculate the Actual Reporting Period Energy Use over the 12 and 24 month reporting periods directly from billing data.
3. Energy savings at the specific milestone is the difference between the Total Adjusted Baseline Energy Use and the Total Reporting Period Energy Use.
4. Chart the Adjusted Baseline Energy Use and the Actual Energy Use each month to determine if savings are accruing properly or whether non-routine events (NRE) have taken place.
5. If evidence exists that an NRE has occurred, alert the program team to investigate. See the Non-Routine Adjustment section for procedures to calculate the impact of the non-routine event.

F. Threshold for Expected Savings

As described in the Savings Calculation section above, the threshold for savings depends upon multiple factors: the amount of anticipated savings expected from the project, the accuracy of the baseline and post-installation models used to calculate savings, the number of monitoring points in the baseline and reporting periods, and the confidence level at which savings uncertainty is reported. These factors combine to provide an estimate of the savings uncertainty for each project. Discernable savings requires that the maximum allowable savings uncertainty be 50% of the reported savings, however this level of uncertainty is certainly too high for stakeholders. The lower the uncertainty the better. With this proposed gross savings approach, we will be able to establish acceptable levels of uncertainty at the project level, as well as for the population of program participants.

This methodology will enable evaluation of typical rules of thumb that are used to establish a threshold for savings, such as a requiring a minimum of 10 to 15% savings on annual energy use when using Option C methods with monthly data.

G. Baseline Adjustments

Baseline adjustments are categorized as routine and non-routine. Routine adjustments to energy use are due to regular and expected changes in influential parameters. In many buildings, these parameters include ambient weather conditions, production rate, and operating schedule. Data for these parameters are collected and used to establish regression-based energy models that describe how baseline or reporting period energy use are adjusted so that savings may be calculated for a common set of conditions. This is the basis for the monthly and AMI data modeling approaches described in the savings calculation section.

Baseline Assumptions

The following is a list of the assumptions used to develop baseline energy models. Additional assumptions have been documented in Section C.

i) The data we collect and use in development of the monthly and AMI-based energy models will be appropriate and have sufficient influence on each building's energy use.
ii) Concurrent data for building production rate (meals per day, customers per day, etc.) may be collected for the entire baseline and post-installation periods.
iii) Natural gas and electricity use in small, medium, and large buildings may be accurately modeled using the monthly and AMI data methods described in Section C.

H. Net-to-Gross Adjustment for Net Energy Savings

The above energy savings calculation and methodology will derive the HOPPs gross energy savings. The proposed M&V protocol will go one step further to identify potential sites and collect NTG data using a generally accepted NTG survey instrument at end of project installation. To minimize free-riders for the program, SoCalGas will conduct the following activities:

1. Target older MF buildings based on county and real-estate records.
2. Conduct an initial customer eligibility assessment at the onset of the project.
3. After the installation is completed, SoCalGas will engage an independent third-party M&E evaluator to conduct the NTG survey developed by the CPUC consultant who conducted the most recent MF impact evaluation. The benefit of conducting an exit NTG survey is to capture timely response and feedback for the project. Please refer to MF HOPP Process flow chart.

By taking these actions, SoCalGas will be able to report both timely and meaningful gross and net savings for this HOPP. Separately, ED will be able to authorize additional ex-post impact evaluation for the MF HOPP.

I. EM&V Process Evaluation

SoCalGas believes to ensure success of this EM&V plan, a proper process evaluation should be incorporated. Below, please find a high level scope of work (Step-1 Project Concept). This process evaluation may include the following:

1) A review of MF HOPP intervention theory against the effectiveness of implementation, including participant targeting and market outreach activities,
2) A review of best practices for performance based program design,
3) A review of this HOPP's ability to overcome MF market barriers as planned,
4) Provide program design and implementation feedback from implementer and program participants (i.e., property owners).
5) A review of HOPP program impact analysis in coordination with the M&V results.
6) The above work can be done in two stages: (1) at the early implementation stage to obtain rapid feedback to support program adjustment/s, (2) full process evaluation at the end of implementation cycle.
7) The above process evaluation should coordinate its activities with the planned NTG survey and analysis.
8) This process evaluation will generate a list recommendations for future program design, implementation as well as improvements for future data collection efforts.

SoCalGas will submit statement of work for M&E step-2 approval when appropriate. Once this HOPP is approved, SCE will augment the M&E roadmap to incorporate this study into the M&E Study Roadmap.

Appendix 1: Description of the LBNL Temperature and Time-of-Week Model

The following description includes paraphrased descriptions of the temperature and time-of-week model (TTOW model). For a more comprehensive description of the modeling algorithm, please consult the publication by Matthieu, et. al.[4]

- A facility's electric and natural gas energy use is generally a function of ambient temperature and the time of week. In some cases, additional parameters influence energy use in buildings, such as humidity and a production variable. The TTOW model may include independent variables in addition to the time-of-week and temperature, if their data are provided in concurrent time intervals (such as hourly or daily time intervals). As the dominant influencing parameters for building energy use is the schedule of operation and ambient temperature, this model description focuses on the use of these parameters.
- The time-of-week parameter is modeled as an indicator variable. This allows some flexibility to define this parameter according to the time-interval of the data. Natural gas energy use data (therms) from advanced metering systems is also available in hourly time intervals from SoCalGas. Therefore, the time intervals used in the TTOW models will be hourly, and models based on daily time intervals will be used if more accurate models are needed. The following description assumes hourly time intervals, but also applies for daily time intervals.
- Each week is divided into hourly intervals (indexed by i), with the first interval from midnight to 1 am Monday morning, the second from 1 am to 2 am, and so on for the 168 hours each week (7 for daily time intervals). A different regression coefficient for each time of week indicator variable, α_i allows each time-of-week to have a different predicted load.
- Energy response to temperature in a building is non-linear but may be modeled as continuous and piecewise linear. At low temperatures, electric energy use may increase as temperatures lower due to more use of heating system equipment such as pumps, fans, and electric heating elements. In moderate temperatures, the building does not require heating and cooling and therefore, energy use is not sensitive to temperature. At warm temperatures, energy use increases with increasing temperature due to use of cooling system equipment. At the highest temperatures, energy use may again be insensitive to temperature as cooling

[4] Matthieu, J.L., P.N. Price, S. Kiliccote, and M.A. Piette, "Quantifying Changes in Building Electricity Use, With Application to Demand Response," IEEE Transactions on Smart Grid, 2:507-518, 2011

equipment has reached its maximum load. There may be multiple regimes of energy response to temperature.

- For natural gas use in multi-family buildings, we expect high gas use at low ambient temperatures, with use decreasing as temperature warms. At some point, space heating is no longer required, and the only use for gas is for water heating, which is expected to have a milder relationship with ambient temperature. We therefore also expect multiple regimes for natural gas use, though they are likely fewer than for electric use.
- The piecewise linear and continuous temperature at time t, $T(t_i)$ (which occurs at time of week interval i) is broken down into a number of component temperatures, $T_{c,j}(t_i)$, with j = 1 to n_s (n_s being the number of line segments, usually no more than 10 to avoid overfitting). Each $T_{c,j}(t_i)$ is multiplied by β_j and then summed to determine the temperature dependent load.
- Boundary values of the temperature segments are defined by B_k (k = 1…n_s-1). And component temperatures are determined with the following algorithm (assuming n_s = 6):
    - If $T(t_i) > B_1$, then $T_{c,1}(t_i) = B_1$. Otherwise, $T_{c,1}(t_i) = T(t_i)$ and $T_{c,m}(t_i) = 0$ for m = 2 … 6 and algorithm is ended.
    - For n = 2 … 4, if $T(t_i) > B_n$, then $T_{c,n}(t_i) = B_n - B_{n-1}$. Otherwise, $T_{c,n}(t_i) = T(t_i) - B_{n-1}$ and $T_{c,m}(t_i) = 0$ for $m = (n + 1)$ … 6 and algorithm is ended.
    - If $T(t_i) > B_5$, then $T_{c,5}(t_i) = B_5 - B_4$ and $T_{c,6}(t_i) = T(t_i) - B_5$.
- The building is anticipated to have a different response to temperature in occupied periods versus unoccupied periods. The occupied load is estimated using the following equation:

$$\hat{E}_o(t_i, T(t_i)) = \alpha_i + \sum_{j=1}^{n} \beta_j T_{c,j}(t_i)$$

- Unoccupied loads are expected to have a single temperature parameter, since the building is expected to operate without sensitivity to temperature when systems are off during these periods. Unoccupied load is modeled with the following equation:

$$\hat{E}_u(t_i, T(t_i)) = \alpha_i + \beta_u T(t_i)$$

- The parameters α_i, for i = 1 to 168, β_j for j = 1 to n and β_u are estimated using the data from the baseline and post-installation periods with ordinary least squares.
- The total energy use estimated by the model is the sum of the occupied and unoccupied terms for each time interval.

$$\hat{E} = \sum_{i=1}^{n} (\hat{E}_o - \hat{E}_u)$$

- The model produces residuals that are autocorrelated and heteroscedastic, and the regression parameters α_i and β_j are correlated. This means that the standard errors associated with each regression parameter underestimates their level of uncertainty. However, uncertainty on the load predictions can be approximated with the standard error, which can be computed at each interval *i*.
- Two methods for implementing the TTOW model exist:
    1. This algorithm is available in Python programming language at the following link: https://pypi.python.org/pypi/loadshape/0.2.1. This includes an R program and a Python wrapper so that it can be called from within Python. The software allows the user to input streams of dates and time stamped energy use and ambient temperature data, manipulate parameters and develop linear regression models with time-of-week indicators and ambient temperature as independent variables. The software calculates the α_i and β_j parameters according to the user-specified analysis time interval (e.g. hourly or daily) and number of line segments for the piecewise continuous temperature dependence. The Python and R programming environments are free to the public.
    2. Under a California Energy Commission Public Energy Interest Research program grant, the TTOW model has been programmed as an analysis module in PG&E's Universal Translator version 3 software, available at no cost at the website www.utonline.org. The freely available software enables program administrators to prepare and develop M&V analysis, and allow technical reviewers to review the analysis for consistency, accuracy, and conformance with program and policy rules.

ATTACHMENT C

Advice No. 4965-A

Review Sheet Reference Matrix for SoCalGas' Central Water Heater Multifamily Building Solution Program

Attachment C

Review Sheet Reference Matrix for SoCalGas' Central Water Heater Multifamily Building Solution Program

Compliance Area	PA Proposal Requirements	Not applicable	Initial Review: Included? Y/N	Full Review: Accept/ Don't Accept	Resubmission: Accept/ Don't Accept	Referenced Section in SoCalGas Advice Letter 4965-A
Principles of HOPPs (p. 6)	1. Proposal will increase energy efficiency in existing buildings.					Described in the Attachment A, Section "A. HOPPs Principles and Program Rationale"
	2. Proposal references studies, pilots, EM&V etc. that support the idea that this project/program is a high opportunity.					Described in the Attachment A, Section "A. HOPPs Principles and Program Rationale"
	3. Proposal demonstrates how the program/project will focus on activities that are newly permissible under CPUC code 381.2 (b), by a) Program/project will reach stranded energy savings potential by utilizing the new approaches to value and measure savings.					Described in the Attachment A, Section "A. HOPPs Principles and Program Rationale"
	b) Focus on interventions that PAs could not previously do.					Described in the Attachment A, Section "A. HOPPs Principles and Program Rationale"
	c) If proposal is a modification to an existing program, then proposal should clearly identify the differences with the existing program and benefits of the proposal consistent with the HOPPs principals stated on p. 6.					Not Applicable; CMBS program is a new approach to the SCG Multifamily Sector
General Program Description (p.24)	1. Description of the intervention strategy employed, with reference to the type of known existing business model being employed (e.g. Standard Performance Contracting, ESCO models, retro-commissioning, experimental design, financing).					Described in the Attachment A, Section "B. General Program Description"

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	2. Provides specifics on the terms of the program structure.					Described in the Attachment A, Section "D. Program Structure"
	3. Explains how the project/proposal addresses past challenges that have arisen with the business model being employed?					Described in the Attachment A, Section "C. Intervention Strategy and Market Barriers Addressed"
Measure Treatment (p.25)	1. Measures and end uses that will be addressed-Describe what type of intervention activities will be applied to what measures. If implementers propose to use deemed savings values, then the DEER value applicable to the site's existing condition baseline treatment must be identified (or an alternative work paper offered per CalTF vetting process).					Described in Attachment B, Section "B. Measure Treatment"
Savings Calculation Methods (p.25)	1. For normalized metered energy consumption, detailed description of the savings calculation methods and provide access to models used for addressing normalized, metered and energy consumption, detailed in Attachment A.					Described in Attachment B, Section C., in the following sub-sections: (Section C does not list any sub-sections) • Savings Calculations General Methodology & Background
	2. For deemed savings projects that are providing incentive payments based on ex ante values, standard custom project savings calculation methods apply.					Not Applicable; Not a deemed program for natural gas.
Incentive Design (p. 25 & 26) & **Customer incentives (Attachment**	1. Basis and rationale for payment structure-Explain the payment structure, including the basis for setting the upfront payment (if any) and how the structure mitigates the risk that potential upfront payments do not overrun the value of the realized savings.					Described in the Attachment A, Section D., Sub-Section "4. Incentive Structure"

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A p. 11-12)	2. Measure costs and capital burden—Identify the estimated capital costs, the sources of capital funding the project, and what portions of costs are to be borne by ratepayer and by implementer.					Described in the Attachment A, Section D., Sub-Section "5. Funding Sources"
	3. Partial or incremental payments with true-up over time-Describe the terms and schedule of the incentive payments.					Described in the Attachment A, Section D., Sub-Section "3. Measures Incented" and Sub-Section "1. Program Sequence"
	4. Strategy for tracking persistence—Describe the long term tracking and reporting strategy for sustained savings with ongoing feedback.					Described in the Attachment A, Section E., Sub-Section "1. Program Objectives"
Normalized Metered Energy Consumption (Attachment A p. 1-4)	1. Programs and projects must document the method for normalization and list a) the variables included in the normalization process and		Y			Described in Attachment B, Section D and E, in the following sub-sections: • Independent Variables – Discusses the variables included in the normalization process (weather, production volume/occupancy) • Calculations & Regression Models – Within the Monthly Data and AMI Data sections
	b) Documentation of specific program actions that are intended to drive savings.					Described in the Attachment A, Section "C. Intervention Strategy and Market Barriers Addressed"
	2. Models, methods, and tools must use recognized engineering, economic, or statistical approaches to normalization.					Described in Attachment B, Section C and E, in the following sub-sections: • General Methodology & Background • Calculations & Regression Models – Monthly Data, AMI Data, Steps 3 & 4 • Appendix 1: Description of the LBNL Temperature and Time-of-Week Model
	3. Models, methods, and tools must be transparent, reviewable, and replicable by peer reviewers.					Described in Attachment B, Section C and E, in the following sub-sections: • General Methodology & Background • Calculations & Regression Models – Monthly Data, AMI Data, Steps 3 & 4

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						• Appendix 1: Description of the LBNL Temperature and Time-of-Week Model
	4. In addition to normalized savings as defined here, programs and projects shall also report absolute changes in consumption expressed with a common denominator.					Described in Attachment B, in Sub-Section "Absolute Changes Expressed with a Common Denominator"
	5. Models must include pre- and post-intervention data streams. Minimum 1 year post data for retrofits, and minimum 3 years for Behavior Retrofit or Operations.					Described in Attachment B, Section C, D, and E, in the following sub-sections: • General Methodology & Background • Required Energy Data • Data Quality • Calculations & Regression Models *Behavior, Operational, Retro-commissioning not applicable to this program.
	6. Models, methods, tools must be transparent, reviewable and repeatable.					Described in Attachment B, Section C and D in the following sub-sections: (Section C does not list any sub-sections) • General Methodology & Background • Calculations & Regression Models – Monthly Data, AMI Data, Steps 3 & 4 • Appendix 1: Description of the LBNL Temperature and Time-of-Week Model
	7. Meter does not necessarily equal whole building; proposals must make clear the link between meter and building.					Not Applicable; this is not a whole building approach instead CMBS is a targeted whole building water heating system multi-measure approach
	8. Proposals for programs or projects must document the market barriers they are designed to address and the interventions planned to achieve reductions in energy consumption.					Described in the Attachment A, Section "C. Intervention Strategy and Market Barriers Addressed" in footnotes.
	9. If proposal deviates from Attachment A, PA must provide clear rationale.					Not Applicable

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Type of Program or Project (Attachment A p. 5-6)	1. Description of the nature of the proposed program or project intervention with respect to whole building or single measures.					Described in the Attachment A, Section "B. General Program Description"
	2. Site level results will be discernable at building level for verification purposes.					Technical basis for discernibility described in Attachment B, in the following sections: • Section E, Calculations, Regression Models and Description Normalization – Monthly Data, AMI Data, Step 4 • Section F, Threshold for Expected Savings
Threshold for Expected Savings (Attachment A p. 6-7)	1. Description of the expected saving from the proposed program or project intervention.					Described in the following: • Attachment A Section F, Threshold for Expected Savings
	2. Literature or field performance data demonstrating the expected impact and expected certainty of estimates.					Described in Attachment B, in the following sections: • Section E, Calculations & Regression Models – Monthly Data, AMI Data • Section F, Threshold of Expected Savings • Appendix 1: Description of the LBNL Temperature and Time-of-Week Model
Baseline Adjustments (Attachment A p. 8-9, and under "Normalized" , p. 2)	1. Documentation of the baseline assumptions and strategy for collecting necessary information.					Described in Attachment B, in the following sections: • Section D, Data Collection Strategy • Section E, Calculations, Regression Models and Description Normalization - Monthly Data, AMI Data, • Section G, Baseline Adjustments, 1. Baseline Assumptions
	2. Description of how normalization methods capture (or not) baseline assumptions.					Described in Attachment B, Section E, in the following sub-sections: (Section C does not list any sub-sections) • Calculations & Regression Models – Monthly Data, AMI Data, Steps 3 & 4
	3. Description of the methods that will be used to adjust the baseline for non-routine adjustments, when applicable for the type of proposal.					Described in Attachment B, Section E, "Non-Routine Adjustments" sub-section
Application to Behavioral,	1. Program/project proposals shall: Include requirement that participant sign up for a					Not Applicable

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Operational, Retro-commissioning (B.R.Os) (Attachment A p. 9-10)	maintenance plan for at least three years.					
	2. Program/project proposal shall: Include requirement that participants commit to install a minimum set of measures according to PA pre-defined criteria.					Not Applicable
	3. PA is encouraged to include a training component to program/project offerings.					Not Applicable
	4. Performance post-intervention: a) Must ensure persistence of savings that ensures multiyear savings for measures that are based in changes in behavior or operational practices.					Not Applicable
	b) During the claimable expected useful life (EUL) period of one year, continuous feedback should be in place.					Not Applicable
	c) PAs shall consider incentive structures that encourage long term savings					Not Applicable
	d) Incentives shall only be paid once participant commits to a maintenance plan for a minimum of three years (evidence should be made available to Commission staff upon request).					Not Applicable
Financing (Attachment A p. 12)	1. Description of any use of financing programs or external financing to support the program or proposed project.					Not Applicable
Additional Comments from Review						Regulatory Lead: Elizabeth Baires EBaires@semprautilities.com Policy Lead: Lujuanna Medina

Compliance Area	PA Proposal Requirements	Not applicable	Initial Review: Included? Y/N	Full Review: Accept/ Don't Accept	Resubmission: Accept/ Don't Accept	Referenced Section in SoCalGas Advice Letter 4965-A
Team						LMedina@semprautilities.com EM&V Lead: Loan Nguyen LNguyen@semprautilities.com